

**LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE
UNIVERSITY OF LONDON**

**ENTREPRENEURSHIP AND THE FORMATION OF A BUSINESS ENVIRONMENT
IN NINETEENTH-CENTURY BRAZIL: THE CASE OF MINAS GERAIS**

by

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THESIS SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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ABSTRACT

This thesis is divided into four parts. The first examines the social background of mineiro entrepreneurs and the source of their capital. The second assesses the structural development of mineiro firms. The third investigates the process of technology transfer in nineteenth-century Minas Gerais, the dependence of various firms on foreign technical knowledge, and the limits to the development of indigenous technology. The fourth examines capital-labour relations and the formation of the labour market in Minas Gerais. The objective of the research is to consider - and extend - the debate in the literature about patterns of development in backward economies. According to the "historical determinist" approach, the history of advanced countries traces out the road of development for less developed economies. Opposing this view, the "economic backwardness" approach points out that the development of backward countries differs considerably from the advanced countries in terms of the speed of development and the productive and organizational structures of their economies. This thesis uses the concept of "economic backwardness" to investigate the formation of a "spirit of capitalism" in Minas Gerais and how far the Brazilian economy was able to close the development gap with the more advanced economies. This thesis also contributes to the study of Brazilian economic history by looking specifically at the process of development of the state/province of Minas Gerais. The economic historiography of Brazil on the nineteenth century is heavily based on evidence drawn from São Paulo and Rio de Janeiro and overlooks important socio-economic differences between the various sub-regions.

As this thesis demonstrates, the rate and character of the development of Minas Gerais were to a large extent determined by its degree of backwardness, intellectual climate and natural potentialities, and accordingly the course of development of the mineiro economy differed considerably from process observed in more advanced countries. In addition, comparison between Minas Gerais, São Paulo, and Rio de Janeiro shows important differences among these three economies, mainly in sources of entrepreneurship and labour.

To my wife and daughters:

Ziz, Gabriela and Juliana

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ABBREVIATIONS

ATT	American Telephone and Telegraph Company
CCC	Companhia Cedro e Cachoeira
CCM	Companhia Cachoeira de Macacos
CIM	Companhia Industrial Mineira
CME	Companhia Mineira de Eletricidade
CTS	Companhia de Tecidos Santanense
CUI	Companhia União e Indústria
FTR	Fábrica de Tecidos do Rink
SPR	San Paulo Railway
WEC	Westinghouse Electric Company
CFTC	Companhia de Fiação e Tecidos Corcovado
CNFE	Companhia Nacional de Forjas e Estaleiros
CPIB	Companhia Progresso Industrial do Brasil
EFCB	Estrada de Ferro Central do Brasil
FFTC	Fábrica de Fiação e Tecelagem Carioca
FTPG	Fábrica de Tecidos Pau Grande
FTSC	Fábrica de Tecidos de São Christóvão
FTSJ	Fábrica de Tecidos São João
FTSL	Fábrica de Tecidos São Lázaro
SAIM	Sociedade Anônima Industrial Machadense
CFLCL	Companhia Força e Luz Cataguazes-Leopoldina
CFTCI	Companhia de Fiação e Tecidos Confiança Industrial
CFTSF	Companhia de Fiação e Tecidos São Félix
FFTTA	Fábrica de Fiação, Tecidos e Tinturaria Alliança
FFTTB	Fábrica de Fiação, Tecidos e Tinturaria Bomfim
EFDPII	Estrada de Ferro Dom Pedro II
RJTLPC	Rio de Janeiro Tramway, Light and Power Company Ltd.
SJDRMC	St. John del Rey Mining Company
SPTLPC	São Paulo Tramway, Light and Power Company

INTRODUCTION

The nineteenth century witnessed the consolidation of industrial capitalism and the widening of the development gap between the first industrial countries and latecomer economies such as Brazil. However, the question of underdevelopment was overlooked by many contemporary economists, who assumed that the historical experience of countries such as England would repeat itself elsewhere. It was only more recently that the problem of the development of latecomer economies began to be studied as a problem in its own right. Economic development in backward countries was not only an unique and specific process, but also did not necessarily followed the same path taken by the more advanced economies. In other words, differences were observed in the pace and substance of development in latecomer economies in contrast to the first industrial countries and it was recognised that these were due to the distinct nature of the historical process of development of backward countries. Hence, it is important to ask to what extent the process of economic development of nineteenth-century Minas Gerais repeated the historical experience of the more advanced economies and in which respects was the mineiro experience peculiar and unique?

Furthermore, for much of the nineteenth century the Brazilian economy has been generally regarded as a coffee export economy. Indeed, the coffee sector was by far the most dynamic in Brazil during this period and has commanded the attention of many economic historians. Coffee was not only the main Brazilian cash crop, but coffee capital also financed to a large extent the early process of industrialization, the construction of the infrastructure, and many other businesses such as banking and trade. Consequently, the major coffee-growing areas of the country, Rio de Janeiro and São Paulo, have tended to be the subject of most studies dealing with the economic development in Brazil. This has led to a tendency to over-generalize from the experiences of the coffee sector, a process which neglects (or minimizes) important socio-economic differences amongst regional economies in southern and central Brazil during the nineteenth century. Minas Gerais, for example, had a much more varied economy than Rio de Janeiro and São Paulo with areas dedicated to mining, ranching, manufacturing, the production of foodstuffs for internal consumption, as well as the production of coffee for export in the mid-nineteenth century. Thus, some questions pose themselves: how distinct was the business environment in Minas Gerais from that of São Paulo and Rio de Janeiro? How far can generalizations based on the experiences of the two principal coffee provinces/states be applied to the case of Minas Gerais? Very little attention has been given to these questions and very little has been written on the business environment in Brazil to date. In providing answers to these questions this research will make a contribution to a better understanding of the overall historical process of development in Brazil.

The purpose of this dissertation is to make a contribution to the study of the process of economic development and business formation in latecomer economies by studying the formation of a business environment in nineteenth-century Minas Gerais. The focus of the work is on non-agricultural enterprises. Business environment is defined as the conditions or circumstances in which people make production and commercial decisions about their businesses. Thus, it is possible to say that different periods of human history witnessed different business environments, such as the feudalist, mercantilist, or capitalist. Yet,

within these specific modes it is possible to identify different business environments for each stage of development, for example, competitive capitalism of the beginning of the nineteenth century and mature or monopolist capitalism at the end of the century. Finally, regarding place, different business environments can be distinguished from region to region or from country to country.

As Gerschenkron has pointed out, many nineteenth-century classical economists had faith in a perfectly comprehensible past whose flow was determined by simple and general historical laws. John Stuart Mill, for example, has spoken of the slavery of antecedent circumstances¹ and Karl Marx predicted that:

"The country that is more developed industrially only shows, to the less developed, the image of its own future"².

This "historical determinist" approach has dominated the debate about the process of development of backward countries. Even more recently authors such as Rostow have tried to identify:

"the particular factors of reality which appear to run through the story of the modern world since about 1700"³

Moreover, Rostow has described - and attempted to homogenize - the historical development of countries as distinct as late eighteenth-century Britain and Nasser's Egypt, locating these countries within the same five-stage pattern of economic growth⁴.

Studying latecomer countries in Europe, Gerschenkron observed considerable differences in the nature of their processes of economic development and rejected the "historical determinist" approach. According to the Gerschenkron, industrial development in backward countries differed not only with regard to the rate of growth but also with regard to the productive and organizational structures. Differences in the speed and nature of development were the result of the application of institutional instruments - by banks or the state - which had no counterpart in the more developed economies. Furthermore, the intellectual climate within which development proceeded was quite distinct among advanced and backward economies. Finally, the character of economic development was also dependent on the degree of backwardness and the natural potentialities of each country⁵.

Applying a similar set of ideas to the analysis of the process of development and economic dependence of Latin America, Cardoso and Faletto also reject the "historical determinist" approach. According to these authors, the interpretations inspired by this approach has always assumed that the

¹ A. Gerschenkron, Economic Backwardness in Historical Perspective: A Book of Essays, (1962), p.5.

² K. Marx, Capital, (1976), I, p.91.

³ W.W. Rostow, The Stages of Economic Growth: A Non-communist Manifesto, (New York, 3rd ed. 1990), pp.1-2.

⁴ See *Ibid.*, chapter 2.

⁵ Gerschenkron, op.cit., p.7.

relations of the political, social and economic systems in the USA and Western Europe anticipate the future of the underdeveloped societies. Yet these interpretations also maintain that underdeveloped countries are late in the development of some aspects of their structure though not in others⁶. However, as Cardoso and Faletto point out, the differences between developed and underdeveloped economies were not only with regard to the nature of the productive system, but more importantly with regard to the position of the latter within the international economic structure of production and distribution. From the beginning, the process of capitalist development determined one type of relationship between the central economies themselves and another with peripheral economies. Thus, different stages of capitalist development assigned a different role to the periphery in the international economic system of production. The process of industrial expansion in England, for example, required from the peripheral economies a certain degree of dynamism and development to supply raw materials and to consume manufactured goods. Furthermore, to understand the process of development in Latin America in all its complexity the pure economic analysis proved to be too narrow. It is necessary to take into account the relationship between the economic, social and political dimensions of the process. In other words, it has to take into account the broader environment within which economic phenomena take place. As the authors pointed out, in Latin America development in a context of dependency has produced a dynamic and differentiated process⁷.

Over the years there has been several attempts to explain Brazil's relative historic backwardness, giving birth to an economic historiography which is, however, largely based on the experience of São Paulo and Rio de Janeiro. In the nineteenth and early twentieth centuries, climate, culture, laws, race and religion were blamed for Brazil's underdevelopment⁸. Only after the Second World War has Brazilian economic history been studied in a more serious and systematic manner⁹. The structuralist theory, which took shape under the auspices of the Economic Commission for Latin America (ECLA) just after the Second World War, was mainly concerned to explain and remedy Latin America's perceived slow industrial growth. Focusing on internal bottlenecks and structural crisis in the world economy, cepalistas stressed the historic limits of export-led growth and observed that the gains from economic specialization and participation in a relatively open world trade system were not as predicted by conventional liberal theory. Differing income elasticities of demand for primary and secondary products, the cumulative consequences of cyclical instability in the international system, and imperfect factor markets in the industrialized economies resulted in the concentration of productivity gains in the so-called central, industrialized economies, and in the

⁶ F.H. Cardoso and E. Faletto, Dependência e Desenvolvimento na América Latina: Ensaio de Interpretação Sociológica, (Rio de Janeiro, 6th ed. 1981), p.19. See also the English version Dependency and Development in Latin America, (1979).

⁷ *Ibid.*, pp.9-34.

⁸ S. Topik, "Recent Studies on the Economic History of Brazil", in Latin American Research Review, XXIII (1988) No.1, p.176.

⁹ *Ibid.*, p.176.

deterioration of terms of trade for peripheral, primary producing economies¹⁰. The solutions envisaged by cepalistas were various: (1) import-substituting industrial expansion and export diversification, to be accomplished with government assistance; (2) agrarian reform; and (3) regional integration¹¹. The main contribution of the cepalista approach to the Brazilian business historiography is the general assumption underpinning much of its work that there was a fund of entrepreneurs waiting the right circumstance to seize economic initiatives¹².

For Furtado, one of the main exponents of the cepalista approach in the Brazilian economic historiography¹³, up to the twentieth century Brazil's growth was based upon a succession of export staples. Until the emergence of coffee as the main cash crop in the second half of the nineteenth century, subsistence predominated and the Brazilian economy remained as an archipelago of loosely linked export enclaves. The earlier mono-product booms had fostered anti-progressive, seigniorial attitudes amongst the local oligarchies, which led to the consolidation of a conservative, patrimonial state. Only with coffee production in the province of São Paulo after the 1860s, a new social and economic configuration emerged creating a more propitious environment for business development and economic diversification. There is now an extensive literature devoted to coffee and development, but much of it is mainly based on the experiences of São Paulo and Rio de Janeiro¹⁴.

During the 1960s, the shortcomings of the cepalista development model and school of historical analysis provoked radical criticism. The distorted nature of Latin American industrialization, particularly the failure to promote an autonomous industrial development, the dominant position of foreign-owned

¹⁰ C.M. Lewis, "Historia Económica y Historia Empresarial: Tendencias recientes en la Literatura Brasileña, c.1850-1945", (Mimeo., paper presented at XXVII Asamblea CLADEA, La Gerencia en la América Latina: Experiencias Comparativas, Universidad de los Andes, Bogotá, Octubre 21 a 24 de 1992), pp.2-3.

¹¹ C. Abel and C.M Lewis, "General Introduction", in Latin America: Economic Imperialism and the State, ed. C. Abel and C.M Lewis, (1991), p.4.

¹² Lewis, Historia Económica y Historia Empresarial, p.3.

¹³ For the Cepalista approach as applied to Brazil, see C. Furtado, Formação Econômica do Brasil, (São Paulo, 16th ed. 1979) and M.C. Tavares, Da Substituição de Importações ao Capitalismo Financeiro: Ensaio sobre Economia Brasileira, (Rio de Janeiro, 11th ed. 1983).

¹⁴ See among others T.H. Holloway, The Brazilian Coffee Valorization of 1906: Regional Politics and Economic Dependence, (Madison, 1975); E.A. Cardoso, "Desvalorizações Cambiais, Indústria e Café: Brasil, 1862-1906", Revista Brasileira de Economia, XXXV, (1981), No.2, 85-106; A. Delfim Netto, O Problema do Café no Brasil, (São Paulo, 1959); J.H. Lima, Café e Indústria em Minas Gerais, 1870-1920, (Petropolis, 1981); S.J. Stein, Vassouras: A Brazilian Coffee County, 1850-1900, (Cambridge, Mass. 1957); W. Dean, Rio Claro: A Brazilian Plantation System, 1820-1920, (Stanford, 1976); O. Nogueira de Matos, Café e Ferrovias: A Evolução Ferroviária de São Paulo e o Desenvolvimento da Cultura Cafeeira, (São Paulo, 1974); R.H. Mattoon, "Railroads, Coffee and the Growth of Big Business in São Paulo, Brazil", HAHR, LVII, (1977), No.2, 273-92; W. Cano, Raízes da Concentração Industrial em São Paulo, (São Paulo, 3rd. ed. 1990); F.A.M. Saes, A Grande Empresa de Serviços Públicos na Economia Cafeeira, (São Paulo, 1986); J.E. Sweigart, Coffee factorage and the Emergence of a Brazilian Capital Market, 1850-1888, (1987); and S. Silva, Expansão Cafeeira e Origens da Indústria no Brasil, (São Paulo, 1976).

transnational corporations, and continuing social inequity, became the main focus of the dependency debate¹⁵. This scholarship portrayed dependence as in part a function of internal and institutional structures which frustrated or distorted development in Latin America. The "dependency" approach is also critical of the economicism of early cepalista analysis and its failure to address political issues and stress effectively the need for social reforms. Cepalistas had naively assumed that economic development would solve social inequities and sectoral imbalances. For some participants in the dependency debate, Latin America's economic and social problems were the result of a legacy of backwardness and a growing imbalance, dating from the colonial period, in the region's relations with the metropolitan economies. For others, the focus upon the efficacy or appropriateness of contemporary policy is not superfluous, but it lacks centrality¹⁶.

The modern debate about dependency emerged mainly with the works of Frank and Cardoso and Faletto which devoted substantial attention to Brazil¹⁷. Frank, who drew upon Marxian analysis to explain underdevelopment in Latin America, argued that development in Brazil had been hindered by an early (external) form of capitalist penetration which had maintained pre-modern, anti-developmental social structures. These conservative forces inhibited local capital accumulation, restricted the growth of the internal market, and prevented the Brazilian bourgeoisie and proletariat from fulfilling their historical role. Cardoso and Faletto, as mentioned above, combined an analysis of the internal and external dimensions of the problem offering a more dynamic and differentiated account of Latin American development. For them, the main question was how to build a national capitalism within an environment dominated by international capital. Cardoso and Faletto stressed the ability of the nineteenth-century paulista elite to control economic resources and the willingness of planters to divert coffee profits into other sectors, mainly infrastructure and manufacturing. If this process was partly explained by the nature of coffee production and the position of Brazil in the international economy, the result was the replacement of a narrow concentration upon agricultural enterprise, said to be characteristic of oligarchies elsewhere in Brazil, by a more pragmatic approach to investment and the inculcation of an ethos of profit maximization.

During the 1980s, a number of works dealing with the pre-Second World War period, and enriched by the mutual antagonism of much dependency and structuralist scholarship, constituted what may be properly described as the "Campinas School". Despite its large impact on the Brazilian economic

¹⁵ The main exponents of the "dependency" approach as applied to Brazil are A.G. Frank, Capitalism and Underdevelopment in Latin America: Historical studies of Chile and Brazil, (New York, 1967); and Cardoso and Faletto, op.cit.. Among the main authors contributing to marxist and nationalist strands of the dependency debate are H. Jaguaribe, Desenvolvimento Econômico e Desenvolvimento Político, (Rio de Janeiro, 1962); F. Oliveira, A Economia Brasileira: Crítica à Razão dualista, (Petropolis, 1988) and A Economia da Dependência Imperfeita, (Rio de Janeiro, 1980); T. Santos, Dependencia y Cambio Social, (Mexico, 1970); O. Ianni, Industrialização e Desenvolvimento Social no Brasil, (Rio de Janeiro, 1963); N.W. Sodr , Hist ria da Burguesia Brasileira, (Rio de Janeiro, 1964); and P. Evans, Dependent Development: the Alliance of Multinational, State and Local Capital in Brazil, (Princeton, 1979).

¹⁶ For a more detailed account of the origin and evolution of the dependency debate and the nature of the links between cepalista and dependency, see Abel and Lewis, op.cit., pp.10-20.

¹⁷ Frank, op.cit.; Cardoso and Faletto, op.cit..

historiography, much of this literature is narrowly concerned with industrialization, but devotes a great deal of attention to policy issues, if largely based on the experience of São Paulo. Its main exponents are Suzigan, Cardoso de Mello and Cano. Suzigan investigates Brazilian industrial development in the pre-Second World War period in order to determine the nature and extent of the process. Through the construction of a proxy for industrial investment from capital goods imports, he concludes that investment in industry up to 1913, and to a lesser extent up to 1929, was directly related to the performance of exports. The industries developed during this period were complementary and dependent of the export sector (mainly coffee). Moreover, during this period economic policy was basically concerned with the performance of the export sector. It was only after 1930 that industrial growth was more directly linked to the internal market and favoured by a policy of import substitution¹⁸. Cardoso de Mello develops Gerschenkron's ideas about institutional substitutability in late industrializing economies and opportunities or constraints deriving from the international setting¹⁹. Cano investigates the roots of industrial concentration in São Paulo. According to Cano, this process goes back to the last two decades of the nineteenth-century when the formation of what he calls the paulista coffee economic complex began. This complex was well established by the 1930s, when the paulista economy consolidated its predominant position within the Brazilian economy²⁰.

Many of the debates in the Brazilian economic historiography reviewed above have shaped and stimulated the study of business history in Brazil. Among the several themes that can be identified in the Brazilian historiography for the nineteenth and early twentieth centuries period, none have had a larger impact upon business history than controversies about entrepreneurship. The modern origin of the controversy dates from Dean's study of paulista industrial expansion²¹. Dean's work contained the assertion that in pre-Second World War Brazil the industrial entrepreneurialism was of foreign origin. According to him, industrialists were drawn exclusively from the ranks of overseas merchants. This view has been successfully challenged by exponents of the cepalista and the Campinas school and among the best examples are the works of Cano and Mello on São Paulo, and Giroletti, Lima, Arantes, and Vaz on Minas Gerais²². New works on Minas Gerais extend the challenge to Dean by cautioning against over-generalization from the case of São Paulo. Following Campinas scholars, these authors have acknowledged the importance of immigrants for mineiro industrial growth, but at the same time stressed the significance of native entrepreneurship. In

¹⁸ W. Suzigan, Indústria Brasileira: Origem e desenvolvimento, (São Paulo, 1986).

¹⁹ J.M. Cardoso de Mello, O Capitalismo Tardio: Contribuição à Revisão Crítica da Formação e Desenvolvimento da Economia Brasileira, (São Paulo, 1982).

²⁰ Cano op.cit..

²¹ W. Dean, A industrialização de São Paulo, (São Paulo, 1971).

²² Cano, op.cit.; Z.M.C. Mello, Metamorfoses da Riqueza: São Paulo, 1845-1895, (São Paulo, 1985); D.A. Giroletti, A Industrialização de Juiz de Fora: 1850-1930, (Juiz de Fora, 1988); A.M. Vaz, Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987, (Belo Horizonte, 1990); Lima, op.cit.; L.A.V. Arantes, "As Origens da Burguesia Industrial em Juiz de Fora, 1858/1912", Universidade Federal Fluminense, Unpublished M.Sc. thesis, Niterói, 1991.

emphasising the autonomous nature of early industrial growth in up-country regions, they point to a process that was less export-driven than the paulista. Until the turn of the century, manufacturing in Minas Gerais was largely divorced from the foreign trade sector which played such an important role in São Paulo and Rio de Janeiro. Larger accounts of government macroeconomic policy also contain a great deal of information about the general environment within which business operated and about connexions between business and the state²³. Many sectoral and regional studies have also contributed to Brazilian business history. On agriculture, Dean's earlier work about paulista planters, the pioneering micro studies on the mechanics of plantation enterprises on coffee counties in Rio de Janeiro and São Paulo by Stein and Dean respectively, Eisenberg's account of the paulista coffee lobby in the late 1870s, and Szmrecsanyi's informative work on sugar production and processing in São Paulo, are important contributions²⁴. There are also a number of works on railways providing information about inter-corporate rivalries and strategic planning of individual firms, profitability at firm level, technology transfer, management and shareholding, and conflict amongst state, local private and foreign owned companies²⁵. Finally, there is an extensive bibliography on manufacturing, ranging from Stein's study on the cotton textile industry²⁶ to the more regional and sub-sectoral recent works²⁷. These works have pointed to many of the issues to be pursued by

²³ Reference points for this discussion are the works of Evans, op.cit.; Topik, op.cit.; and A. Villanova Villela and W. Suzigan, Política do Governo e Crescimento da Economia Brasileira, 1889-1945, (Rio de Janeiro, 1973).

²⁴ Stein, Vassouras; Dean, Rio Claro; W. Dean, "The Planter as Entrepreneur: The Case of São Paulo", HAHR, XXXVI, (1966), No.2, pp.138-52; P.L. Eisenberg, A Mentalidade dos Fazendeiros no Congresso agrícola de 1878, (São Paulo, 1990); T. Szmrecsanyi, "Agrarian Bourgeoisie, Regional Government and the Origins of São Paulo's Modern Sugar Industry", paper presented at the Symposium on Elites and Economic Management in Latin America, XIX and XXth Centuries, 47th International Congress of Americanists, Tulane 1990.

²⁵ See Nogueira de Matos, op.cit.; F.A.M. Saes, As Ferrovias de São Paulo, 1870-1940, (São Paulo, 1981) and A Grande Empresa de Serviços Públicos; C.M. Lewis, Public Policy and Private Initiative: Railway Building in São Paulo, 1860-1889, (1991); A.C. El-Kareh, Filha Branca de Mãe Preta: A Companhia de Estrada de Ferro D. Pedro II, 1855-1865, (Petrópolis, 1982); and R.H. Mattoon, op.cit.. Similar issues are raised by Giroletti on his work about the União e Indústria turnpike, D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980.

²⁶ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1979).

²⁷ J.A. Paula, "Dois Ensaios sobre a Gênese da Industrialização em Minas Gerais: a Siderurgia e a Indústria Têxtil", in Anais do II Seminário sobre a Economia Mineira, Belo Horizonte, 1983, pp.19-73; Silva, op.cit.; Cano, op.cit.; D.A. Giroletti, Industrialização de Juiz de Fora, 1850-1930, (Juiz de Fora, 1988); and C. Castro, As Empresas Estrangeiras no Brasil, 1860-1913, (Rio de Janeiro, 1979). These works are attempts to emulate Dean's thesis on São Paulo and project a larger regional analysis of industry. A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, Unpublished M.Sc. thesis, Niterói, 1985; Vaz, op.cit.; R.B. Martins, "A Indústria Têxtil Doméstica de Minas Gerais no Século XIX", in Anais do II Seminário sobre a Economia Brasileira, Belo Horizonte, 1983, pp.77-94; E.V.D. Weid and A.M.R. Bastos, O Fio da Meada: Estratégia de Expansão de uma Indústria Têxtil, Companhia América Fabril - 1878/1930, (Rio de Janeiro, 1986); E.V.D. Weid and A.M.R. Bastos, O Fio da Meada: Estratégia de Expansão de uma Indústria Têxtil - 1878/1930, (Rio de

business historians and set the agenda for the recent development of the Brazilian business historiography.

As Lewis argues, there is now a growing body of clearly recognizable business history, but to date few works are firmly anchored to what may be considered core theoretical business history analysis²⁸. In addition to texts on entrepreneurial formation mentioned above, there are a limited number of biographies²⁹, memoirs³⁰, and works which specifically address questions of entrepreneurial status (social and political), training and competence³¹. The already mentioned works by Mattoon, Mello and Vaz represent important studies of risk-taking portfolio diversification and corporate investment. Together they extend the discussion initiated by Dean and taken up by the Campinas school and other scholars studying distinct Brazilian regions.

Labour is another subject of over-riding importance and issues such as supply, training and discipline have been the subject of the attention of, among others, Eisenberg and Lamounier on São Paulo, and Libby and Giroletti on Minas Gerais³². A related important field of research is the problem of access

Janeiro, 1986); and L.C. Soares, A Manufatura na Formação Econômica e Social Escravista no Sudeste: Um Estudo das Atividades Manufatureiras na Região Fluminense, 1840-1880, (Niterói, 1980). These works are solidly researched accounts on the textile industry in a number of provinces/states.

²⁸ Lewis, "Historia Económica y Historia Empresarial", pp.13-4.

²⁹ See the works of Faria on Mauá, Martins on Conde Matarazzo, and Mascarenhas on Bernardo Mascarenhas. A. Faria, Mauá, (Rio de Janeiro, 1926); J. Souza Martins, Empresário e Empresa na Biografia do Conde Matarazzo, (Rio de Janeiro, 1967); and N.L. Mascarenhas, Bernardo Mascarenhas: o Surto Industrial de Minas Gerais, (Rio de Janeiro, 1954).

³⁰ See W.L. von Eschwege, Pluto Brasiliensis, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979).

³¹ F.H. Cardoso, Empresário Industrial e desenvolvimento Econômico, (São Paulo, 1964); F.C. Prestes Motta, Empresários e Hegemonia Política, (São Paulo, 1979); E. Diniz, Empresário, Estado e Capitalismo no Brasil, 1930-45, (São Paulo, 1978); D.A. Giroletti, "A Formação do Empresário Industrial", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1991; Souza Martins, *op.cit.*; V.C. Piccini, "Deve-se Formar Empresários?", in Anais da IX Reunião da ANPAD, (Florianópolis, 1985); F.H. Cardoso, Ideologias de la Burguesia Industrial en Sociedades Dependientes (Argentina y Brasil), (Mexico, 1971). One of the few historians to inject elements of modern "business science" into the study of businessmen is L.C. Bresser Pereira, Empresários e Administradores no Brasil, (São Paulo, 1974); more diffuse is the compilation História Empresarial Vivida, ed. Cleber Aquino (São Paulo, 1987).

³² The works of Eisenberg on São Paulo and Libby on Minas Gerais capture the concerns of modernizing employers with the problem of supply and quality of the labour force. Lamounier's work examines the supply of immigrant labour for the coffee plantations of São Paulo, while Giroletti's and Libby's studies on Minas Gerais provide an example of how industrialists conceived and resolved the problem of training and the inculcation of work discipline in the native non-slave labour force. See Eisenberg, *op.cit.*; D.C. Libby, Trabalho Escravo e Capital Estrangeiro no Brasil: O Caso de Morro Velho, (Belo Horizonte, 1984) and Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988); M.L. Lamounier, "Between Slavery and Free labour: Experiments with Free Labour and Patterns of Slave Emancipation in Brazil and Cuba c.1830-1888", University of London, Unpublished Ph.D. thesis, 1993; D.A. Giroletti, Fábrica Convento Disciplina, (Belo Horizonte, 1991).

to skilled personnel and equipment faced by pioneer firms³³. Finally, business environment has been the subject of few works. Arguably, the work of Ridings is one of the very few which approach this issue directly³⁴.

These and many other issues in the Brazilian business history still requires much more research and attention. In this respect, this thesis represents an important contribution to the Brazilian literature since it addresses many of the issues listed above. As already mentioned, this work extends existing bibliography on business environment in nineteenth-century Brazil. More specifically, it examines and elaborates the debate about entrepreneurial formation, corporate investment, marketing strategies, firm structural organization, production, technology transfer, and capital-labour relations in nineteenth-century Minas Gerais.

The thesis is divided into an introductory chapter and four sections. The introductory chapter reviews Brazilian and mineiro economic history in the nineteenth century. It provides a general background for the thesis. Section I examines the social background of mineiro entrepreneurs and the source of their capital. Chapter 2 analyses the evolution of the concept of the entrepreneur, the nature of entrepreneurship in different economic environments, and the debate about the emergence of the entrepreneur in the Brazilian economic historiography. With foreigners constituting a smaller proportion of its population compared with that of São Paulo and Rio de Janeiro, and coffee very much confined to the southern regions of Minas Gerais, chapter 3 investigates the social and ethnic background of mineiro entrepreneurs and the origin of their capital.

Section II assesses the degree of structural development of mineiro firms in the nineteenth century and relates it to the prevailing business environment. Chapter 4 reviews the literature on organization theory with an emphasis on the study of different forms of "corporate" structures, their origins and implications for the business environment. Chapter 5 examines the scale and scope of activities and the administrative structure of several mineiro firms in order to assess their degree of organizational maturity.

Section III investigates the process of technology transfer to Minas Gerais, the reliance on foreign technical knowledge, and restrictions on the development of native technology. Chapter 6 reviews the literature on technological progress. It investigates the nature of technical change and the importance of technological progress for the process of economic development of less developed countries such as Brazil. As production of new technologies during the nineteenth century was limited to a small number of more advanced countries, less developed regions such as Brazil relied heavily on imported technology to promote

³³ For the nineteenth century, the works of Vaz on the mineiro textile industry, Giroletti on turnpikes and Mattoon on paulista railways provide a good idea of the extent of these problems, whereas Eakin demonstrates that the diffusionist function of highly successful individual enterprises could be limited. See Vaz, op.cit.; Mattoon, op.cit.; Giroletti, "A Companhia e a Rodovia União e Indústria"; and M.C. Eakin, The St. John d'El Rey Mining Company and the Morro Velho Gold Mine, (Durham, 1989).

³⁴ E.W. Ridings, "Business Associationalism, the Legitimation of Enterprise, and the Emergence of a Business Elite in Nineteenth-Century Brazil", in Business History Review, 63, (Winter 1989), pp.757-96.

economic development. Therefore, chapter 7 examines the process of technology transfer in nineteenth-century Minas Gerais. It discusses the dependence of various firms on imported technical knowledge and the limits to the development of an indigenous technology during this period. It also discusses how mineiro entrepreneurs managed to absorb and modify these technologies.

Section IV examines capital-labour relations and the formation of a labour market in Minas Gerais. The provision of labour was considered one of the most acute problems faced by Brazilian businessmen during the last century and its solution was one of the priorities of both businessmen and politicians. Slavery was the main source of labour for most of the period and its legacy poisoned the relationship between non-slave workers and employers. Therefore, non-slave Brazilians were reluctant to replace slave hands because they feared to be treated like slaves. Moreover, employers saw non-slave Brazilians workers as unreliable. Only São Paulo was successful in attracting a large number of foreigners and other parts of Brazil had to rely basically on non-slave "national" labour. Thus, chapter 8 examines the main forces in the shaping of the Brazilian labour market and the formation of the working class, while chapter 9 examines the main sources of labour in Minas Gerais.

The material used in this thesis is derived from a variety of manuscript and printed sources. For the analysis of the origins of entrepreneurs, largely printed sources were used, namely books, almanacks, contemporary newspapers, genealogical studies, family histories and biographies and other publications dealing with the history of specific cities. The Biblioteca Nacional (Rio de Janeiro) also contains valuable data on individual entrepreneurs. Other sections of the thesis are based primarily on the rich documentation produced mainly by the companies. Annual company reports, annual accounts, statutes, correspondence, proceedings of shareholders' meetings and so forth, provide data on the commercial and productive activities of firms, on their administrative structure, and on their labour force. For the iron industry, information was gathered mainly from the memoirs of W.L. von Eschwege and the works produced by the Escola de Minas de Ouro Preto during the nineteenth century. Much of this material is located in private libraries and at the Arquivo Público Mineiro (Belo Horizonte). The collection of documents of the Arquivo Público Mineiro also provided useful information about textile companies in Minas Gerais, as did the archives of the Companhia de Tecidos Santanense, Companhia Cachoeira dos Macacos, and Companhia Cedro e Cachoeira. The archive of the latter company, Museu Décio M. Mascarenhas (Caetanópolis), has an impressive amount of material including thousands of letters. Material about the Sociedade Anônima Industrial Machadense was gathered at the archive of the Fundação 18 de Março (Machado) and at the Arquivo Público Machadense (Machado). Most of the material about the Companhia União e Indústria was found at the Instituto Histórico e Geográfico Brasileiro (Rio de Janeiro) and at the Museu Mariano Procópio Ferreira Lage (Juiz de Fora). Contemporary newspapers were found in the archives of the Companhia Força e Luz Cataguazes-Leopoldina (Cataguazes) and Universidade Federal de Juiz de Fora, which also contained material about the Companhia Mineira de Eletricidade. Finally, the archives of the British Library (London) and of the British Library of Political & Economic Science (London) were important sources of official publications used in several parts

of the thesis.

Much of the material used in this thesis is scattered in several different locations throughout the state of Minas Gerais and the city of Rio de Janeiro. Most of the archives are poorly organized and access is not easy. The material is of good quality although there are gaps for large periods of time. There are very few sources of material about the private life of entrepreneurs, although information about finance, management and production is much more abundant. As there was no set of laws regulating capital-labour relations, information about workers is very scarce. Data on the iron industry is also very scarce even though the Mining School of Ouro Preto dates to the 1880s.

Chapter 1 - NINETEENTH-CENTURY BRAZILIAN AND MINEIRO ECONOMIC HISTORY

Introduction

During the nineteenth century, Brazil went through a number of social and political changes which had a great impact on the economic structure of the country. During this period, Brazil became independent from Portugal, slavery was abolished, and the Republic was proclaimed. At the same time, a new economic pole based on coffee-growing emerged in the centre-south region - replacing the north-eastern sugar economy as Brazil's main economic centre. This change had a profound impact. Meanwhile, Minas Gerais became largely an agro-pastoral economy after the gold-mining boom, which had characterized its economy for most of the eighteenth century, faded.

This chapter identifies changes in the social, institutional, and economic structures of Brazil and Minas Gerais which have a bearing upon the "business environment". Brazil started the nineteenth century as a Portuguese colony, whose main export, sugar, was produced mainly in the north-eastern region. At the beginning of that century, the mineiro economy was depressed and in contrast with the rich and sumptuous recent past there was misery and poverty. At the end of the nineteenth century, coffee was Brazil's main cash crop and it had come to serve as a basis for the development of capitalism. Minas Gerais, however, was fragmented, each sub-region developed in a different way - the north was backward and the south developing rapidly.

1.1 - Nineteenth-Century Brazil

From the discovery of Brazil in 1500 to its independence in 1822 the promotion of exports was the central concern of the Portuguese crown because exports were the principal means by which monopoly profits were extracted from the colony. Brazil was thus transformed into an agricultural colony supplying tropical products, with the exception of the century-long gold rush which began shortly before 1700. Timber (mainly Pau Brasil) was the first main export, followed by sugar. Sugar remained Brazil's main cash crop throughout the colonial period, although from the late seventeenth century onwards sugar exports fell in value and Brazil lost her virtual monopoly of world production. By the end of the eighteenth century, Portugal stimulated the diversification of production in her colonies with some success. As a result, and partly due to interruptions in the Caribbean trade between 1776 and 1815, sugar revived and export of other commodities grew significantly¹.

The Brazilian economy, at the beginning of the nineteenth century might be described as a series of economic systems or, to quote Furtado, an archipelago². The main areas - the sugar and the gold

¹ W. Dean, "Economy", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell, (Cambridge, 1989), p.218.

² C. Furtado, Formação Econômica do Brasil, (São Paulo, 16th. ed. 1979), p.90.

MAP 1 - LATE NINETEENTH-CENTURY BRAZIL



Source: E.W. Ridings, "Business Associationalism, the Legitimation of Enterprise, and the Emergence of a Business Elite in Nineteenth-Century Brazil", in *Business History Review*, 63, (Winter 1989), p.763.

economies - were mutually connected whereas the others were nearly isolated. Connected with the sugar nucleus was the cattle-breeding economy of the north-east. The mining nucleus was linked with the southern cattle-breeding hinterland, the latter spreading from São Paulo to Rio Grande do Sul. These two systems were in turn loosely connected by the São Francisco river. There were two autonomous centres, Maranhão and Pará, in the northern region of the country. The former had enjoyed the initial advantage of careful attention from the Portuguese government, which had established a highly capitalized trading company responsible for financing the development of the region. The latter lived exclusively on the forest-extractive economy organized by the Jesuit fathers - which decayed after the Portuguese persecution of them in the last decades of the eighteenth century - and was based on exploitation of the Indian labour force. Although Maranhão constituted an autonomous system it was connected with the sugar nucleus by the cattle-breeding periphery. Thus, whereas Pará existed as a totally isolated nucleus, the three main economic nuclei - the sugar nucleus, the mining nucleus and Maranhão - were linked by the vast cattle-breeding hinterland³.

With the French invasion of Portugal in 1808, the Portuguese court was transferred to Rio de Janeiro, a fact which represented a major stage in the evolution of Brazil towards independence. Of even greater significance was the end of the monopoly of colonial trade and the elimination of Lisbon as an entrepôt for Brazilian imports and exports. On his arrival in Brazil, Dom João - the Prince Regent - opened Brazil's ports to direct trade with all friendly nations, which in practice, at least until the end of the Napoleonic Wars, meant trade with England. He also revoked all decrees prohibiting manufacturing in the colony, exempted industrial raw materials from import duties, encouraged the invention or introduction of new machinery, and offered direct subsidies to the cotton, wool, silk and iron industries⁴. However, in 1810, as the price for British protection of what remained of the Portuguese colonial empire, Britain was granted the position of a privileged power with extraterritorial rights and preferential tariffs at extremely low levels. For much of first half of the nineteenth century, the 1810 treaties seriously hampered the autonomy of the Brazilian government in the economic sector mainly by reducing its capacity to generate revenue from taxing imports⁵.

With the liberation of Portugal and the end of the war in Europe the then King Dom João VI was soon forced to return to Portugal, leaving his son Dom Pedro I behind in Rio as Prince Regent. Independence in 1822, was the result of a conflict of interests between the Brazilian landowning class and the Portuguese overseas merchants, but produced few innovations in the economic structure of the country. Thus, colonial structures (like slavery and plantations) and with them the dependent nature of the export trade, remained largely intact. The landowning class strengthened its power, while English merchants replaced the Portuguese in the international trade sector though not necessarily in domestic commerce. At

³ Ibid., pp.89-92.

⁴ L. Bethell and J.M. Carvalho, "1822-1850", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell (Cambridge, 1989), pp.14-20.

⁵ Furtado, Formação Econômica do Brasil, pp.93-4.

the same time several revolts erupted, challenging the authority of the central government. These revolts were reactions against the socially and economically disaggregative effects of neocolonialism⁶. They also reflected the weakness of the new Brazilian government in both political and economic terms. In political terms, the various sub-groups of the Brazilian elite could not agree how to best organize the country. Those linked to the Rio economy advocated a more centralized system, whereas the long-established rural oligarchies fought for provincial power. Furthermore, independence in 1822 was incomplete, since the movement for independence from Portugal was led by a Portuguese prince, whose commitment to sever all family and dynastic ties with the formal colonial power was doubted by many leading Brazilian figures. In economic terms, Brazil lacked a cash crop which would give her a stronger and wider economic basis, and the price paid for independence proved too expensive. Political stability was only finally achieved in the 1840s, when the country enjoyed certain prosperity based on exports of coffee and the dominant class reached relative agreement on fundamental issues⁷.

After independence, the new Brazilian government also faced increasing financial difficulties caused mainly by the unequal commercial treaty of 1810, renewed in 1827, which was the price that Britain exacted for the recognition of Brazilian independence. Until the middle of the 1840s, economic policy in Brazil was marked by a struggle against constant deficits in the balance of payment and scarcity of fiscal resources. As indicated above, according to the commercial treaties of 1810 and 1827, England was granted extraterritorial rights and a general 15% ad valorem customs tariff. This situation created serious difficulties for the Brazilian government since the taxing of imports was the usual means whereby primarily producing countries, like Brazil, collected their basic revenues. As a fiscal apparatus to collect any other form of taxes (such as income and property) was almost non-existent, the only alternative was to tax exports. However, in a slave-based economy this would have meant a reduction in the profits of the great landlords and the new (post-independence) government was pledged to abandon "mercantilist" taxes that had been used to finance administration during the colonial period. Thus, restricted to customs duties as the sole source of revenue and means of sustenance and without any further means of increasing its revenue, the central government found itself in serious financial difficulties until the denunciation of the treaties with England in 1844, when the increasingly irksome and economically debilitating commercial treaties expired, liberating tariff policy and strengthening the government's revenues⁸.

When Brazil became independent from Portugal, it had an overwhelmingly rural population of between four and five million. This relatively small population was scattered over a vast territory, but was heavily concentrated in the coastal provinces - from the provinces of the north-east (with 40-45% of the total population) to the provinces of the south, including Rio de Janeiro and São Paulo. The only inland province with a large population was Minas Gerais as a result of the gold rush in the first half of the eighteenth

⁶ Dean, "Economy", p.219.

⁷ Bethell and Carvalho, *op.cit.*, pp.45-112.

⁸ Furtado, *Formação Econômica do Brasil*, pp.96-8.

century. At this time, the mineiro population still accounted for 20% of total population, though it was mostly located in the south of the province adjoining the province of Rio de Janeiro. Less than a third of Brazil's population was white, the majority being black or mulatto. At least 30% were slaves, of whom three-quarters were concentrated in only five of the eighteen provinces - Maranhão, Pernambuco, Bahia, Minas Gerais and Rio de Janeiro. In many of these areas slaves constituted the majority of the population⁹.

For the greater part of the history of Brazil, African slavery was the dominant form of labour. Brazil imported more Africans than any other colony or country in the New World. Brazil received around 38% of the 9.6 million Africans brought to the American continent during the history of the Atlantic slave trade. For almost the whole colonial period (1500-1822), the number of slaves surpassed that of the non-slave population. In the middle of the eighteenth century, slaves made up more than 60% of the total population, a percentage which decreased to about a third around 1800, as shown in Table I.1. During this period slaves constituted almost all the workers in the important regional systems of production of primary products for export, these systems characterizing this phase of the Brazilian economic history, i.e. sugar in the northeast in the sixteenth and seventeenth centuries, and gold panning and diamond mining in Minas Gerais and Goiás in the eighteenth century¹⁰.

Table I.1 - Slave Population in Relation to the Total Population in Brazil, 1800-1900.

Years	Slaves	Total Population
1800	*1,000,000	*3,000,000
1823	1,147,515	3,960,866
1850	2,500,000	8,020,000
1872	1,510,806	10,112,061
1887	723,419	
1890		14,333,915

Source: C. Prado Júnior, História Econômica do Brasil, (São Paulo, 36th ed. 1988), p.358.

* Estimated

In the nineteenth century (until the abolition of slavery in 1888), although slaves lost their absolute and relative importance in the total population, slavery continued to dominate the main economic activity of the century, coffee-growing on the farms of Rio de Janeiro, São Paulo, Minas Gerais and Espírito Santo¹¹. Furthermore, slaves were to be found throughout rural Brazil in stockraising, in cereal production, in the cultivation of basic staples for local consumption, and in subsistence agriculture¹². Slaves were also employed in technical positions on sugar and coffee farms and in sugar mills - i.e., as "factory" hands. In

⁹ Bethell and Carvalho, op.cit., pp.45-6.

¹⁰ P.C. Mello and R.W. Slenes, "Análise Econômica da Escravidão no Brasil", in Economia Brasileira: Uma Visão Histórica, ed. P. Neuhaus, (Rio de Janeiro, 1980), p.91.

¹¹ Ibid., p.91.

¹² Bethell and Carvalho, op.cit., p.46.

addition, several industrial enterprises (shipyards, textile industries, metal industries, candle factories, etc.) also employed a considerable number of slaves¹³. In Minas Gerais, for example, slaves could be found working in the iron industry, as weavers in textile mills, in British-owned gold mines, and in the construction of roads¹⁴. Slaves were also widely employed as domestic servants. In the urban areas, for example the city of Rio de Janeiro (the major slave-owning city on the entire American continent during the nineteenth century), slaves were employed in diverse functions as stevedores and porters in the docks, as water and refuse carriers, as transporters of people, and as masons and carpenters. There were also slave prostitutes and some were even beggars¹⁵. Religious houses and hospitals owned slaves. The State owned and hired slaves for the building and maintenance of public works¹⁶. The Emperor himself had slaves on his estate in Santa Cruz, as a British woman travelling in Brazil in 1823 observed:

"After dinner I walked about a little in the village of the negroes. There are, I believe, about fifteen hundred in the estate, the greater part of whom belong to the outlying farms or feitorias, (...) The negroes of Santa Cruz are not fed or clothed by the Emperor, but they have their small portions of land; and they have half of Friday, all Saturday and Sunday, and every holiday, to labour for themselves; so that they at most work for their master four days in return for their house and land; and even some of the external marks of slavery are removed, as the families feed and clothe themselves without the master's interference."¹⁷

Furthermore, the report of the Minister of Agricultura, Commercio e Obras Publicas of 1863 listed 38 slaves who belonged to that Ministry¹⁸. Until the first serious efforts were made to end the African slave trade, in the late 1840s, slaves were both available and cheap¹⁹.

¹³ Mello and Slenes, *op.cit.*, p.109.

¹⁴ For a detailed analysis of the employment of slave labour in the iron, textile, and gold-mining industries in Minas Gerais in the period 1830-89 see D.C. Libby, *Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX*, (São Paulo, 1988), pp.134-344; D.C. Libby, *Trabalho Escravo e Capital Estrangeiro no Brasil: O Caso de Morro Velho*, (Belo Horizonte, 1984); and M.C. Eakin, *The St. John d'El Rey Mining Company and the Morro Velho Gold Mine*, (Durham, 1989). For the use of slaves in the construction of the União e Indústria turnpike see D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980.

¹⁵ L.C. Soares, "Urban Slavery in Nineteenth-Century Rio de Janeiro", University of London, unpublished Ph.D. thesis, 1988, pp.145-273.

¹⁶ Bethell and Carvalho, *op.cit.*, p.46.

¹⁷ M.D. Graham, *Journal of a Voyage to Brazil and Residence There, During Part of the Years 1821, 1822, 1823*, (1824), p.286.

¹⁸ According to the report of 1863, 10 slaves were working in the telegraph service, 13 in the Tijuca woods, 4 in the carpentry shop as apprentices, 5 at several tasks in the Ministry, 3 were youths, 2 were blind and one too old to work. Ministerio da Agricultura, Commercio e Obras Publicas, *Relatorio da Repartição dos Negocios da Agricultura, Commercio, Obras Publicas: Relatorio da Inspeção Geral das Obras Publicas do Municipio da Corte*, (Rio de Janeiro, 1862), Table 12.

¹⁹ Bethell and Carvalho, *op.cit.*, p.46.

Table I.2 - Slave Imports into Brazil, 1831-1855.

Years	Slaves	Years	Slaves	Years	Slaves
1831	138	1840	20,796	1849	54,061
1832	116	1841	13,804	1850	22,856
1833	1,233	1842	17,435	1851	3,287
1834	749	1843	19,095	1852	800
1835	745	1844	22,849	1853	0
1836	4,966	1845	19,453	1854	0
1837	35,209	1846	50,324	1855	90
1838	40,256	1847	56,172		
1839	42,182	1848	60,000		

Source: L. Bethell and J.M. Carvalho, "1822-1850", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell, (Cambridge, 1989), p.95.

The trans-Atlantic slave trade was declared illegal by treaty with Britain in 1826, effective from 1830. During the three years 1827-30, in anticipation of the abolition of the trade, 175,000 slaves were imported. As a consequence, in the years immediately after 1831, very few slaves entered the country as the market was glutted; demand and prices fell off. However, the temporary end of the slave trade coincided with the rapid expansion of coffee plantation in the Paraíba Valley, where coffee farms were worked by slaves. Moreover, slave mortality was so high in Brazil that regular new supplies from Africa were required. Soon the demand for slaves revived, especially in the coffee regions of the centre-south, and the slave trade was gradually reorganized after 1830. In 1839, the British government adopted tougher measures to curb the Brazilian slave trade which was then growing very quickly. During this year, more than 40,000 slaves entered the country, as shown in Table I.2. Therefore, from 1839 to 1842 - partly as a result of these initiatives and partly as a result of the temporary glut on the market following the huge slave imports of the late 1830s - imports into Brazil fell to less than a half of their previous level. Even so, in the second half of the 1840s the slave trade began to revive once again after several years of reduced activity. During the three years 1846-9 at least 50-60,000 slaves per annum were imported into Brazil, as shown above in Table I.2. Nevertheless, by the early 1850s the trans-Atlantic slave trade was finally brought to an end, as a result of strong British pressure and the enforcement of the Eusébio de Queiroz law of 4 September 1850, which declared the slave trade equivalent to piracy²⁰.

After the suppression of the slave trade in 1850 the slave population began to decline, mainly because of the continuing high rate of mortality. It is probable that the reduction in the supply of Africans and their rising prices had led to an intensification in the utilization of the slave labour, thus causing further

²⁰ Ibid., pp.94-109. For further discussion about the abolition of the trans-Atlantic slave trade to Brazil see L. Bethell, The Abolition of the Brazilian Slave Trade. Britain and the Slave Trade Question, 1807-1869, (Cambridge, 1970); R. Conrad, The Destruction of Brazilian Slavery: 1850-1888, (Berkeley, 1972), chapter 2; and R. Conrad, World of Sorrow: The African Slave Trade to Brazil, (Baton Rouge, 1986).

depletion of the slave population. Nevertheless, the decline in slave numbers in coffee districts was at first offset by an internal traffic. Slaves were sold from the less productive north-eastern sugar provinces and from urban areas to the coffee-growing areas in south-eastern Brazil²¹.

By the middle of the century, coffee had become the main Brazilian export and its participation in the value of the major Brazilian exports increased from then onwards, as shown below in Table I.3. At the same time, the price of sugar continued to fall and its participation in exports decreased steadily. It is the differences in the fate of these two commodities (coffee and sugar) which basically explains the shifting distribution of the slave population from the northern to the southern part of the country²².

Table I.3 - Value of Major Brazilian Exports in Relation to Total Exports, 1821-1900 (%).

YEAR	COFFEE (1)	SUGAR (2)	COTTON (3)	RUBBER (4)	Total of (1)+(2)+(3)+(4)
1821/30	18.4	30.1	20.6	0.1	69.2
1831/40	43.8	24.0	10.8	0.3	78.9
1841/50	41.4	26.7	7.5	0.4	76.0
1851/60	48.8	21.2	6.2	2.2	78.4
1861/70	45.5	12.3	18.3	3.1	79.1
1871/80	56.6	11.8	9.5	5.5	83.4
1881/90	61.5	9.9	4.2	8.0	83.5
1891/00	64.6	6.0	2.7	15.0	88.2

Source: L.C.T.D. Prado, "Commercial capital, domestic market and manufacturing in imperial Brazil: the failure of Brazilian economic development in the XIXth century", University of London, unpublished Ph.D. thesis, 1991, p.60.

Although it had been introduced into Brazil at the beginning of the eighteenth century, coffee acquired commercial importance only at the end of that century with the disorganization of production in the French colony of Haiti²³. The climate and soil of south-eastern Brazil were very suitable for coffee-growing and coffee beans were easy to transport and store. Furthermore, there was no need for complex industrial processes to prepare them for the market²⁴. When coffee became commercially important its production was concentrated in the hilly regions around the city of Rio de Janeiro, where there was a relatively abundant supply of labour and, given the proximity of the port, there were no transport problems²⁵. During the early decades of the nineteenth century, coffee cultivation spread up the Paraíba Valley. By the

²¹ Dean, "Economy", p.255.

²² Furtado, Formação Econômica do Brasil, p.114.

²³ *Ibid.*, p.113.

²⁴ A.P. Canabrava, "A Grande Laboura", in História Geral da Civilização Brasileira - II. O Brasil Monárquico, ed. S.B. Holanda (São Paulo, 4th. ed. 1985), VI, pp.87-102.

²⁵ Furtado, Formação Econômica do Brasil, p.113.

middle of the century, it started to move towards the north of the province of São Paulo²⁶.

In the first decade of Brazil's independence, coffee already accounted for 18% of exports by value, taking third place after sugar and cotton, as shown in Table I.3. In the 1830s coffee moved into the lead, comprising more than 40% of the country's exports by value. In the 1850s, coffee was responsible for nearly half of all Brazilian export earnings. At the same time, Brazil's share of world coffee output rose from a little under 20% in the 1820s to over 40% in the 1840s, when the country became by far the world's largest producer. From then on, Brazilian coffee production accounted for around 50% of world coffee output during the third quarter of the last century and for 75% at the beginning of the twentieth century, as shown below in Table I.4. The growth in coffee demand from the middle of the nineteenth century onwards was the consequence of the appearance of a mass market in Western Europe and the USA, where a taste for coffee developed in the expanding urban centres, especially among the middle classes. Furthermore, Brazilian coffee was cheaper than that of other areas, since it was chiefly low grade. Minimal care was devoted to the cultivation and harvesting of the crop²⁷.

Table I.4 - Participation of Brazilian production in world coffee output, 1820-1904.

PERIOD	PERCENTAGE	PERIOD	PERCENTAGE
1820-1829	18.18%	1870-1879	49.09%
1830-1839	29.70%	1880-1889	56.63%
1840-1849	40.00%	1890-1894	59.70%
1850-1859	52.09%	1895-1899	66.68%
1860-1869	49.07%	1900-1904	75.64%

Source: V.N. Pinto, "Balanço das Transformações Econômicas no Século XIX", in Brasil em Perspectiva, ed. C.G. Mota, (Rio de Janeiro, 17th ed. 1988), p.139.

The second half of the nineteenth century was a period of great transformation in Brazilian economic history. The first half of the century was a period of adjustment to the new situation created by independence from Portugal. The economic, financial, social, and political crisis, which began with the transfer of the Portuguese crown in 1808 and independence in 1822, lasted until the end of the first half of the century. However, the seed of transformation sowed during this period would mature and produce its fruits only in the second half of the nineteenth century²⁸. Thus, during the last part of the century several important phenomena changed the social and economic structure of the country: the building of the railway network, which began in 1852 and which by the end of the century had expanded to more than 9,000 kilometers of line; the abolition of slavery in 1888 and the arrival of a large number of immigrants in the southern parts of the country; the proclamation of the Republic in 1889; and the beginning of the process

²⁶ R. Graham, "1850-1870", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell (Cambridge, 1989), p.116.

²⁷ Bethell and Carvalho, op.cit., p.85.

²⁸ C. Prado Júnior, História Econômica do Brasil, (São Paulo, 36th ed. 1988), p.192.

of industrialization²⁹.

In the 1850s, Brazil enjoyed a period of economic prosperity (which lasted until the financial crisis of 1857). As a consequence of the end of the slave trade and the resultant transfer of funds from this trade to the domestic economy, the more liberal monetary policy applied since the beginning of the decade, and a good export performance due to increasing international demand for tropical products, the economy grew rapidly³⁰. Furthermore, in 1850 Brazil was given her first commercial code, which updated and integrated a variety of laws and regulations dating back to the colonial period. By newly codifying commercial relations regarding partnerships, contracts and bankruptcies, business activity was boosted³¹. A large number of new companies were established during the 1850s including 62 factories, 17 banks, 20 shipping companies, 8 railways, 8 mining enterprises, 4 colonization companies, 23 insurance companies, 2 gas companies, and 3 urban transport companies³². Not long afterwards, the government began to guarantee interest on capital invested in railways, bolstering the efforts of the planters to link Brazil more closely to the overseas markets³³.

In the early 1860s, Brazil faced a greater crisis than that of 1857. This crisis was a result of the more restrictive monetary policy implemented by the conservative Cabinet then in government. In the aftermath of the crisis of 1857, the liberal administration failed to create an adequate financial structure to support economic growth either in the rural or in the manufacturing sectors. The financial chaos that followed created the conditions for the take-over by the so-called metallists, conservative politicians who advocated rigid monetary control³⁴. During the same period a more restrictive commercial code was adopted, forcing all would-be companies to obtain preliminary government approval³⁵. The 1864 crisis was followed by the Paraguayan War³⁶. The cost of the war was greater than could have been predicted. Sustaining the

²⁹ E. Viotti da Costa, Da Monarquia à República: Momentos Decisivos, (São Paulo, 1987), pp.210-1.

³⁰ L.C.T.D. Prado, "Commercial Capital, Domestic Market and Manufacturing in Imperial Brazil: The Failure of Brazilian Economic Development in the XIXth Century", University of London, unpublished Ph.D. thesis, 1991, p.217.

³¹ Graham, "1850-1870", p.146.

³² Prado Júnior, op.cit., p.192.

³³ C.M. Lewis, Public Policy and Private Initiative: Railway Building in São Paulo, 1860-1889, (1991), pp.4-13.

³⁴ Prado, op.cit., pp.234-71.

³⁵ Graham, "1850-1870", p.148.

³⁶ The Paraguayan War is the war in which Brazil, Argentina, and Uruguay waged against Paraguay for 5 years (1865-1870), and which was the most serious international crisis in Brazilian history. The war turned out to be long and tough, demanding a large amount of resources. In the end, Brazil won the war, but paid a high price for it. Moreover, Paraguay could not pay even a small part of the war debt. Prado Júnior, op.cit., pp.193-4. For further details about the Paraguayan War see, N.W. Sodré, Formação Histórica

war effort more than doubled public expenditure between 1864/65 and 1866/67 and the money supply rapidly increased. Nevertheless, war-time inflation stimulated the domestic economy which had been flat since the early 1860s³⁷. The ten-year period 1870-1880 was one of the most prosperous in Brazilian history. The number of industrial, commercial, and - most of all - agricultural enterprises increased rapidly. The number of banks and all sorts of financial institutions also multiplied and the State - and to a lesser extent foreign capital - invested in large enterprises, such as railways, ports, and the urban infrastructure³⁸.

The first population census taken in Brazil in 1872 shows that there were approximately 10 million inhabitants. Slaves represented just over 15% of the total population, in sharp contrast to the situation at the end of the eighteenth century when they represented more than half of the total population³⁹. Furthermore, in the following decades they were to be more and more concentrated in coffee provinces of the south-east (São Paulo, Rio de Janeiro, and Minas Gerais). However, from 1870 onwards the supply of slaves, who in 1872 constituted about 20% of economically active population and about 70% of plantation labour, was certainly precarious and the labour issue called for an urgent solution⁴⁰. As growth in Brazil consisted merely of increasing utilization of the available factor - land - through the incorporation of greater quantities of labour, the supply of slaves was a key factor. However, alternatives to slave labour were very limited⁴¹.

The growing free Brazilian population appeared to be a great potential source of labour. In most provinces, free people had outnumbered slaves since the early nineteenth century⁴². In São Paulo, where there was an absolute increase in the slave population triggered by the expansion of coffee plantation, slaves represented little more than 18% of the whole population in 1872⁴³: even in the coffee-growing regions, the free population was in a majority. Furthermore, Brazilian free workers, white and coloured, participated in various activities in the export sector. Small holders usually constituted a source of part-time labour for coffee plantations and independent workers were also recruited as private police force, administrators, or foremen. In addition, they were employed to clear forest, to build roads, to cart, to assist at harvest time,

do Brasil, (Rio de Janeiro, 10th ed. 1979), pp.228-34; Graham, "1850-1870", pp.150-8; and A. Sousa Júnior, "Guerra do Paraguai", in História Geral da Civilização Brasileira, ed. S.B. Holanda (São Paulo, 1985), VI, pp.299-314.

³⁷ Prado, op.cit., pp.271-2, 285-7.

³⁸ Prado Júnior, op.cit., pp.194-5.

³⁹ Directoria Geral de Estatística, Relatórios e Trabalhos Estatísticos, (Rio de Janeiro, 1872).

⁴⁰ Dean, "Economy", p.235.

⁴¹ Furtado, Formação Econômica do Brasil, pp.117-22.

⁴² M.L. Lamounier, "Between Slavery and Free Labour: Experiments with Free Labour and Patterns of Slave Emancipation in Brazil and Cuba c.1830-1888", University of London, unpublished Ph.D. thesis, 1993, pp.183-4.

⁴³ Directoria Geral de Estatística, Relatórios Anexo ao do Minsiterio dos Negocios do Imperio de 1876, (Rio de Janeiro, 1877), p.8.

and to grow subsistence crops for the plantation. In other words, although not fully available for regular work, the free Brazilian population constituted a potential source of occasional labour. Nevertheless, despite the fact that Brazilian workers (white and coloured, free and freed) were perceived by many as a viable alternative of labour, their wide and large scale employment demanded complex reforms in the law, which were very controversial and of uncertain political and economic costs⁴⁴.

Difficulties in recruiting domestic free labour on a large-scale and growing certainties about the end of slavery stimulated attempts to attract immigrants. At the beginning of the 1880s, it was obvious that the abolition of slavery was imminent. Growing external and internal pressure resulted in several laws which would gradually end slavery. Thus, in 1871 all newly-born children of slaves were declared free. In 1885, all slaves over 65 years old were freed. In 1888, slavery was finally abolished⁴⁵. What was feared by the large landowners as an economic catastrophe - after the failure of the earlier experiments in immigrant labour many southern farmers predicted a chronic shortage of labour and economic ruin for themselves after abolition - eventually proved to be a smooth transition from slave to free labour. Most freed slaves accepted wage and sharecropping contracts on nearby or even on the same estates. There was also a great migration to the new zones of large-scale exploitation for export, such as southern Bahia (cacao) and the western Amazon (rubber)⁴⁶. More significantly, in the last quarter of the century European immigrants began to come to Brazil in increasing numbers. During this period, immigration amounted to more than 800,000⁴⁷. At the beginning of the 1880s an immense wave of Italian, Spanish, and Portuguese workers began to migrate to Brazil. They went mainly to the coffee-growing regions, subsidized by state and federal governments⁴⁸. São Paulo was the state which absorbed the larger number of immigrants: nearly 52% of the 300,000 immigrants who came to Brazil between 1888 and 1890, and 64.9% of the 1,129,315 of those who entered the country between 1891 and 1900 went to São Paulo⁴⁹. Until the First World War the number of immigrants entering into Brazil was kept as high as possible because they often tended to move from agriculture to other activities after a while or to return to their home countries⁵⁰.

During the second half of the nineteenth century, coffee was by far the most successful Brazilian product in the international market. The second and third quarters of the century were basically the period

⁴⁴ Lamounier, *op.cit.*, pp.184-98.

⁴⁵ Viotti da Costa, *Da Monarquia à República*, pp.243-4.

⁴⁶ Dean, "Economy", pp.235-236.

⁴⁷ Sodré, *op.cit.*, p.251.

⁴⁸ Dean, "Economy", pp.235-236.

⁴⁹ B. Fausto, "Society and Politics", in *Brazil: Empire and Republic, 1822-1930*, ed. L. Bethell (Cambridge, 1989), pp.257-8.

⁵⁰ Dean, "Economy", pp.236-7.

of early growth for the coffee economy⁵¹.

Table I.5 - Annual Average Export of Coffee from Rio de Janeiro by Province in Relation to Total Exports, 1858-59 (%).

PROVINCES	PER CENT
Rio de Janeiro	78.62
Minas Gerais	7.80
São Paulo	11.10
Bahia	0.42
Espírito Santo	2.60
Total	100.00

Source: Parliamentary Papers, Consular Reports, LXIII, (1861), p.462.

In the late 1850s, coffee production in Rio de Janeiro accounted for the greatest part of Brazilian coffee export. As shown in Table I.5, Rio de Janeiro exported more than 78%, while Minas Gerais, São Paulo, Espírito Santo, and Bahia, together accounted for less than 22% of the total. In the last quarter of the nineteenth century, the great fertile plateau of São Paulo became the main source of coffee production. The arrival of the railway, the input of foreign investments in the decade after 1885, and the cheap money of the Republican provisional government stimulated new planting in São Paulo, doubling the number of the Brazilian coffee plantations⁵². By 1901 exports had reached 888,000 tons⁵³. From 1822 to 1907 coffee prices went through three cycles, 1857-1868, 1869-1885 and 1886-1906, ending each time with prices near to US\$ 0.15 per kilogram⁵⁴. Low prices discouraged potential competitors and Brazil supplied more than half of the coffee sold in the international market. As Brazil's other exports did not enjoy similar success in world trade the Brazilian economy, until the 1930s, was characterized by a very high dependence on the performance of the price of a single export product: coffee⁵⁵.

It is striking that although Brazil had a relatively large export capacity, and an immense territory, and was richly endowed with varied natural resources, throughout the nineteenth century she participated in the international market essentially as an exporter of a single crop. The explanation of this does not depend entirely on the external facts. In certain circumstances natural disadvantages were beyond remedy as, for example, geographical problems encountered by Brazilian sugar producers while Cuban planters enjoyed more suitable, flatter terrain, and closer proximity to the consumer markets. In other circumstances,

⁵¹ Furtado, Formação Econômica do Brasil, p.114.

⁵² Lewis, op.cit., pp.35-51.

⁵³ Dean, "Economy", p.226.

⁵⁴ C.M. Peláez, Economia Brasileira Contemporânea: Origens e Conjuntura Atual, (São Paulo, 1987), p.29.

⁵⁵ Dean, "Economy", p.226.

it seems that the solution was within Brazil's reach but was incompletely applied, as in the case of cotton. Even though short-staple cotton had been introduced into the country in the 1860s, Brazil lost her overseas markets⁵⁶. In the period 1780-1820, Brazil became an important supplier of cotton to the British textile mills. Although demand for raw cotton increased enormously during the nineteenth century, Brazil's share of British raw cotton imports declined in the period 1820-1860 owing to the preference for cheaper US cotton. At the time of the Civil War in the USA, Brazilian cotton was again briefly competitive. However, the end of the American Civil War and the revival of the cotton trade, represented the collapse of the Brazilian cotton boom due to the low price of this commodity coupled by the precarious and high costs of inland transport in Brazil⁵⁷. Thus, successful international trade was limited to products with enormous comparative advantages to offset high costs of production and commercialization and high internal taxes. It is true that improvements in the conditions of production and in organization of marketing depended on scarce capital resources. Nevertheless, various government schemes, providing guarantees and even funding, although ill-conceived or incompletely executed, proved that these resources were not totally unavailable⁵⁸. Even when capital resources were generated in quantities sufficient for providing funds for improvement of productivity on a large scale, as in the case of the coffee economy, emphasis was placed upon price maintenance rather than upon competitiveness⁵⁹.

At the beginning of the twentieth century, the Brazilian government became engaged in the enormous task of stabilizing the price of its main product in the world market. In the late 1890s, coffee prices were depressed and the Brazilian coffee growers faced the effects of the internal deflationary policy that was imposed by the funding loan of 1898⁶⁰. Between 1901 and 1904 coffee export revenue in Brazilian currency fell at the rate of 5.92% a year. Facing the possibility of bankruptcy, Brazilian coffee growers organized themselves into a powerful pressure group and compelled the government to intervene in the international coffee market⁶¹. In 1906, the three of the main coffee-producing states - São Paulo, Minas Gerais, and Rio de Janeiro - and the federal government agreed to support coffee prices, but the federal and state governments of Rio de Janeiro and Minas Gerais withdrew leaving São Paulo to act alone. Coffee producers from Minas and Rio were not as adversely affected by the coffee crisis as their paulista counterparts. Furthermore, the financial risks for both states (Minas Gerais and Rio de Janeiro) to participate

⁵⁶ Ibid., pp.228-9.

⁵⁷ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), pp.57-8.

⁵⁸ Dean, "Economy", pp.228-9.

⁵⁹ For a detailed discussion of the Brazilian coffee valorization schemes see T.H. Holloway, The Brazilian Coffee Valorization of 1906: Regional Politics and Economic Dependence, (Madison, 1957) and Peláez, Economia Brasileira Contemporânea, pp.39-52.

⁶⁰ Dean, "Economy", pp.228-30.

⁶¹ Peláez, Economia Brasileira Contemporânea, p.37.

in the scheme would be proportionally greater due to their smaller budgets. The so-called "valorization" scheme involved the raising of funds to purchase surplus of coffee at a price remunerative for Brazilian producers. Coffee was then stored and stocks used to regulate prices. The whole operation was financed by European and US banks through the intercession of coffee importers⁶². Later, the federal government finally agreed to guarantee the loans, and prices did begin to rise again. However, this policy diverted resources from other sectors of the economy, ignored the issue of productivity, and encouraged foreign competitors to expand their production⁶³.

If in the past the Brazilian economy had relied on sugar and gold to promote its economic development, for much of the nineteenth century it relied heavily and almost exclusively on coffee. However, if in the former cases the result was economic stagnation after each specific economic boom, in the latter the result was the economic modernization. The coffee economy became the centre of a rapid process of capital accumulation, and it was as part of this process of accumulation that Brazilian industry was born⁶⁴. In São Paulo, for example, coffee capital created the "coffee export complex", which included the production and processing of coffee, the transport system (railways, ports, etc.), the export and import trade, and the banking system⁶⁵. Thus, the coffee economy created the fundamental prerequisites for the emergence of industrial capital and large-scale industry. These conditions include capital accumulation for investment in the industrial sector, the formation of a free-labour market, the creation of an internal market for industrial goods, and the capacity to import wage goods, raw materials and machinery⁶⁶. As Peláez puts it, the coffee trade constituted the engine of growth as it provided the social capital for infrastructure, the exchange to purchase industrial equipments, the market for the new manufactures, and the supply of skilled immigrant labour for the coffee farms. In other words, it created the basis for industrial development in Brazil⁶⁷.

Although the emergence of the first industries date to the 1860s and 1870s, the first industrial upsurge took place only between 1880 and 1890. From its origin, Brazilian industry developed unevenly through the various regions of the country and tended to concentrate in the coffee region; especially in Rio de Janeiro, São Paulo, and Minas Gerais⁶⁸. The very first products to be manufactured were those whose weight-to-cost ratio was so high that even with the most rudimentary technique they cost less to produce

⁶² Holloway, *op.cit.*, p.37, 56-61.

⁶³ Dean, "Economy", pp.228-30.

⁶⁴ S. Silva, Expansão Cafeeira e Origem da Indústria no Brasil, (São Paulo, 1976), pp.77-81.

⁶⁵ W. Cano, Raízes da Concentração Industrial em São Paulo, (São Paulo, 3rd. ed. 1990), pp.69-86.

⁶⁶ J.M. Cardoso de Mello, O Capitalismo Tardio: Contribuição à Revisão Crítica da Formação e Desenvolvimento da Economia Brasileira, (São Paulo, 1982), p.99.

⁶⁷ Peláez, Economia Brasileira Contemporânea, p.32.

⁶⁸ Silva, *op.cit.*, pp.77-81.

in Brazil than to buy from Europe. At least until the 1920's, with very few exceptions, only those goods that were quite bulky and intrinsically low in value were being produced. Furthermore, they were fashioned either from local raw materials or from semi-processed imported materials which would have been much bulkier if fully transformed before shipment. Nevertheless, even this rudimentary stage of pre-1920 industrialization involved a wide range of goods. Almost every kind of construction material was domestically produced by 1920, as well as shoes, beer, soft drinks, furniture, pots and pans, flour, boilers, hats, stonework, and coarse textiles⁶⁹. Furthermore, most of the industries which emerged in the period previous to the First World War were mainly complementary or subsidiary to the export sector - from whom they also depended for the import of raw materials and other inputs such as machinery and equipment -, especially coffee⁷⁰. Their activities included the processing of coffee, cotton, meat and oil seeds, the milling of sugar, small mechanical workshops for maintenance services, the packing, assembling and finishing of goods, or the adapting of foreign products to the local market, and the production of textiles⁷¹.

During the twenty-year period 1850-70, landowners and merchants together still played a dominant role in the political system, despite the growth of the cities. Before 1870, manufacturers were not an important nor an independent political force and many were themselves merchants or landowners. The vast majority of the population, constituted by the non-propertied (slave and free), exercised little influence upon the State. Brazil was under the rule of a constitutional monarch, Dom Pedro II (1825-91). He succeeded his father Dom Pedro I (1798-1834), who had abdicated in 1831. Parties at this time were merely parliamentary agglomerations lacking unity and not depending on disciplined electorates, or representing ideologically defined movements⁷².

In 1889, the monarchy was overthrown as the result of the concerted action of three groups: coffee planters from western São Paulo, members of the urban middle class, and a faction of the military⁷³. During the first half of the century, the Brazilian monarchy was established and consolidated by a coalition between high-ranking bureaucrats, sectors of the landowning class (mainly in Rio de Janeiro, but to a lesser extent in Bahia and Pernambuco), and merchants established in the main cities and anxious to contain urban social and political unrest. Opposition to political and administrative centralization, which characterized the early decades of the Empire, reappeared in the later decades of the nineteenth century. In the new areas of economic expansion, particularly the coffee-growing regions of São Paulo, a movement emerged in favour of a federal republic, with a greater degree of provincial autonomy which would enable them to levy taxes,

⁶⁹ W. Dean, A Industrialização de São Paulo, 1880-1945, (São Paulo, 1971), pp.15-6.

⁷⁰ W. Suzigan, Indústria Brasileira: Origens e Desenvolvimento, (São Paulo, 1986), p.349.

⁷¹ C. Furtado, Análise do "Modelo" Brasileiro, (Rio de Janeiro, 7th. ed. 1982), p. 16.

⁷² Graham, "1850-1870", pp.138-45.

⁷³ E. Viotti da Costa, "1870-1889", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell (Cambridge, 1989), pp.212-3.

to formulate their own immigration programme, to create their own military force, and to contract foreign loans⁷⁴. Thus, the overthrow of the Empire led to the institution of an extremely decentralized economic and political structure.

During the first years of the Republican regime, the country enjoyed an economic boom, which was sustained until 1895. As a result of the extraordinary monetary expansion, the exchange rate collapse. The monetary expansion was the result of a financial reform, which more than doubled the monetary base in the first two years of the new government. The collapse of the exchange rate was also the result of a sudden interruption in 1890 of the large inflow of foreign capital of the late 1880s and the higher levels of import caused by the demand-generating effects of the credit expansion⁷⁵. Thus, the Republican provisional government which took power in 1889 aggressively promoted economic growth through a highly liberal economic policy. In the ebullient transitional period, known as the *encilhamento* (the stock market bubble of the early 1890s), numerous initiatives - such as banks of emission and joint stock companies - were launched in a very speculative way. Despite the impressive business growth during this period the provisional government was overcome by inflation and the accumulation of foreign debt, and in 1894 was toppled. The following republican governments were much less interventionist and put constraints on internal development. They were much more concerned with their credit-worthiness with the attitude of foreign bankers as early republican administrations had produced even more fiscal deficits than those of the Empire. These deficits were covered through foreign loans which were often accompanied by conditions that interfered directly in the policy-making. The deflationary programme imposed by the funding loan in 1898, for example, remained the centrepiece of government policy until 1905, no matter how depressive it was upon production and employment⁷⁶.

To sum up, during the nineteenth century Brazil became independent from Portugal, the Republic was proclaimed, slavery was abolished, European immigrants entered the country in large numbers and a free-labour market emerged, coffee became the main export, the economy diversified and the coffee economy created the basis for the development of industry in Brazil. Nevertheless, the process of social and economic development of each Brazilian region differed in varied degrees and respects from the general pattern described in this section. Thus, the next part of this chapter will examine the social and economic history of Minas Gerais during the nineteenth century, pointing out those changes that have a bearing upon the "business environment".

1.2 - Nineteenth-Century Minas Gerais

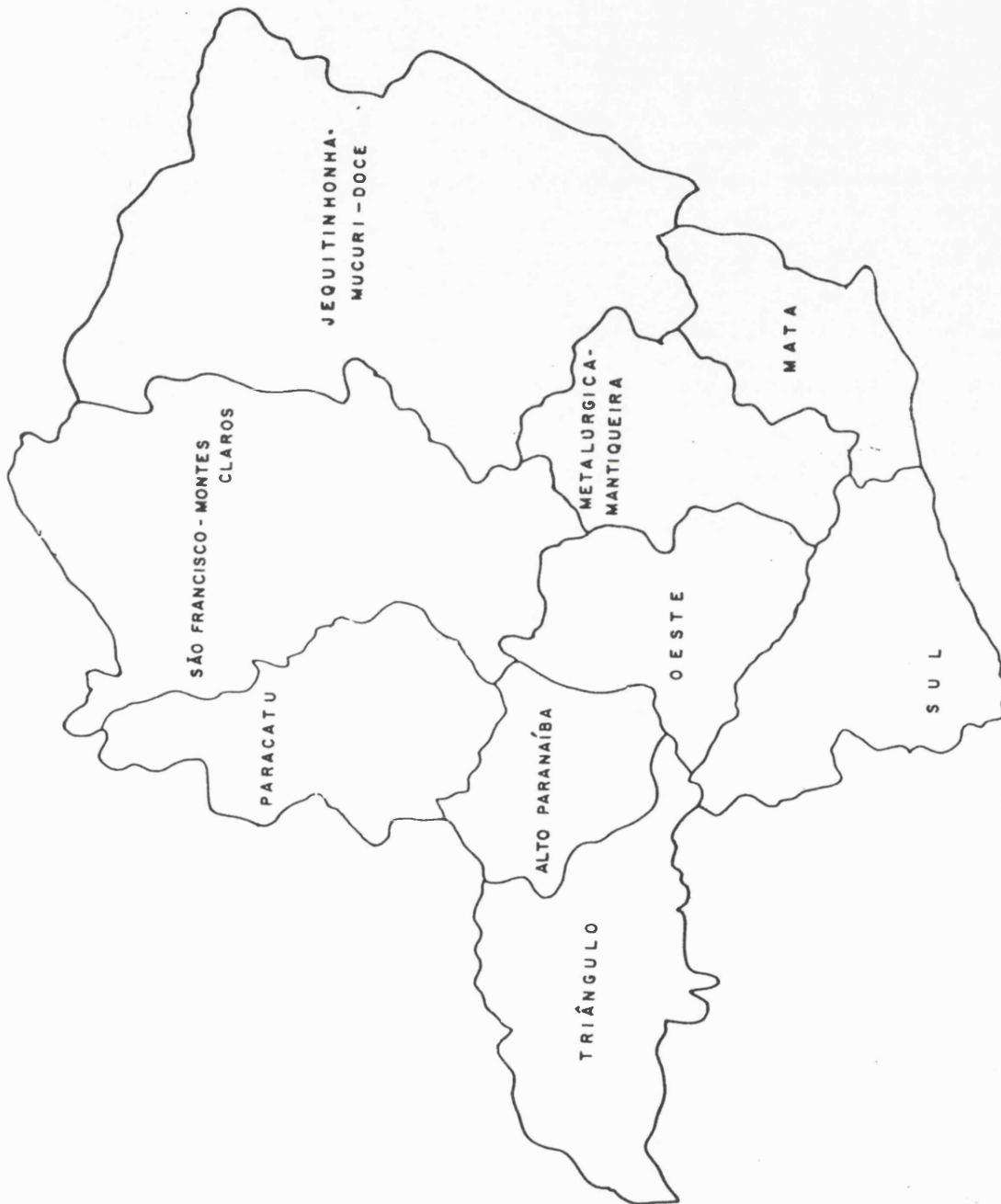
Minas Gerais is a landlocked territory the size of France, with a variety of landscapes. Its frontiers do not define a coherent geographical region and Minas Gerais was not a natural economic unit. The rivers

⁷⁴ Fausto, *op.cit.*, p.265.

⁷⁵ W. Fritsch, *External Constraints on Economic Policy in Brazil, 1889-1930*, pp.4-5.

⁷⁶ Dean, "Economy", pp.220-2.

MAP 2 - MINAS GERAIS: ZONES



Source: D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), p.32..

form several disconnected systems, and there are several mountain ranges which divide sub-regions, imposing huge barriers to communications and transport. Thus, during the last century Minas had a disarticulated pattern of growth which was largely determined by geographical considerations. The Triângulo - which was juridically linked to São Paulo until 1816 - and the South zones were logical extensions of the São Paulo hinterland, to which they were linked economically and culturally. Most of the northern region of Minas Gerais is geographically part of the Brazilian sertão, stretching into Ceará in north-eastern Brazil. It was formerly administered from Salvador, the capital of Bahia, until the middle of the eighteenth century and all of its exports passed through Salvador until this century. The western region was part of the colonial cattle-frontier, extending from Bahia to Goiás. The Mata zone, in south-eastern Minas, was linked economically with the port of Rio de Janeiro and was part of Rio de Janeiro's hinterland from the coffee boom of the 1830s. The central part of Minas was the seat of provincial and later state government, whose authority over the other zones was weakened until the 1930s by poor communications and lack of economic influence. Thus, the more developed regions in the southern part of Minas Gerais (Triângulo, Mata, and South) were historically linked to São Paulo and Rio de Janeiro, whereas the less developed northern part was a backwater of Bahia⁷⁷.

The occupation of the territory was directly linked to the discovery of gold at the end of the seventeenth century, mainly in the central part of Minas Gerais. Gold production reached its peak around the 1760s and after that began to decline slowly⁷⁸. In the 1800s, production was less than half the level of the 1760s, and in the 1820s the decay of the gold-mining economy was beyond doubt. Several different factors contributed to the decay of eighteenth-century mineiro gold economy: production was restricted to alluvial gold deposits because of the requirements or difficulties of underground gold-mining; lack of slave labour; heavy duties levied on goods entering Minas Gerais making the cost of living very expensive; and the low standards of the prevailing methods of production⁷⁹. With the progressive decay of the gold-mining economy during the last quarter of the eighteenth century, the economy of Minas Gerais went through a great transformation. During this period, there was an important expansion of craft production, mainly of textiles and iron. However, this incipient production had its development hindered by the Portuguese colonial government, which prohibited it in 1785. Furthermore, a large proportion of the population of the decaying gold-mining area turned to subsistence activities, moving from the central part of Minas towards the northern and western parts - where a cattle-raising economy emerged -, and towards the southern parts - where dairy production developed⁸⁰.

⁷⁷ J.D. Wirth, Minas Gerais in the Brazilian Federation, 1889-1937, (Stanford, 1977), pp.1-5.

⁷⁸ P.I. Singer, Desenvolvimento Econômico e Evolução Urbana: Evolução Econômica de São Paulo, Blumenau, Porto Alegre, Belo Horizonte e Recife, (São Paulo, 1968), pp.199-203.

⁷⁹ F. Iglésias, "Minas Gerais", in História Geral da Civilização Brasileira, ed. S.B. Holanda (São Paulo, 4th. ed. 1985), IV, pp.368-9.

⁸⁰ Singer, op.cit., pp.204-6.

With the arrival of the Portuguese royal family in Brazil in 1808, there were several attempts to revive the economy of the central part of Minas Gerais by the establishment of an iron industry. Although the attempt to produce iron on a large scale in the Metalúrgica zone failed, mainly because of restricted markets, several small iron foundries of limited economic importance emerged. Their production was small and the greater part of output was consumed locally⁸¹. Nevertheless, during the first years of the nineteenth century agriculture replaced gold as the main economic activity of Minas Gerais. Rural production, either for the mineiro or for the Brazilian and international markets, increased in importance. Gradually agriculture shifted from a predominantly subsistence to market orientated activities. The main products of this period were coffee, corn, sugar, tobacco, cotton, rice, manioc, and beans⁸².

Coffee spread into the Mata and the South zones, where it adapted very well to the soil and the climate. It became an important mineiro item of trade for the first time in 1819, when more than 95% of the output was produced in Matias Barbosa, a district situated in the Mata zone, close to Juiz de Fora⁸³. In 1842/43, coffee was the third largest mineiro item of trade by value⁸⁴. From the 1850s onwards, coffee became the main mineiro item of trade. In the 1850s, coffee represented 56.1% of exports (to other provinces) by value, and by the end of the century 84.6%⁸⁵. The rapid expansion of production until the beginning of the 1860s was helped by three factors: the availability of labour being released by the declining gold-mining economy, the availability of suitable soil, and the high prices of coffee. In the 1860s, the construction of the União e Indústria turnpike, and later of the D. Pedro II railway (EFDPII), helped to open up new areas for coffee, guaranteeing the expansion of production⁸⁶.

Nevertheless, coffee production was not very representative of the economic life of Minas Gerais as a whole. Throughout the Empire (1822-1889), coffee production was confined mainly to a relatively small part of the Mata zone close to the border with the province of Rio de Janeiro. Until the early 1870s, the mineiro coffee economy employed less than 15% of the non-slave population and only a quarter of the slave population. Furthermore, the area covered by coffee plantation did not represent more than 4% of the territory of the province. In the 1880s, the South zone became a coffee-growing area. However, it was only after the disorganization of coffee production in the Mata zone, as a result of the abolition of slavery in 1888, that coffee production in the South zone became important. More representative of the mineiro economic life was the production of non-coffee products in the huge area outside the coffee-growing where

⁸¹ Ibid., pp.206-7.

⁸² Iglésias, "Minas Gerais", pp.368-9.

⁸³ J.H. Lima, Café e Indústria em Minas Gerais, 1870-1920, (Petrópolis, 1981), p.13.

⁸⁴ Singer, op.cit., p.209.

⁸⁵ R.B. Martins and M.C.S. Martins, "As Exportações de Minas Gerais no Século XIX", in Seminário Sobre a Economia Mineira, (Diamantina, 1982), Sept., p.117.

⁸⁶ Lima, op.cit., p.14.

the majority of the slave and non-slave population lived⁸⁷.

Cattle-raising, for example, was the second traditional economic activity in Minas Gerais, and was well adapted to extensive ranching specially in the northern part and in the Triângulo zone. The techniques and the organization of ranching were introduced by Bahians in the seventeenth century and, combined with a favourable environment, produced Brazil's largest herd of beef cattle⁸⁸. After the decay of the eighteenth-century gold economy, cattle-raising became the most important economic activity in Minas Gerais until the 1840s when it was surpassed by coffee-growing⁸⁹. From then onwards, beef on the hoof, meat, and animal products were the second largest item of trade of the province⁹⁰.

As mentioned above, until the end of the eighteenth century the establishment of industries was prohibited by the Portuguese colonial government. When the Portuguese crown was transferred to Brazil in 1808 this legal impediment was revoked. However, obstacles of a different nature then became obvious such as, lack of capital and credit, lack of suitable means of transport, small and scattered markets, and lack of a large and reliable work-force. These factors hindered the industrial development of Minas Gerais⁹¹. Nevertheless, a few industrial sectors, such as mining, iron-working, textiles, and food industries, did develop during the nineteenth century, and were concentrated mostly in the developed southern half of Minas Gerais⁹².

Although the gold-mining boom was over at the beginning of the last century, hopes of new discoveries persisted. During the first decades of the nineteenth century the primitive and disordered gold-mining activity of the end of the eighteenth century was replaced by foreign mining companies using "state of the art" technology. Some of these foreign mining companies, such as the British-owned Saint John Del Rey Mining Company and the Imperial Brazilian Mining Association, became large scale enterprises⁹³. The former, which exploited the mine at Morro Velho, was the largest single industrial employer in Minas Gerais until the 1930s and the only one to survive among the 9 Brazilian and foreign-owned gold-mining companies active in 1900. Furthermore, prospecting for diamonds and semiprecious stones still provided a precarious livelihood for a few thousand people⁹⁴.

⁸⁷ Martins and Martins, *op.cit.*, pp.109-10.

⁸⁸ Wirth, *op.cit.*, p.45.

⁸⁹ Iglésias, "Minas Gerais", p.393.

⁹⁰ Wirth, *op.cit.*, p.45.

⁹¹ F. Iglésias, *Política Econômica do Governo Provincial Mineiro, 1835-1889*, (Rio de Janeiro, 1958), pp.90-3.

⁹² Wirth, *op.cit.*, pp.49-50.

⁹³ Libby, *Transformação e Trabalho*, pp.257-269.

⁹⁴ Wirth, *op.cit.*, p.11.

The isolation of Minas Gerais and the high price of imports allowed the mineiro iron industry to develop numerically and geographically for six decades after the 1820s. Initially, changes in the process of gold-mining boosted the industrial production of iron, underground gold mines constituting important consumers of iron goods during this period. Later on, the consumer market for iron products grew and the agricultural sector and muletrains became important consumers. In the 1880s, the industry suffered two lethal blows: the end of its geographical isolation with the arrival of the railway in the central part of Minas Gerais and the abolition of slavery, the latter depriving the small foundries of their major competitive advantage against foreign competition⁹⁵. With the proclamation of the Republic the small foundries disappeared and a few major ironworks were built but with little success. Minas was doomed to await until the 1930s, when iron and steel products led the second mineiro industrial boom and several charcoal-based steel plants began production⁹⁶.

The first sustained industrial upsurge in Minas Gerais began with the establishment of the textile industry⁹⁷. However, the development of this industry was preceded in the first half of the last century by a flourishing domestic textile production, a legacy of the colonial times⁹⁸. It was only in the 1870s that the first successful textile mills began to emerge in response to a set of favourable conditions: expanding local markets, exchange devaluations, cheap raw materials, high import tariffs, and high freight rates⁹⁹. The mineiro textile industry grew rapidly until the late 1920's. In 1907 it was the largest mineiro industrial sector, contributing 40.2% of the total value of industrial production, accounting for 62.9% of capital invested in mineiro industry, and employing 50% of the mineiro industrial work-force¹⁰⁰.

In 1907 the food industry was the second largest industrial sector, accounting for 32.6% of the value of industrial production, 18.9% of the capital invested in the mineiro industry, and 17.3% of the mineiro industrial work-force. Nevertheless, the industry was made up of small factories employing on average 6 people¹⁰¹. Another important economic sector in nineteenth-century Minas Gerais was transport. In the late 1850s, the Companhia União e Indústria built 144 kilometres of carriageway linking the southern part of Minas Gerais to the province of Rio de Janeiro. The construction of the turnpike pre-dated railways.

⁹⁵ Libby, Transformação e Trabalho, pp.134-5.

⁹⁶ F.A.M. Gomes, História da Siderurgia no Brasil, (Belo Horizonte/São Paulo, 1983), p.35.

⁹⁷ Banco de Desenvolvimento de Minas Gerais, Diagnóstico da Economia Mineira, (Belo Horizonte, 1968), I, pp.64-5.

⁹⁸ R.B. Martins, "A Indústria Têxtil Doméstica de Minas Gerais no Século XIX", in Anais do II Seminário sobre a Economia Brasileira, (Belo Horizonte, 1983), pp.81-4.

⁹⁹ D.A. Giroletti, "A Modernização Capitalista em Minas Gerais: A Formação do Operariado Industrial e de uma Nova Cosmovisão", Universidade Federal do Rio de Janeiro/Museu Nacional, unpublished Ph.D. thesis, Rio de Janeiro, 1987, pp.16-109, and Libby, Transformação e Trabalho, pp.225-39.

¹⁰⁰ Lima, op.cit., p.82.

¹⁰¹ Ibid., p.82.

It was a time when the bulk of the transport of people and goods was made on the back of animals¹⁰². During this period, Juiz de Fora grew and became a large coffee entrepôt in Minas Gerais¹⁰³.

The first phase of railway construction in Minas Gerais began in the 1870s. In 1869, the EFDPII (later Central do Brasil) reached the Mata zone, and in the late 1880s arrived in the central part of the province¹⁰⁴. Several other small lines were built during this period in the Mata zone. All these early railways received concessions (guaranteed interest payments on invested capital) from the provincial and Imperial governments. Several of these railways were built by coffee planters either by themselves or in conjunction with British capitalists. Between 1875 and 1899, a total of 3,500 kilometers of track was laid in Minas Gerais, most of it in the south. Nevertheless, by the late 1890s several of these private lines were taken over by the government, as coffee prices declined and could no longer support the high freight rates these railways needed to work profitably. Later, 21 railways of the Mata zone were incorporated into the British-owned Leopoldina system. From 1900 onwards, the federal government dominated railway construction until the 1920s, when the state government became actively involved¹⁰⁵.

It is important to point out that despite all of its economic transformation during the nineteenth century, Minas Gerais at the end of this period continued to be divided into disarticulated and autonomous sub-regions, each having developed in a different way, with particular histories and specific problems¹⁰⁶. In the 1880s, the Triângulo became a modern agro-pastoral economy. In contrast, the northern region, with the exception of a diamond rush which was over by 1830, followed the tracks of a seventeenth-century ranching economy and its cities stagnated on the margins of vast latifúndia until the arrival of the railway at the beginning of the twentieth century. The cattle trade was the main activity of the western region, whose towns had been linked by ancient cattle trails and later by railways. The Mata and South zones developed a coffee-based agriculture, which financed their mid-nineteenth-century rise. After the proclamation of the Republic these two zones became the most important regions in terms of wealth, population, and political power. Throughout the nineteenth century, the central part of Minas lost ground to both the Mata and the South zones. The long decline of the central region only came to an end in the 1920s, when the growth of consumer industries, banks, and commerce gave the new political capital (Belo Horizonte) an economic base¹⁰⁷.

Compared with the southern half, the backward north - with the exception of the Triângulo zone - lagged behind in towns and transport. The south had a well-articulated network of towns and transport

¹⁰² Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1861), p.5.

¹⁰³ Singer, op.cit., p.210.

¹⁰⁴ Iglesias, Política Econômica do Governo Provincial Mineiro, p.165.

¹⁰⁵ Wirth, op.cit., pp.57-8.

¹⁰⁶ Singer, op.cit., p.213.

¹⁰⁷ Wirth, op.cit., pp.3-5.

routes, which were created mainly during the great coffee boom and railway-construction phase in 1850-1900. With large population and a good transport system, the Mata and the South were the most urbanized zones of Minas Gerais. Nevertheless, most mineiros lived in isolated rural areas. In 1920, only 11% of the mineiro population lived in urban centres: if cities smaller than 5,000 are left out, the urban population falls to 5%¹⁰⁸.

Table I.6 - Total population of Minas Gerais and Brazil according to the estimates of 1808, 1823, 1830, and 1854, and the census of 1872, 1890, 1900, and 1920.

YEARS	MINAS GERAIS	PERCENTAGE	BRAZIL
1808	350,000	14.5%	2,419,406
1823	640,000	16.2%	3,960,866
1830	930,000	17.4%	5,340,000
1854	1,300,000	16.9%	7,677,800
1872	2,102,689	20.8%	10,112,061
1890	3,184,099	22.2%	14,333,915
1900	3,594,471	20.8%	17,318,556
1920	5,888,174	19.2%	30,635,605

Sources: Adapted from Ministerio da Agricultura, Industria e Commercio, Directoria Geral de Estatistica, Recenseamento do Brazil realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, pp.403-23.

As shown in Table I.6, throughout the nineteenth century Minas experienced a rapid demographic growth and was one of the most densely populated regions in Brazil until 1920. In the first half of the last century the mineiro population represented around 16% of the Brazilian population, a percentage which increased to around 20% in the second half. Furthermore, a large proportion of the mineiro population was made up of slaves. In the eighteenth century, negroes made up over one-third of the mineiro population¹⁰⁹. During 1831-40 and 1854-57, slaves accounted for 31% and 25% of the total population respectively¹¹⁰. According to the census of 1872, there were 1,510,806 slaves in Brazil, of whom nearly a quarter were to be found in Minas Gerais, as shown in Table I.7. Of the estimated 723,000 Brazilian slaves shortly before the abolition of slavery in 1888, nearly 27% were in Minas Gerais, more than in any other province in absolute terms¹¹¹. After abolition, social mobility remained difficult for coloured people, and whites continued to control the high-status positions in the hierarchical and agrarian-based mineiro society. Although priding themselves on having a tolerant attitude towards race, the mineiro elite had a low estimation of the coloured. Moreover, most of the surviving Indian tribes had long since migrated into Goiás to avoid being hunted and enslaved by settlers or catechized by missionaries. Thus, choosing to ignore the

¹⁰⁸ Ibid., pp.23-4.

¹⁰⁹ Ibid., pp.14-6.

¹¹⁰ Libby, Transformação e Trabalho, pp.46-7.

¹¹¹ L. Kowarick, Trabalho e Vadiagem: A Origem do Trabalho Livre no Brasil, (São Paulo, 1987), pp.52-3.

coloured, and having expelled most of the Indians, the mineiros directed their attentions towards European immigrants for labour supply. But immigrants who, in turn, preferred São Paulo and the southern parts of Brazil to Minas¹¹².

Table I.7 - Brazilian population in 1872 per province and divided by nationals and slaves.

PROVINCES	POPULATION		
	NATIONALS	SLAVES	TOTAL
Alagoas	312,268	35,741	348,009
Amazonas	56,631	979	57,610
Bahia	1,211,792	167,824	1,379,616
Ceará	689,773	31,913	721,686
Rio de Janeiro*	226,033	48,939	274,972
Espirito Santo	59,478	22,659	82,137
Goiás	149,743	10,652	160,395
Maranhão	284,101	74,939	359,040
Mato Grosso	53,750	6,667	60,417
Minas Gerais	1,669,276	370,459	2,039,735
Pará	247,779	27,458	275,237
Paraíba	354,700	21,526	376,226
Paraná	116,162	10,560	126,722
Pernambuco	752,511	89,028	841,539
Piauí	178,427	23,795	202,222
Rio de Janeiro	490,087	292,637	782,724
Rio Grde. do Norte	220,959	13,020	233,979
Rio Grde. do Sul	367,022	67,791	434,813
Santa Catarina	144,818	14,984	159,802
São Paulo	680,742	156,612	837,354
Sergipe	153,620	22,623	176,243
Brazil	8,419,672	1,510,806	9,930,478

Source: Ministério da Agricultura, Indústria e Commercio, Recenseamento do Brazil Realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, p.414.

* The city of Rio de Janeiro.

Foreigners as a group were relatively unimportant, although in the 1860s German colonists turned artisans were the original pool of talent for Juiz de Fora's entrepreneurial class¹¹³. Moreover, the South zone was the major area of Italian immigration in the late nineteenth century and Italian rural workers turned craftsmen and merchants provided urban services for the South's small cities, as well as for Juiz de Fora, São João del Rei, and Barbacena. Nevertheless, immigration was a failure and between 1900 and 1920 there was a net out migration of foreigners from Minas Gerais¹¹⁴. Despite all the efforts (such as state-subsidized

¹¹² Wirth, op.cit., pp.14-6.

¹¹³ L.A.V. Arantes, "As Origens da Burguesia Industrial em Juiz de Fora, 1858/1912", Universidade Federal Fluminense, unpublished M.Sc. thesis, 1991, pp.81-109.

¹¹⁴ Wirth, op.cit., p.14.

passages and agricultural colonies), Minas Gerais could neither attract nor hold immigrants during the phase of major population transfer from the Old to the New World (1880-1920)¹¹⁵. In the 1890s, around 50,000 immigrants came to Minas at the expense of the state, whereas more than 700,000 went to São Paulo¹¹⁶. The failure to bring European labourers drew the attention of the mineiro elite to the native labour force made up of ex-slaves and caboclos, who traditionally were thought to lack motivation, reliability, and skill. Poor but happy, the caboclo had long been thought to live a carefree existence off the land. His image improved with the need for his labour¹¹⁷.

Thus, during the nineteenth century the mineiro economy was transformed into agro-pastoral economy after the decay of eighteenth-century gold-mining economy. In the 1830s, the gold-mining industry became dominated by foreign-owned large-scale enterprises exploring underground mines. Until the coffee boom of the middle of the last century, cattle-raising was the main economic activity in Minas Gerais. From the 1850s onwards, coffee became the main mineiro item of trade. Nevertheless, the coffee economy was restricted to the southern part of the province, adjoining Rio de Janeiro, and its impact on the mineiro economy as a whole was not comparable to that of the coffee economy in São Paulo. The abolition of slavery in 1888 forced the entrepreneurial class to resort to the native labour force, since European immigration was a failure. In the last quarter of the century, the first industries began to emerge, mainly the textile industry which was the largest industrial sector until the 1920s, just as in the rest of Brazil. It was during this period also that the first phase of railway construction took place. Nevertheless, nineteenth-century Minas Gerais was sharply divided into two halves: the developed south and the backward north. The central part was the seat of the provincial - and later the state - government, but exerted very little influence over the rest of Minas Gerais. Most of the other sub-regions were more closely linked, economically and culturally, to São Paulo, Rio de Janeiro, or Bahia.

¹¹⁵ Iglésias, Política Econômica do Governo Provincial Mineiro, p.129.

¹¹⁶ M.T.S. Petrone, "Imigração", in História Geral da Civilização Brasileira, ed. S.B. Holanda (São Paulo, 4th. ed. 1985), IX, pp.104-21.

¹¹⁷ Wirth, op.cit., pp.14-6.

PART I - THE ENTREPRENEUR

Introduction

This section is divided into two chapters. The first examines the evolution of the concept of the entrepreneur, the nature of entrepreneurship in different economic environments, and the debate about the emergence of the entrepreneur in the Brazilian economic historiography. This analysis establishes the theoretical framework for the second chapter which, in examining the social background of mineiro entrepreneurs and the origin of their capital, contributes to an investigation of the business environment in nineteenth-century Minas Gerais.

The analysis of the mineiro entrepreneur reveals that there was a great deal of entrepreneurial initiative in nineteenth-century Minas Gerais and that the general social attitude towards entrepreneurship was on the whole positive. It also shows that in contrast with their counterparts in São Paulo and Rio de Janeiro, mineiro entrepreneurs were mainly recruited from the local elite constituted basically by Brazilians. Furthermore, although the sources of capital (mainly agriculture and trade) used by mineiro entrepreneurs were not very distinct from that used by their paulista and carioca counterparts, they differed in their nature with coffee and import-export activities playing a smaller role.

Chapter 2 - A BRIEF REVIEW ON THE LITERATURE ON THE ENTREPRENEUR

This chapter is divided into two parts. The first addresses the concept of the entrepreneur in the economic literature. The second examines the emergence of the Brazilian entrepreneur during the nineteenth century and considers debate about the social and economic origins of the Brazilian industrialist as a prelude to the analysis of the formation of mineiro entrepreneurial class in the nineteenth century.

2.1 - The Concept of the Entrepreneur

The authors reviewed here are either leading authorities on the subject or those whose works have indirectly influenced the study of the entrepreneur. Several other authors could have been included but because of the scope of this work and the lack of relevance of their work to the study of nineteenth-century business environment they have not been included¹.

Even though there is no established theory of the entrepreneur, the subject has been extensively discussed by economists, political scientists, and sociologists². The entrepreneurial function in society is probably as old as the institutions of barter and exchange and many economists would probably agree that the entrepreneur is a central figure in economic life. Despite his pivotal importance in economic activity, the entrepreneur has been a shadowy and elusive figure. His actions have more often been attributed to faceless institutions or impersonal market structures. Nevertheless, entrepreneurship has been traditionally associated with the activities of businessmen³.

The term entrepreneur is of French origin which until the end of the twelfth century encompassed the functions of inventor, planner, architect, builder, manager, employer, and supervisor, but not those of capital provision and risk-taking. It was only with the emergence of capitalism that a clearer distinction emerged between those who performed artistic and technical functions, and those who undertook the commercial aspects of any enterprise. It was Richard Cantillon, an eighteenth-century businessman and financier, who first used the concept obtrusively and infused it with precise economic content. Cantillon suggested that the entrepreneur is someone who has the foresight and willingness to assume risk and takes the action requisite to making a profit. This self-interested and daring activity has important social consequences: it is the actions of entrepreneurs reacting to changes in prices that brings about a balance

¹ For a further discussion of the concept of the entrepreneur and its historical evolution in the economic theory see R.F. Hébert and A.N. Link, The Entrepreneur: Mainstream Views and Radical Critiques, (New York, 1982); M. Casson, The Entrepreneur: An Economic Theory, (Oxford, 1982); H. Barreto, The Entrepreneur in Microeconomic Theory: Disappearance and Explanation, (New York, 1989); M. Binks and P. Vale, Entrepreneurship and Economic Change, (1990); and H. Lydall, The Entrepreneurial Factor in Economic Growth, (1992).

² Casson, op.cit., p.9.

³ Hébert and Link, op.cit., pp.7-9.

between supply and demand in specific markets. In other words, the entrepreneur is described as the equilibrating mechanism in a market economy. Furthermore, Cantillon suggests that the entrepreneur is a capitalist, but to a very limited extent⁴.

It is easy to see how foresightness, a willingness to assume risk and to act as described by Cantillon, was a requisite for entrepreneurial activity in the backward economic environment of nineteenth-century Minas Gerais. The obstacles posed by the lack or inadequacy of some of the basic requirements conducive to normal business could only be overcome by particularly adventurous individuals who had initiative and were willing to take risks.

Among the French writers, the distinction between capitalist and entrepreneur was common until the physiocrats introduced new shades of meaning to the term⁵. Quesnay, for example, described the entrepreneur as a mere patron who supervised the labour process but did not participate in it directly. Quesnay envisaged an analytic system, grounded in agrarian capitalism, that featured three economic classes. The participation of each in the economy was related to, and determined by, the economic function of its members. The propertied class owned land and leased it to the farmers who in turn produced the raw materials demanded by a sterile class of artisans. Thus, farmers constituted the only productive class in the system while landlord-proprietors advanced capital to enterprising farmers⁶. Baudeau, a follower of Quesnay and a physiocrat himself, described the entrepreneur as someone motivated by profits, a decision-making individual who bears risk because of the nature of his activities and also invents or innovates in order to reduce costs and thereby raise profit. Baudeau went beyond Cantillon in emphasizing the importance of ability - the entrepreneur need for information and knowledge. Because the agricultural entrepreneur carried on production at his own risk for his own account, he had to have the capacity to exercise control over productive processes, i.e., to act in an entrepreneurial way. In order to do this the entrepreneur has to be an innovator⁷. Turgot, another physiocrat, did not make any distinction between the capitalist and the entrepreneur. For him, the entrepreneur is a capitalist who employs labour in a productive process either in agriculture or in manufacturing. Thus, the same person supplies the capital and employs the labourers and makes production possible⁸.

It is interesting to point out that both Turgot and Cantillon described the entrepreneur as pivotal to the market system, although they differed in their assessments about the nature of entrepreneurship. As mentioned above, Turgot assumed that the entrepreneur was a capitalist and for Cantillon ownership of capital was not an essential prerequisite. Furthermore, it is important to emphasize that whereas Quesnay

⁴ See R. Cantillon, Essai sur la Nature du Commerce en Général, (1931), Part I, Chapter XIII.

⁵ Hébert and Link, op.cit., p.24.

⁶ F. Quesnay, Quesnay's 'Tableau Économique', (1972).

⁷ Hébert and Link, op.cit., pp.25-7.

⁸ A.R.J. Turgot, Reflexions on the Formation and the Distribution of Riches, (New York, 1971).

and Baudeau described the entrepreneur as a wealthy farm operator who plans, organizes, and takes risks, Turgot described him as a rich merchant or industrialist who advances capital and plans or supervises production in a effort to accumulate more wealth.

Although the economic context observed by these authors differed in several and important respects from that of nineteenth-century Minas Gerais, the most general aspects of their descriptions of the nature of entrepreneurship applies to the mineiro entrepreneur. Thus, the mineiro entrepreneurial class was mainly composed of wealthy men - farmers, merchants, and, towards the end of the century, industrialists - who planned, organized and supervised production, employing labour, advancing capital, and taking risks.

Jean-Baptiste Say also attributes to the entrepreneur a vital role in economic life. According to Say, the productive process is divided in three distinct stages: the first is the scientific stage whereby knowledge about the nature and purpose of any product must be acquired before it can be produced; the second stage - the entrepreneurial one - concerns the application of this knowledge to a useful purpose; the last stage is the actual manufacture of the product. Thus, the entrepreneur has a pivotal role because, although all three stages of the productive process are necessary, it is the entrepreneur who combines them all. Furthermore, to be an entrepreneur requires certain qualities - sound judgement, perseverance, and knowledge of business. The entrepreneur needs to be able to estimate, with some accuracy, the importance of a specific product, probable demand, and the means for its production. In other words, entrepreneurial activity is synonymous with management, which does not necessarily include ownership of capital. Although both functions can be combined in the same person, entrepreneurial and capitalist functions are separated. The entrepreneur-manager is an expert in organization and administration, whereas the capitalist is just the lender of money. Furthermore, contrary to authors mentioned earlier, the entrepreneur in Say is not necessarily a risk-taker⁹.

What does Say contribute to the study of the mineiro entrepreneur? It is interesting to point out that in a economic environment such as nineteenth-century Minas Gerais, where technological production was virtually non-existent, the nature of entrepreneurship differed slightly from that observed in advanced economies: it had less to do with the application of technology to a useful purpose and more to do with the successful transfer of the technologies devised elsewhere. Furthermore, management ability, stressed by Say, proved to be an extremely important requisite for the mineiro entrepreneur. Because enterprises were neither large nor complex enough to have a developed managerial capability, businessmen had to manage firms themselves, with little or no help. Thus, they needed sound judgement to estimate probable demand for their products, and the means for producing them.

Classical economists did not attribute to the entrepreneur any special role in economic life. Smith, for example, failed to separate the entrepreneur from the various kinds of industrious people in the economy, as if each business was practically run by itself. There were passing references to the merchant or undertaker, who accumulated capital and merely hired workers who did the rest. There are also references to the fact that the capital of the undertaker was exposed to risk, but his function was merely the supervision

⁹ J.B. Say, Tratado de Economia Política, (São Paulo, 1983).

of his business in order to guarantee his profits¹⁰. Ricardo does not use the term entrepreneur. Neither does he conceive of businessmen as agents of change, rather he refers to them as shadowy bearers of technological improvements¹¹. Mill's main contribution was his analysis of business income. According to Mill, businessmen receive wages of superintendence - as a return for their skill and ability as managers - a premium for risk-taking, and interest on the part of their own capital that they employed. Mill is not precise about whether or not risk bearing is an entrepreneurial task along with management. Furthermore, he failed to distinguish the entrepreneur from the capitalist and said nothing about the entrepreneur as innovator¹².

This classical legacy was bequeathed to Karl Marx who also did not distinguish the functions of the capitalist from those of the entrepreneur. According to Marx, the capitalist is the possessor of money which is used in the process of circulation with the intention of making more money. However, the capitalist exists only as a potential purchaser of labour and becomes a real capitalist only when the worker submits to the commands of capital. The purpose of the capitalist is the appropriation of ever more wealth. He achieves it by turning his money into commodities which serve as the building materials for a new product and as factors in the labour process, and by incorporating labour, transforming value into capital. Moreover, due to the very nature of the labour process, the command of capital develops into a requirement, into a real condition of production. The unification of wage-labourers into one single productive body, and the establishment of a connection between their individual functions, lies on the competence of the capitalist who brings them together and maintains them in that situation. Thus, the function of the capitalist becomes the work of directing, superintending, and combining factors of production. However, as soon as the capitalist's stock of capital has reached a critical threshold, he is relieved from actual labour and transfers the task of direction and supervision to a special kind of wage-labourer, managers, foremen, and overseers who command the labour process in the name of capital. The work of supervision becomes their established and exclusive function. Nevertheless, to act as a capitalist means to supervise and direct the process of capital's valorization, which is wider than the supervision of the labour process and includes the purchase of the means of production, the sale of the labour's products, and so on¹³.

Thus, the Marxian entrepreneur is a capitalist and an employer of factors of production. The latter function includes the supervision and management of the productive process, reinforcing the managerial side of the entrepreneurial activity, pointed out by Say, a contribution which also applies to the study of the mineiro entrepreneur.

¹⁰ A. Smith, Inquiry Into the Nature and Causes of the Wealth of the Nations, (Harmondsworth, 1970), pp.201-47, 459-75.

¹¹ See D. Ricardo, Principles of Political Economy and Taxation, (Cambridge, 1992), Chapter VI..

¹² J.S. Mill, Principles of Political Economy With Some Other Applications to Social Philosophy, (New York, 1987).

¹³ K. Marx, Capital, (1988), I.

At the end of the nineteenth century the study of the entrepreneur was greatly influenced by the work of German historians and sociologists, who believed that to understand man's economic behaviour and the institutions which constrained such behaviour, a thorough analysis of the historical process was necessary. Schmöler, for example, began to analyse historical economic behaviour and discovered that a central factor present in all economic activity was the spirit of enterprise, or the entrepreneur. Sombart and Weber extended Schmöler's ideas. Sombart introduced the idea of a new leader (the entrepreneur) who animates the entire economy through creative innovation, whereas Weber described the entrepreneur as a deviant who breaks way from the old methods of production and creates new ones¹⁴.

Weber's main concern was to explain how a social system evolved from a stable form to a another type of society. A static society does not require the activity traditionally associated with the entrepreneur and the ordinary routine work is done either by workmen or managers. However, this stable and self-perpetuating state is at some point altered and this change have been historically associated with charismatic leaders of an entrepreneurial nature. Thus, the motives behind this entrepreneurial force are important to the understanding of the evolution of the society. In the specific case of the emergence of the modern form of capitalism, Weber identified religious imperatives as the critical characteristics of the successful entrepreneur. These religious imperatives make up what is called the Protestant ethic and the specific ethos of the first European capitalist entrepreneurs. According to Weber, it is the ethos of the first European capitalist entrepreneurs which explains why the modern form of capitalism is a phenomenon peculiar to Western civilization.

Entrepreneurs were the predominant bearers of the "spirit of capitalism", which combined the impulse to accumulate with a frugal life-style. The accumulation of wealth was morally sanctioned in so far as it was combined with a sober, industrious career; wealth was condemned only if employed to support a life of idle luxury or self-indulgence. Though, the greatest possible productivity in work and the rejection of luxury led to a style of life which directly influenced the spirit of capitalism, by creating the right atmosphere for its development. Thus, for Weber, the spirit of capitalism was closely connected with the Puritan religious ideas which supplied the moral energy and drive to the capitalist entrepreneur. It is important to emphasize the crucial role played by the entrepreneur in Weber's framework. According to the author, what brought about the capitalist revolution in the economic life was not a stream of new money invested in the industry, but, above all, the spirit of capitalism¹⁵.

Thus, Weber describes the entrepreneur as a deviant, who is not necessarily a capitalist, driven by a set of principles and values, which in the case of the first European entrepreneurs was embodied in the Protestant ethic. This analysis provides an useful starting point for the investigation of the intellectual formation of the mineiro entrepreneur and the ideas which drove them. In some parts of Minas Gerais, for example, European immigrants of a Protestant background constituted an important source of entrepreneurs.

¹⁴ Hébert and Link, *op.cit.*, pp.29-35.

¹⁵ M. Weber, The Protestant Ethic and the Spirit of Capitalism, (20th. ed. 1989).

In others, the intellectual formation of some of the most prominent entrepreneurs followed principles very similar to the ideas which constituted the background of the spirit of capitalism, as defined by Weber.

Schumpeter is another classical author. The main point of his analysis is the intimate association between entrepreneur and economic development. To Schumpeter development is a spontaneous and discontinuous change in the channels of the existing course of economic growth, it alters and displaces forever the equilibrium state previously existing. These spontaneous and discontinuous changes may occur in the following cases: 1) the introduction of a new good; 2) the introduction of a new method of production; 3) the opening of a new market; 4) the conquest of a new source of supply of raw materials or semi-manufactured goods; 5) the carrying out of new organization in an existing industry. Credit can be used to facilitate the acquisition of the necessary means of production as to foster new combinations. The credit supply, however, is the function of that category of individuals - the financiers - who the author identifies as capitalists and who should not be confused with the category of individuals who carry out the new combinations, the innovators and risk-takers, i.e. entrepreneurs. The Schumpeterian concept of the entrepreneur includes not only the innovator and risk-taker, the independent businessmen, but all who actually fulfil the function by which the concept is defined, like managers, members of boards of directors, and even other types of employees of a company. However, it does not include all heads of firms or managers or industrialists who merely may operate an established business. The concept, therefore, includes only those who actually have the capacity of innovation¹⁶.

Schumpeter's description of the new combinations of productive forces fits very well into what can be observed of the action of several mineiro entrepreneurs during the last century. However, his concept of the entrepreneur is sometimes a little narrow to fit into the mineiro experience. The carrying out of new productive combinations in the mineiro business environment involved much management effort, which was an essential part of the entrepreneurial activity.

A more recent contribution to the concept of entrepreneurship is the work of Kirzner, drawn from the so-called "Austrian School", of which Schumpeter was an early exponent, and which conceives the economy as a market process in a state of perpetual desequilibrium, driven by human action - man's constant alertness to the opportunity to improve his position. The tendency to desequilibrium creates continuously opportunities for entrepreneurial activity¹⁷. Thus, to Kirzner the entrepreneur is the arbitrageur and equilibrating agent whose prime characteristic is the ability to perceive profit opportunities and act upon them. He has no need to possess capital or special knowledge and he does not fulfil any coordinating or management role in the productive process. Thus, the entrepreneur requires no special ability to carry out his function other than the capacity to perceive an opportunity for gain thereby ensuring increasing perfection in the working of the market¹⁸.

¹⁶ J.A. Schumpeter, A Teoria do Desenvolvimento Economico, (Sao Paulo, 1982), p.68.

¹⁷ Lydall, op.cit., pp.69-71; Binks and Vale, op.cit., pp.12-3, 43; Barreto, op.cit., 14-21.

¹⁸ I.M. Kirzner, Competition and Entrepreneurship, (Chicago, 1973), pp.13-81.

The main difference between Kirzner and Schumpeter is that whereas the Schumpeterian entrepreneur acts breaking the state of equilibrium the Kirznerian entrepreneur is the equilibrating force of the economic life. However, both authors agree that risk-taking is an essential feature of the entrepreneurial function.

The authors reviewed so far have written about the entrepreneur regardless of the economic environment in which he acted. These authors did not take into account that the role of the entrepreneur and the nature of entrepreneurship may change according to differences in the business environment. One of the first authors to introduce such idea is Gerschenkron, who rejects those theories which predict that the industrially more developed countries present to the less developed countries a picture of their future. For Gerschenkron, such generalizations, based on the pattern of industrialization in England, does not fit the experience of more backward countries because it does not take into account the fact that the development in backward countries may differ fundamentally from that of advanced countries.

According to Gerschenkron, the entrepreneur plays an important role in the process of economic development since everywhere the process of industrialization means, among other things, the appearance of men, willing and able to exercise the entrepreneurial function. Nevertheless, the role played by the entrepreneur will be different according to the uniqueness of each individual country and, mainly, to its degree of backwardness. Different degrees of backwardness gave rise to divergent patterns of development where entrepreneurs, banks, and the State played distinct economic roles. Therefore, while entrepreneurs were crucial in the process of industrialization in England, the same cannot be said about the experience of backward countries. Despite the fact that the entrepreneur still plays an important role in the process of economic development, in moderately backward countries industrialization occurred under the aegis of the banks, or under the aegis of the State in more backward areas.

Industrialization in England occurred without any substantial utilization of banking for long-term investment purposes. By contrast, because in relatively backward countries capital was scarce and diffused, the distrust of industrial activities was considerable, and there was great pressure for bigness, the use of industrial investment banking was critical for development. However, such use was specific not to backward countries in general, but to those countries where backwardness did not exceed certain limits. Where the level of economic development was incomparable lower when industrialization began, the role of the State was clearly distinct. Usually in these countries the supply of capital required the compulsory machinery of the government. Thus, the greater the backwardness the less central is the role played by the entrepreneur. The banks or the State will replace him in some of his functions such as: capital provision and investment in infrastructure¹⁹.

Gerschenkron's main contribution to the study of the mineiro entrepreneur is his concept that different degrees of backwardness produced important qualitative differences in the nature of entrepreneurship. Thus, in backward countries banks or the State intervened to overcome the existing social

¹⁹ A. Gerschenkron, Economic Backwardness in Historical Perspective: a book of essays, (Cambridge, 1962).

and economic barriers to industrialization, replacing the entrepreneur in some of his traditional functions and devoting their attention to the heavy industry, rather than the light, and the building of infrastructure. Consequently, in backward countries it seems more likely to find entrepreneurs investing in light industries, such as textiles, food processing, and so on, which was indeed the starting point of the Brazilian industrial entrepreneurial class²⁰.

Hence, the various theories of the entrepreneur reviewed above describe the entrepreneur as risk-taker, capitalist, innovator, leader, manager, and employer of factors of production. He is presented as being motivated by material gains (most of the time, profits), will, religious conviction, or social recognition. He is perceived by some as a deviant, whose actions disrupt the "self-perpetuating equilibrium", and by others as the point of equilibrium in a market economy. Furthermore, depending on the degree of backwardness and the intellectual climate of the business environment there will be important differences in the role of the entrepreneur and the nature of entrepreneurship, resulting in the intervention of banks or the State. Thus, the various theories of the entrepreneur reviewed in this part provide an useful framework to the investigation of entrepreneurship in nineteenth-century Minas Gerais. The following part examines the debate about the emergence of the Brazilian entrepreneur in order to place the study about Minas Gerais within a more specific context.

2.2 - The Brazilian Entrepreneur

Drawing on the Brazilian economic historiography, this part considers the debates about the emergence of the coffee entrepreneurial class and the origins of the industrial entrepreneuriat in the nineteenth century.

During most of the nineteenth century, the Brazilian business elite struggled to legitimize itself. Legitimation was necessary because the business profession was held in low esteem and business enterprise usually relied on government support. Traditional Luso-Brazilian culture accorded the businessman low status and regarded him as habitually dishonest. A large proportion of the Brazilian business elite during this period was made up of foreigners. Merchants often faced the animosity of large landowners, the Brazilian dominant class, because of the nature of economic relations between them. Industrialists had to prove the desirability and feasibility of manufacturing as alternative to Brazil's traditional economy²¹.

The Brazilian economy in the late eighteenth century was overwhelmingly agricultural and pastoral and, moreover, export oriented. To speak of entrepreneurs at that time is to speak of *senhores de engenho* (sugar planters and millowners) and other plantation owners. During the colonial period, there was a clear distinction between the rural aristocracy, most of whom were Brazilians, and merchants, most of whom were foreigners. In the professions, Brazilians were generally restricted to those positions highly regarded in the

²⁰ F.C. Prestes Motta, *Empresários e Hegemonia Política*, (Sao Paulo, 1979), p.41.

²¹ E.W. Ridings, "Business Associationalism, the Legitimation of Enterprise, and the Emergence of a Business Elite in Nineteenth-Century Brazil", in *Business History Review*, 63, (Winter 1989), pp.757-8.

rural slave-owning society, such as lawyers. Brazilian wealthy and traditional families, would not invest nor work in the commercial sector, unless these activities were subordinated to agrarian interests. Equally they did not feature as import merchants and shopkeepers²². With the development of the coffee economy in the early 1820s, a new entrepreneurial class destined to play an important role in the future economic development of the country began to emerge. This new class was initially made up of local entrepreneurs who had accumulated some capital in commercial activities - mainly provisioning the city of Rio de Janeiro which was the main Brazilian consumer market - and later turned towards coffee production²³.

Comparing the processes of the formation of the ruling classes in the sugar and coffee economies, some fundamental differences can be pointed out. When the ruling class of the sugar economy was formed, commercial activities were controlled by groups established either in Portugal or in the Low Countries. The men in charge of production lacked any perspective of the sugar economy as a whole, as the production and commercial phases were separated. Furthermore, as the fundamental decisions were made at the commercial stage, the sugar-entrepreneurial class lost its true economic function and executive tasks were carried out by overseers and other employees. Thus, as Furtado puts it:

"It can therefore be easily seen how the former entrepreneurs [the sugar-entrepreneurial class] evolved into a class of idle landlords living within a small rural environment whose eventual descendants were to be the easygoing patriarch class."²⁴

Independence from Portugal did not bring about fundamental changes in the sugar-cane planting system.

The formation of the coffee economy occurred under quite different conditions. From the beginning, the ruling class was composed of men with business experience, as mentioned above, and production and trading interests were inter-related. The new coffee-entrepreneurial class was thus formed through a struggle for land, for labour supply, for internal means of transport, for marketing at the ports, for official contacts, and for financial and economic policies. These entrepreneurs indeed took advantage of their proximity to the capital of the country and soon took control of the government. But what particularly differentiates them from the other pre-existing dominant groups is the fact that they had a clear concept of their own interests and utilized that control to attain their objectives²⁵.

Thus, the sugar class lacked several of the characteristics of the entrepreneur enumerated by the economic literature such as risk-taker, capitalist, innovator, and leader. Even the managerial role was handed out to overseers and sugar entrepreneurs were restricted to the role of employers of factors of production. It was only the new class that emerged with the coffee economy which truly performed the role of the

²² L.C.T.D. Prado, "Commercial Capital, Domestic Market and Manufacturing in Imperial Brazil: The Failure of Brazilian Economic Development in the XIXth Century", University of London, unpublished Ph.D. thesis, 1991, pp.174-83.

²³ C. Furtado, The Economic growth of Brazil: A Survey from Colonial to Modern Times, (Los Angeles, 1965), pp.124-125.

²⁴ Ibid., p.125.

²⁵ Ibid., pp.124-6.

modern capitalist entrepreneur.

Nevertheless, it is important to point out that within the coffee entrepreneurial class there were important differences between coffee merchants from Rio de Janeiro and São Paulo. Coffee merchants were roughly speaking divided in three ideal types: factor, sacker and exporter. The factor was responsible for receiving the processed coffee sent by the planter and selling it to another domestic middleman, the sacker. The sacker, in turn, packaged coffee in lots conforming to the requirement of different export houses who sold it abroad. In Rio de Janeiro, coffee factors and sackers were predominantly Brazilian and Portuguese, whereas the export trade was controlled by a small number of foreign merchant houses. Furthermore, very often coffee planters became partners in many *carioca* factorage houses, rendering it difficult to differentiate the factor from the planter. Thus, small, specialized merchants controlled most of the coffee trade in the Paraíba Valley and played a large role in the pioneering coffee entrepreneurial class²⁶. In contrast, coffee trade in São Paulo since the beginning tended to be dominated by large export houses, mostly owned by foreigners, who concentrate all three roles (factor, sacker, and exporter) in one big operation²⁷.

However, during the first half of the nineteenth century no significant industrial class emerged. Although Rio de Janeiro and other Brazilian cities were full of establishments making soap, candles, cotton thread, clothing, hats, snuff, cigars, furniture and ironware, the textile and food-processing industries which were to form the basis of Brazil's early industrial growth did not appear until after 1840. Indeed there was no significant industrial growth until the 1870s. Furthermore, there is some controversy over the debate about the social and economic origins of the Brazilian industrial entrepreneurial class. Two main approaches may be identified in this debate. The first, the "bourgeois immigrant" approach²⁸, which argues that in the promotion of industrialization in Brazil the most important role was played by importers and immigrants, or the so-called bourgeois immigrant. The second, the "latecomer capitalism" approach²⁹, which argues that in São Paulo coffee-planters constituted the social group from which emerged the industrial bourgeoisie. Nevertheless, both approaches agree that until the end of the 1940s Brazilian industrialization was carried out by the rising national bourgeoisie. The participation of the State and of foreign capital was secondary

²⁶ For a detailed description between the relationship coffee planter, factor, sacker and exporter in Rio de Janeiro see J.E. Sweigart, Coffee Factorage and the Emergence of a Brazilian Capital Market, 1850-1888, (1987).

²⁷ For a more detailed account of the coffee merchant in São Paulo see R. Graham, Britain and the Onset of Modernization in Brazil, 1850-1914, (Cambridge, 1968). For a comparative view of the mechanics of the coffee of economy in the Paraíba Valley and Western São Paulo respectively see S.J. Stein, Vassouras: A Brazilian Coffee County, 1850-1900, (Cambridge, Mass. 1957) and W. Dean, Rio Claro: A Brazilian Plantation System, 1820-1920, (Stanford, 1976).

²⁸ Mainly represented by W. Dean, A Industrialização de São Paulo, (São Paulo, 1971), and J. Gorender, A Burguesia Brasileira, (São Paulo, 6th ed. 1986).

²⁹ Mainly represented by J.M. Cardoso de Mello, O Capitalismo Tardio: Contribuição à Revisão Crítica da Formação e Desenvolvimento da Economia Brasileira, (São Paulo, 1982) and W. Cano, Raízes da Concentração Industrial em São Paulo, (São Paulo, 3rd. ed. 1977).

during this period³⁰.

The "bourgeois immigrant" approach, argues that the great-grandfather of the Brazilian entrepreneur is the artisan agent and the trader. During the nineteenth century, with the emergence and development of the importing retail stores, the agent became either the owner of an importing retail store himself or a wage labourer. From these importing retail stores were created the largest fortunes of the country³¹. According to Prestes Motta, industry thought of in terms of establishments founded before the First World War was not only Brazilian, but also, fundamentally concentrated in textiles, food, and beverages. The textile industry represents the starting point of the national bourgeoisie, who conducted the first industrial up-surge. However, if it was the national bourgeoisie who carried out the first industrial up-surge, inside the primitive Brazilian entrepreneurial class, the importance of the immigrants is widely known³². According to Vinhas de Queiroz & Evans, at least 40% of the largest Brazilian economic groups were founded by immigrants³³. According to Silva, the nucleus of the rising industrial bourgeoisie in the coffee-growing regions descended from European immigrants³⁴. Furthermore, as Dean argues, the immigrants who became entrepreneurs were not the ones who did not have any resources. These bourgeois immigrants began in the trading business, mainly in export and import businesses which were controlled by foreign companies. Thus, their social origin and location ensured their position in commerce and manufacturing³⁵. Silva points out that the immigrant became the representative of foreign companies, and was entrusted with the distribution of branded products in the interior³⁶.

Generally speaking, most of these immigrants became industrialists after coming from the trading business, either as owners or as employees. In the city of Rio de Janeiro, most of the textile mills established during the last quarter of the last century were founded by foreign merchants dealing with the import of cloth³⁷. Several paulista retailers dealing in imports followed the same path. Given the importer's privileged position, owing to his control over the internal trade of that time and over commercial capital, he was the one who was frequently at the origin of manufacturing firms established after 1880. Three circumstances favoured the transformation of the importer into an industrialist. Firstly, importers already had

³⁰ A good brief account of both approaches is given by W. Suzigan, Indústria Brasileira: Origem e Desenvolvimento, (São Paulo, 1986), pp.31-8.

³¹ Dean, op.cit.

³² Prestes Motta, op.cit., p.41.

³³ Vinhas de Queiroz & Evans quoted in ibid., p.41.

³⁴ S. Silva, Expansão Cafeeira e Origem da Indústria no Brasil, (São Paulo, 1976), p.91.

³⁵ Dean, op.cit., p.58.

³⁶ Silva, op.cit., p.5.

³⁷ A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1985, pp.342-3.

complementary activities, such as assembly operations or even small industrial transformations, in order to deliver the final product. Secondly, the importer had knowledge of the market as well as the access to the credit provided by the foreign producers or local branches of European banks. Finally, as soon as internal consumption increased and diversified, and demand for more complex machinery also increased, they were stimulated to transform their sales agency into a licensed manufacturing plant³⁸.

According to the "latecomer capitalism" approach, coffee planters actively participated in the establishment of industries at the end of the nineteenth century. Nevertheless, it is important to emphasize that farmers were not the only ones to promote the establishment of industry: traders, bankers, immigrants, importers and other agents of the coffee complex established industries as well. But the great majority of them were in some way or another inter-related with the coffee economy complex. In other words, the Brazilian industrialist of the last century was someone wrapped up with the coffee economy in one way or another. He might be the farmer, the banker, the importer, the trader, the agent, or even all of them at the same time. He could have started in one of these activities, progressively becoming an industrialist. He also could be one of the coffee planters' relatives who got into industry with the planter's help. Thus, if one could draw the genealogical tree of the Brazilian industrialist one should certainly come to the conclusion that his great-grandfather was the colonial merchant capitalist; his grandfather, the merchant, slave-owning coffee planter; and, his father, the capitalist coffee planter or other businessmen of the coffee economic complex³⁹.

According to Cano, it was coffee capital which promoted the first industrial expansion, directly or indirectly. Farmers themselves invested their profits directly in industries, as well as indirectly, when their profits passed through the banking system (or were utilized in the establishment of the banks themselves) or through any other form of financial and capital intermediation⁴⁰. Some evidence of this fact can be found in Mello, who examines the portfolio of the most wealthy persons from São Paulo in the last quarter of the nineteenth century. This group was mainly constituted by farmers, and more specifically, farmers from Western São Paulo, growing coffee or sugar. According to the author, several of these names were directly or indirectly related with the main companies established in the last decades of the last century. They, or their relatives, were directors or shareholders in banks, railways, textile mills, public utilities companies, import and export trading companies, and a number of companies in different branches of the industry⁴¹.

As she puts it:

"There would be, therefore, resources in cash which transferred from the coffee export complex flowed to several other investments. Part of the agrarian capital, transformed in shares, constituted an important source of financing to the new undertakings."⁴²

³⁸ Dean, *op.cit.*, pp.25-9.

³⁹ Cardoso de Mello, *O capitalismo tardio*, and Cano, *op.cit.*.

⁴⁰ Cano, *op.cit.*, pp.69-87.

⁴¹ Z.M.C. Mello, *Metamorfoses da Riqueza: São Paulo, 1845-1895*, (São Paulo, 1985), pp.131-4.

⁴² *Ibid.*, pp.138.

Thus, the "latecomer capitalism" approach supports the idea that the Brazilian industrialist of the last century was someone who logically evolved from the development of the coffee economic complex and was intensively wrapped up with it.

To sum up, according to the Brazilian economic historiography the modern Brazilian capitalist entrepreneur emerged only in the second decade of the last century with the expansion of the coffee economy, first in the Paraíba Valley and then in Western São Paulo. This coffee-entrepreneurial class established the economic and social basis for the emergence of a further stage of capitalist development in Brazil. In regard to the origin of the Brazilian industrialist, there are two main interpretations: the first, which argues that in the promotion of industrialization in Brazil the most important role was played by importers and immigrants, the so-called bourgeois immigrant; the second, argues that coffee-planters constituted the social group within which the industrial bourgeoisie emerged. Moreover, although the State will have an important role in the Brazilian economic development later on, the process of industrialization which occurred during the last century was basically carried out by the Brazilian entrepreneurial class. However, most of what was written so far about the social and economic origins of the Brazilian industrialist are drawn based mainly on evidence of the experience of São Paulo and, to a lesser extent, Rio de Janeiro. Nevertheless, there is evidence suggesting that the pattern of entrepreneurial development in other parts of Brazil, like Minas Gerais was somewhat different.

Chapter 3 - THE MINEIRO ENTREPRENEUR

An important aspect in the study of the entrepreneur is the question of the availability of entrepreneurs. While classic economic theory devotes much attention to factor availability, it does not consider the supply of entrepreneurial talent. The general view is that there will be ample supply of entrepreneurs, as long as there is a suitable legal framework, a free market, and freedom of enterprise. Generally speaking, however, the supply of new entrepreneurs is influenced by the groups from which they come, by general social influences and attitude towards entrepreneurship, and by economic considerations.

In many societies, the pool of entrepreneurial talent is composed of the families, the associates and - occasionally - the workers of existing entrepreneurs. In less developed countries a large proportion of early industrial and commercial entrepreneurs were drawn from the rural sector. Possibly this was due to the farming traditions of independence and self-sufficiency handed down from generation to generation. Often the children of farmers could count on financial support when setting-up in business, as the case of the Mascarenhas family illustrates so well. Also, small early manufacturing enterprises were often established in the countryside¹.

The general social attitude towards entrepreneurship is another major influence on the supply of entrepreneurs. Social influences that derive from the educational system, literature and arts in general, religion, and politics affect the supply of entrepreneurs. Weber, as mentioned above, explored the influence of religion on the general attitude towards entrepreneurship in Western Europe. On the economic side, institutions, laws, or regulations which affect opportunities for the entrepreneurs can also be regarded as having an effect on the supply of entrepreneurship. The availability of means of transport or the willingness of financial institutions to provide funds to new or aspiring entrepreneurs are obviously significant².

This chapter will examine the social, ethnic, and economic origins of nineteenth-century mineiro entrepreneur. It will compare the main social and economic influences on the process of the formation of the mineiro and the Brazilian entrepreneurial classes. The first part investigates the social and ethnic background of the mineiro entrepreneur. Its main focus is an analysis of the social groups from which the mineiro entrepreneurs emerged. The second part examines the main economic influences on the formation of the mineiro entrepreneurial class. In other words, it investigates the main sources of capital available to would-be entrepreneurs.

3.1 - Social Background:

This part considers the social and ethnic origins of entrepreneurs. It is focused on the entrepreneurial formation in the main coffee-growing and non-coffee-growing regions of Minas Gerais (mainly the southern and the central parts respectively) and on four different economic sectors: iron;

¹ H. Lydall, The Entrepreneurial Factor in Economic Growth, (1992), pp.82-3.

² *Ibid.*, pp.84-6.

transport; textile; and electricity generating industries.

As shown above, the social group constituted by importers and immigrants, the so-called bourgeois immigrant, had a large influence on the formation of the paulista entrepreneurial class³. The importance of immigrants is also widely acknowledged, even in the case of the primitive Brazilian entrepreneurial class⁴. Regarding the formation of the mineiro entrepreneurial class, the participation of immigrants was much more limited. Immigrants had a small but relevant participation in the establishment of the mineiro iron industry and had a large participation in the entrepreneurial class of the Mata zone, a major coffee-growing area. Elsewhere, immigrants are hardly observed.

In the iron sector, foreign entrepreneurs were important during the first three-quarters of the last century. Two of the most successful foundries during this period were established by foreigners. The Patriótica foundry was set-up by Eschwege, a German engineer, who came to Minas Gerais in 1811 with the permission of the Portuguese Prince D. João IV for whom he had previously worked in the Figueiró dos Vinhos foundry in Portugal. He was reckoned to be a man of great knowledge, having written extensively about natural sciences⁵. Thus, it is reasonable to conclude that he had a more elaborated background and can be classified as a bourgeois immigrant, as defined by Dean⁶. The São Miguel de Piracicaba foundry was founded by Monlevade, a French engineer who came to Brazil in 1817⁷. Other foundries, smaller and less important, were also established by foreigners⁸. Furthermore, foreigners and their descendants participated in the establishment of the larger foundries which began to dominate the mineiro iron industry in the last quarter of the last century. The Esperança foundry was established in 1888 by three Brazilians (Amaro da Silveira, Henrique Hargreaves, and Carlos da Costa Wigg) and a Swiss metallurgist (Alberto Gerspacher). Later José Gerspacher (son of Alberto Gerspacher and who operated both mills) and Carlos da Costa Wigg established the Burnier foundry in 1892⁹.

Thus, foreign entrepreneurs had a small but relevant participation in the establishment of the mineiro iron industry. This seems due to the technological know-how that these foreigners possessed, which was not available in the form of machinery as was the case of the textile industry¹⁰. Nevertheless, from the

³ W. Dean, A Industrialização de São Paulo, (São Paulo, 1971).

⁴ F.C. Prestes Motta, Empresários e Hegemonia Política, (Sao Paulo, 1979), p.41.

⁵ F.A.M. Gomes, História da Siderurgia no Brasil, (Belo Horizonte/São Paulo, 1983), pp.79-85.

⁶ Dean, op.cit.

⁷ D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), p.149.

⁸ Ibid., pp.163-9.

⁹ W. Suzigan, Indústria Brasileira: Origem e Desenvolvimento, (São Paulo, 1986), pp.258-9.

¹⁰ For a further discussion of iron and textile technologies see chapters 6 and 7.

evidence presented above and bearing in mind that the estimated number of foundries in Minas Gerais during the period 1821-1893 was never smaller than 30¹¹, it is clear that most of the foundries belonged to Brazilians.

The participation of immigrants was much larger within the entrepreneurial class of the Mata zone. Here is widely accepted that foreign residents played a key role in the process of industrialization¹². The flow of immigrants to the region began in the 1850s with the establishment of an immigrant colony by the Companhia União e Indústria (CUI). Most of the immigrants were Germans, who were later responsible for the first industrial upsurge of Juiz de Fora. In the late 1880s, a large number of Italians arrived in Juiz de Fora. Several would subsequently establish tanneries and factories making hats, shoes, furniture, and so on¹³.

Table III.1 - Juiz de Fora: nationality of factory owners, 1858-1912.

Origin	No. of Establishments	%
Germans	28	43.1
Brazilians	19	29.3
Italians	14	21.5
English	01	1.5
Other	02	3.1
No Information Available	01	1.5
Total	65	100.0

Source: Adapted from L.A.V. Arantes, "As Origens da Burguesia Industrial em Juiz de Fora, 1858/1912", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niteroi, 1991, p.160.

Moreover, as shown in Table III.1, immigrants owned more than 66% of the total number of industries established in Juiz de Fora during the period 1858-1912, which seems to corroborated Lydall's view - presented above - that immigrants are one of the major sources of new entrepreneurs¹⁴. German immigrants were particularly well represented and owned the largest number of the industrial establishments (43%). Furthermore, it is important to point out that although nearly half of the Germans who came to Juiz de Fora were Catholics, those who became industrialists during the period 1858-1912 were mainly Protestants¹⁵. This seems to corroborate Weber's theory of the influence of the Protestant ethic on the

¹¹ Libby, *op.cit.*, p.154.

¹² For a further discussion about the participation of immigrants in the industrialization of Juiz de Fora see A. Esteves, *Álbum do Município de Juiz de Fora*, (Belo Horizonte, 1914); D.A. Giroletti, *A Industrialização de Juiz de Fora: 1850-1930*, (Juiz de Fora, 1988); P. Oliveira, *História de Juiz de Fora*, (Juiz de Fora, 1966); L.J. Stehling, "Trajetória da Indústria em Juiz de Fora", in *Revista do Instituto Histórico e Geográfico de Juiz de Fora*, (Juiz de Fora, 1966), Vol.2, No.2, pp.30-7; and L.A.V. Arantes, "As Origens da Burguesia Industrial em Juiz de Fora, 1858/1912", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1991.

¹³ Arantes, *op.cit.*, pp.87-121.

¹⁴ Lydall, *op.cit.*, p.83.

¹⁵ Arantes, *op.cit.*, pp.88-9.

formation of the spirit of capitalism. The figures presented in Table III.1 provide undisputable evidence of the importance of immigrants in the formation of the entrepreneurial class of the Mata zone, especially in the city of Juiz de Fora. Furthermore, contrary to what some authors observed in São Paulo¹⁶, the immigrant who became industrialist in Juiz de Fora usually did not fit into the "bourgeois immigrant" concept. Most of the immigrants who became industrialists in Juiz de Fora had initially come to Brazil to work as labourers, craftsmen, or farm hands, and were attracted by the prospect of owning a piece of land¹⁷.

Despite the importance of immigrants in the establishment of the iron industry and in the formation of the entrepreneurial class of the Mata zone, the mineiro entrepreneurial class was nevertheless largely constituted by Brazilians. Even in the Mata zone Brazilians were an important source of entrepreneurship. As shown in Table III.1, Brazilians were responsible for the establishment of nearly a third of the industries founded in Juiz de Fora in the period 1858-1912. Within Brazilians, industrialists not connected with the coffee economy owned just over 26% of the total number of industries. Farmers had a small participation, owning just over 3% of the industries established in Juiz de Fora¹⁸.

One of the most important enterprises set-up by farmers of the Mata zone was the Companhia União e Indústria (CUI). The company was established by Mariano Procópio Ferreira Lage, a farmer born in Barbacena, and several other farmers of the region¹⁹, as illustrated by the following remark made in the company report of 1857:

"I would like to acknowledge the services rendered to the company by two of its shareholders, (...). They are the Commendador José Antonio da Silva Pinto and Lino José Ferreira Armond. The Commendador José A. da Silva Pinto has advanced large amounts of money to the Company, (...); has hired out to the company more than a hundred slaves from his own stock, who are working on the construction of the turnpike between Mathias and the bridge over the Parahybuna river. Moreover, he has suffered several losses caused by the construction of the section which passes through his farm, destroying stables, etc., and has refused any kind of indemnification.²⁰

Thus, it seems that the CUI was established by local farmers interested in improving the means of transport for their production, as was the case with several of the first railways in the province of São Paulo²¹.

The textile industry, which was mostly concentrated in the central part of Minas Gerais, as shown in Map 3, was established almost exclusively by Brazilian entrepreneurs drawn from a few families or a

¹⁶ See Dean, *op.cit.* and J. Gorender, A Burguesia Brasileira, (São Paulo, 6th ed. 1986).

¹⁷ Arantes, *op.cit.*, p.98.

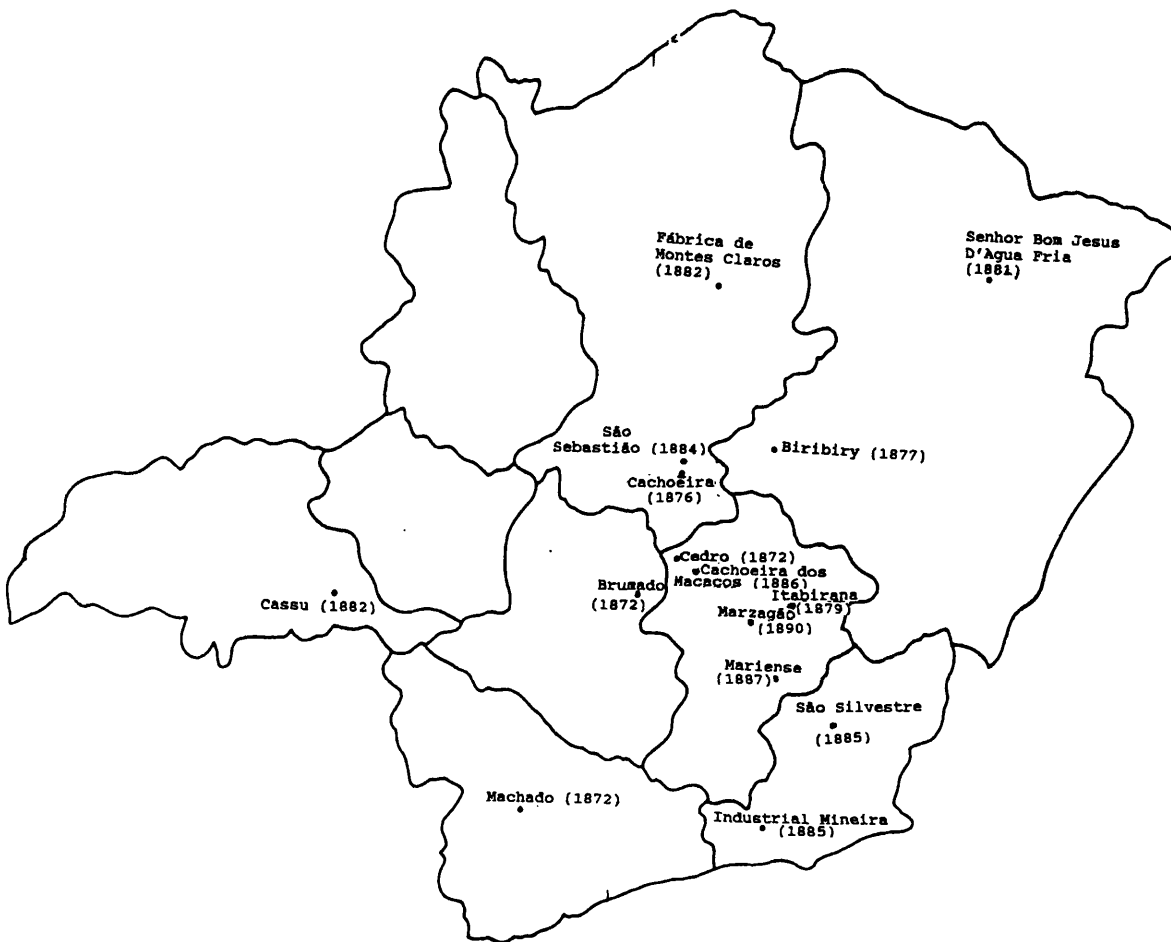
¹⁸ *Ibid.*, p.160.

¹⁹ *Ibid.*, p.35.

²⁰ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), pp.38-9.

²¹ C.M. Lewis, Public Policy and Private Initiative: Railway Building in São Paulo, 1860-1889, (1991), pp.35-55. For a further discussion about the building and the financing of the Paulista railways see also F.A.M. Saes, As Ferrovias de São Paulo, 1870-1940, (São Paulo, 1981).

MAP 3 - MINAS GERAIS: LOCATION OF TEXTILE MILLS FOUNDED BETWEEN 1872 AND 1887.



Source: D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), p.231.

small circle of friends. As shown in Table III.2, the mills founded during the 1870s were established by

Table III.2 - Minas Gerais: nationality of the main promoters and shareholders of the textile mills established in the 1870s.

MILL	MAIN PROMOTERS AND SHAREHOLDERS	NATIONALITY
Cedro	Antônio Cândido Mascarenhas	Brazilian
	Caetano Mascarenhas	Brazilian
	Bernardo Mascarenhas	Brazilian
Brumado	Franciso José de Andrade Botelho	Brazilian
SAIM	Azarias de Souza Dias	Brazilian
Biribiry	Santos family	Brazilian
Cachoeira	Pacífico Mascarenhas	Brazilian
	Victor Mascarenhas	Brazilian
	Francisco Mascarenhas	Brazilian
	Luis Augus o Vianna Barbosa	Brazilian
União Itabirana	Information not available	n.a.

Sources: Compiled from P. Tamm, Uma Dinastia de Tecelões, (Belo Horizonte, 2nd ed. 1960), pp.64-9; G. Guimarães, Francisco José de Andrade Botelho, (Belo Horizonte, 1950), p.14; M.L.P. Costa, A Fábrica de Tecidos de Machado, 1871-1917, (Belo Horizonte, 1989), p.25; M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development, 1868-1906", University of London, unpublished Ph.D. thesis, 1991, pp.50-1; G.M. Mascarenhas, Centenário da Fábrica do Cedro, 1872-1972, (Belo Horizonte, 1972), pp.93-118; S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), p.216.

Notes: (n.a.) information not available.

local entrepreneurs. The Cedro mill, for example, was founded in 1872 by three brothers - Antônio Cândido, Caetano, and Bernardo Mascarenhas - born in Taboleiro Grande, Minas Gerais²². During the same year, Franciso José de Andrade Botelho, born in Carrancas, Minas Gerais, set-up the Brumado mill²³. The Sociedade Anônima Industrial Machadense (SAIM) was organized in 1875 by 24 people, most of whom were local businessmen. Among them, Azarias de Souza Dias, the main promoter and shareholder, who was born in Santo Antônio do Machado, Minas Gerais²⁴. The Biribiry mill was established in 1876 by the bishop of Diamantina, Minas Gerais, João Antônio dos Santos, two of his brothers (Antônio Felício, and Joaquim Felício dos Santos), his nephew and another partner²⁵. The Cachoeira mill was founded in 1877 by three other brothers of the founders of the Cedro mill (Pacífico, Victor, and Francisco de Paula Mascarenhas), who were also born in Taboleiro Grande, and one of their brothers-in-law (Luis Augusto Vianna Barbosa),

²² P. Tamm, Uma Dinastia de Tecelões, (Belo Horizonte, 2nd ed. 1960), pp.64-9.

²³ G. Guimarães, Francisco José de Andrade Botelho, (Belo Horizonte, 1950), p.14.

²⁴ M.L.P. Costa, A Fábrica de Tecidos de Machado, 1871-1917, (Belo Horizonte, 1989), p.25.

²⁵ M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development, 1868-1906", Univeristy of London, unpublished Ph.D. thesis, 1991, pp.50-1.

born in Matozinhos, Minas Gerais²⁶. There is evidence that the União Itabirana mill, founded in 1876, was organized and financed by local people. A report of the Comissão Parlamentar de Inquérito observed that the União Itabirana mill had this name owing to the fact that most of its shareholders came from the city of Itabira, Minas Gerais²⁷.

As shown in Table III.3, during the 1880s textile mills continued to be founded by Brazilians, mainly local entrepreneurs. In 1880, the Filatório Montes Claros was established by a small group of locals connected by ties of kinship and friendship. The major shareholders were two brothers, Manoel and Donato Rodrigues, from Grao Mogol, Antônio Narciso Soares, born in Bocaiúva, Gregório Velloso, from Montes Claros itself and Angelo de Quadros Bittencourt, born in the province of Bahia²⁸. There is no information about the founders of the Marzagão mill established in Sabará in 1880²⁹. Similarly, there is no information about the date when the Cassú mill was established nor about its founders but given the name of the company, Borges, Irmãos & Co., it is reasonable to believe that the mill belonged to Brazilians³⁰. The same can be said about the owners of the Bom Jardim mill, established in 1883 by the partnership Pereira Murta & Co.³¹, and about the owners of the Viçosa mill, established in Viçosa by Mello & Reis Company³². The São Sebastião mill was established in 1884 by Antônio Gonçalves da Silva Mascarenhas, father of the Mascarenhas brothers, founders of the Cedro and the Cachoeira mill, who was born in Curral d'El Rey in Minas Gerais³³. Very little is known about the founders of the São Vicente mill established in Pau Grosso. However, shortly after its establishment the mill was acquired by the Companhia Cedro e Cachoeira (CCC), founded by the Mascarenhas family³⁴. The Companhia Cachoeira de Macacos (CCM) was established in 1886 by a group of locals brought together by Américo Teixeira Guimarães³⁵. He was born

²⁶ G.M. Mascarenhas, Centenário da Fábrica do Cedro, 1872-1972, (Belo Horizonte, 1972), pp.93-118.

²⁷ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), p.216.

²⁸ Versiani, op.cit., pp.81-2.

²⁹ Ibid., pp.75-6.

³⁰ Ibid., p.76.

³¹ Ibid., p.76.

³² Ibid., p.77.

³³ Tamm, op.cit., p.25.

³⁴ A.M. Vaz, Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987, (Belo Horizonte, 1990), pp.102-3.

³⁵ Versiani, op.cit., p.88.

in Inhaúma, Minas Gerais, and was the son of the main shareholder, João da Matta Teixeira³⁶. Little information is available about the União Lavrense mill, apart from the fact that it was established in 1886.

Table III 3 - Minas Gerais: nationality of the main promoters and shareholders of the textile mills established in the 1880's

MILL	MAIN PROMOTERS AND SHAREHOLDERS	NATIONALITY
Cassú	Borges, Irmãos & Co.	n.a.
Marzagão	Companhia Industrial Sabarense	n.a.
Filatório Montes Claros	Manoel Rodrigues Donato Rodrigues Antônio Narciso Soares Angelo de Quadros Bittencourt Gregório Velloso	Brazilian Brazilian Brazilian Brazilian Brazilian
Bom Jardim	Pereira Murta & Co.	n.a.
São Sebastião	Antônio Gonçalves da Silva Mascarenhas	Brazilian
Viçosa	Mello & Reis Co.	n.a.
Industrial Mineira	Andrew Steele John Steele Peter Steele William Moreth Henry Whittaker	English English English English English
São Vicente	Information not available	n.a.
União Lavrense	Information not available	n.a.
Cachoeira dos Macacos	João da Matta Teixeira Jeronymo Francisco França Américo Teixeira Guimarães	Brazilian Brazilian Brazilian
Santa Bárbara	Pedro da Matta Machado Augusto da Matta Machado Francisco F. Corrêa Rabelo Pedro José Verciani João Antônio L. de Figueiredo Antônio Moreira da Costa	Brazilian Brazilian Brazilian Brazilian Brazilian Brazilian
Paulo Moreirense	Information not available	n.a.
Mascarenhas	Bernardo Mascarenhas	Brazilian
Pedreira	Information not available	n.a.
São Roberto	Quintiliano Alves Ferreira	Brazilian
Industrial Ouro Preto	Information not available	n.a.

Source: Compiled from Versiani, *op.cit.*, pp.75-92; Tamm, *op.cit.*, p.25; A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), pp.102-3; N.A.M. Freitas, "Cia. Têxtil Cachoeira dos Macacos: Empresa que deu Origem a uma Cidade", Fundação Mineira de Arte Aleijadinho/Escola Superior de Artes Plásticas, Mimeo., Belo Horizonte, 1990p.17; N.L. Mascarenhas, *Bernardo Mascarenhas: o Surto Industrial de Minas Gerais*, (Rio de Janeiro, 1954), pp.123-5.

Notes: (n.a.) information not available.

³⁶ N.A.M. Freitas, "Cia. Têxtil Cachoeira dos Macacos: Empresa que deu Origem a uma Cidade", Fundação Mineira de Arte Aleijadinho/Escola Superior de Artes Plásticas, Mimeo., Belo Horizonte, 1990, p.17.

Nevertheless, there is evidence that most of its first shareholders lived in the city of Rio de Janeiro -there was pressure to transfer the headquarters of the company from Lavras to Rio de Janeiro³⁷. The founders of the Santa Bárbara mill, established in 1886, were a small and local group of friends and relatives born in the county of Diamantina where the mill was set-up, namely, the three brothers Alvaro, Pedro and Augusto da Matta Machado, their brothers-in-law Francisco Ferreira Corrêa Rabelo, Pedro José Verciani, and João Antônio Lopes de Figueiredo, and Antônio Moreira da Costa³⁸. There is no information about the founders of the Paulo Moreirense mill, established in 1887, nor about the founders of the Pedreira mill, founded in 1888³⁹. The Tecelagem Mascarenhas mill was organized in 1888 in Juiz de Fora by Bernardo Mascarenhas, who was born in Taboleiro Grande, as mentioned above⁴⁰. The São Roberto mill was founded in 1888 by Quintiliano Alves Ferreira, the Baron of São Roberto, who was a local businessman⁴¹. Although there is little information about the establishment of the Industrial Ouro Preto mill, it seems that the mill was set-up by capitalists from Rio de Janeiro⁴². The Industrial Mineira mill was one of the few textile mills established by foreigners during the 1880s: it was established in Juiz de Fora in 1884 by Englishmen - Andrew Steele, John Steele, Peter Steele, William Moreth, and Henry Whittaker⁴³. It is interesting to point out that, with the exception of the Industrial Mineira mill, the SAIM, and the Tecelagem Mascarenhas mill, all of the firms set-up before the end of the 1880s were established in non-coffee-growing areas.

Most of the textile mills organized during the 1890s were also founded by Brazilians, as shown in Table III.4. The Companhia de Tecidos Santanense (CTS) was set-up in Santana do São João Acima in 1891 by members of the Souza Moreira family: Manoel José de Souza Moreira, born in Bonfim, Minas Gerais; his sons, Manoel Gonçalves de Souza Moreira and Augusto Gonçalves de Souza Moreira, born in Santana do São João Acima; and his son-in-law, Antônio Pereira de Mattos, born in Campos, Rio de Janeiro⁴⁴. The São Joanense mill was established in 1891 by Antônio Moreira da Costa Rodrigues, of whom there is no information about his place of birth⁴⁵. The Companhia Industrial Pitanguense - which bought, enlarged and

³⁷ Versiani, *op.cit.*, p.88.

³⁸ *Ibid.*, pp.86-8.

³⁹ *Ibid.*, pp.89-91.

⁴⁰ N.L. Mascarenhas, Bernardo Mascarenhas: o Surto Industrial de Minas Gerais, (Rio de Janeiro, 1954), pp.123-5.

⁴¹ Versiani, *op.cit.*, p.91.

⁴² *Ibid.*, p.92.

⁴³ *Ibid.*, p.82.

⁴⁴ M.A.G. Souza, História de Itaúna, (Belo Horizonte, 1986), I, p.101-94.

⁴⁵ Versiani, *op.cit.*, p.128.

improved the Brumado mill - was founded in 1893⁴⁶. Its major shareholders were Luiz Augusto Vianna Barbosa, Francisco Bahia da Rocha, Sérgio Mascarenhas Barbosa, and Antônio Mascarenhas Barbosa respectively⁴⁷. Sérgio Mascarenhas Barbosa and Antônio Mascarenhas Barbosa were sons of Luiz Augusto

Table III.4 - Minas Gerais: nationality of the main promoters and shareholders of the textile mills established in the 1890s.

MILL	MAIN PROMOTERS AND SHAREHOLDERS	NATIONALITY
Santanense	Manoel José de Souza Moreira	Brazilian
	Manoel Gonçalves de Souza Moreira	Brazilian
	Augusto Gonçalves de S. Moreira	Brazilian
	Antônio Pereira de Mattos	Brazilian
São Joanense	Antônio Moreira da Costa Rodrigues	n.a.
Itabira do Campo	Information not available	n.a.
Pitanguense	Luiz Augusto Barbosa	Brazilian
	Francisco Bahia da Rocha	n.a.
	Sérgio Mascarenhas Barbosa	Brazilian
	Antônio Mascarenhas	Brazilian
Cachoeira Grande	Anônio Ferreira Alves da Silva	Brazilian
	João da Matta Teixeira	Brazilian
	Américo Teixeira Guimarães	Brazilian
	Herculino França	Brazilian
Progresso Fabril	Carlos Vaz de Mello	Brazilian
Melancias	Jeronymo Francisco França	Brazilian
	João da Matta Teixeira	Brazilian
	Theophilo Marques Ferreira	Brazilian
São Domingos	Moreira Penna family	Brazilians
São João Nepomuceno	Daniel de Moraes Sarmiento Junior	Brazilian
Jequitahy	Information not available	n.a.
Perpetua	Information not available	n.a.
Itinga	Information not available	n.a.

Source: Compiled from M.A.G. Souza, *História de Itaúna*, (Belo Horizonte, 1986), I, p.101-94; Versiani, *op.cit.*, p.128-243; G.M. Mascarenhas, *op.cit.*, p.118; Tamm, *op.cit.*, p.87; Companhia Industrial Pitanguense, *Lista Nominativa dos Srs. Subscritores*, (1894), in *Minas Gerais*, 5 January 1894, p.7; Companhia Industrial Pitanguense, *Estatutos*, (1893) in *Minas Gerais*, 5 January 1894, pp.7-8; Companhia Industrial Pitanguense, *Ata da Assembleia Geral Institutiva*, (1893) in *Minas Gerais*, 5 January 1894, p.7; Companhia Progresso Fabril, *Ata da Sessão da Assembléa Geral dos Accionistas para a Constituição da mesma Companhia*, (1893), in *Minas Gerais*, 23 May 1893, pp.6-8; Companhia Industrial São Domingos, *Ata da Assembléa de Instalação*, (1894), in *Minas Gerais*, 21 February 1894, p.7; and Companhia Industrial São Domingos, *Lista dos Acionistas*, (1894), in *Minas Gerais*, 21 February 1894, p.7.

Notes: (n.a.) information not available.

⁴⁶ Companhia Industrial Pitanguense, *Estatutos*, (1893) in *Minas Gerais*, 5 January 1894, pp.7-8; and Companhia Industrial Pitanguense, *Ata da Assembléa Geral Institutiva*, (1893) in *Minas Gerais*, 5 January 1894, p.7.

⁴⁷ Companhia Industrial Pitanguense, *Lista Nominativa dos Srs. Subscritores*, (1894), in *Minas Gerais*, 5 January 1894, p.7.

Vianna Barbosa⁴⁸ and Custódia Mascarenhas, one of the sisters of the Mascarenhas brothers⁴⁹. There is no information about the place of birth of Francisco Bahia da Rocha. However, one of his sons, who had the same name, was a minor shareholder in the CCC and had been manager of the São Vicente mill from 1894 to 1899⁵⁰. The Cachoeira Grande mill was established by Antônio Ferreira Alves da Silva, a farmer from Minas Gerais, associated with João da Matta Teixeira, Américo Teixeira Guimarães, and Herculino França, all three shareholders of the CCM⁵¹. The promoter and major shareholder of the Companhia Progresso Fabril, established in 1893, was Carlos Vaz de Mello, a politician from Viçosa, Minas Gerais⁵². The Melancias mill was established by a group of mineiro investors who were already associated with other textile undertakings in Minas Gerais: Jeronymo Francisco França, João da Matta Teixeira - both of whom were directors of the CCM at the time of the establishment of the Melancias mill - and Theóphilo Marques Ferreira who was born in Lagoa Santa, Minas Gerais⁵³. The São Domingos mill was founded in 1894 in Santa Bárbara by local people⁵⁴. Four of the seven original shareholders belonged to the Moreira Penna family⁵⁵. One of the members of the Moreira Penna family was Affonso Augusto Moreira Penna, who was one of the largest shareholders of the mill and Governor of Minas Gerais at this time⁵⁶. The major shareholder of the Companhia de Tecidos Mineiros São João Nepomuceno, organized in 1894, was Daniel de Moraes Sarmento Junior, who also belonged to a local family, the Moraes Sarmentos⁵⁷. There is no information available about the founders of the Itabira do Campo, the Jequitahy, the Perpetua, and the Itinga mills⁵⁸.

Hence, as evidence presented above has shown, most of the owners/shareholders of textile firms

⁴⁸ Versiani, op.cit., p.168.

⁴⁹ Tamm, op.cit., p.87.

⁵⁰ Versiani, op.cit., pp.169-70.

⁵¹ Ibid., pp.174-5.

⁵² Companhia Progresso Fabril, Ata da Sessão da Assembléia Geral dos Acionistas para a Constituição da mesma Companhia, (1893), in Minas Gerais, 23 May 1893, pp.6-8.

⁵³ Mascarenhas, Centenário da Fábrica do Cedro, p.118 and Versiani, op.cit., p.165.

⁵⁴ Companhia Industrial São Domingos, Ata da Assembléia de Instalação, (1894), in Minas Gerais, 21 February 1894, p.7.

⁵⁵ Companhia Industrial São Domingos, Lista dos Acionistas, (1894), in Minas Gerais, 21 February 1894, p.7.

⁵⁶ Versiani, op.cit., pp.172-74.

⁵⁷ Companhia Tecidos Mineiros, Relação dos Acionistas, (1894), in Minas Gerais, 11 February 1894, p.6.

⁵⁸ Versiani, op.cit., pp.128-243.

in nineteenth-century Minas Gerais were locals with strong ties of kinship and friendship. This is hardly surprising since, as Lydall has observed, in many societies families and associates are the main sources of entrepreneurial talents⁵⁹.

Comparison between the nationality of the main promoters and shareholders of textile firms established in Rio de Janeiro and Minas Gerais illustrates very well the ethnic differences between the

Table III.5 - The city of Rio de Janeiro: nationality of the main promoters of the textile companies established in the period 1878-1895.

COMPANY	MAIN PROMOTERS	NATIONALITY
FTSL	José Maria Teixeira de Azevedo	Portuguese
FTPG	Antônio Felício dos Santos José Rodrigues Peixoto John Sherrington	Brazilian Brazilian English
FTR	Frederico Glette	German
FFTTA	José Augusto Laranja Joaquim C. de Oliveira e Silva Henry Whittaker	Portuguese Portuguese English
FFTTB	Joaquim Marques da Costa	Portuguese
FFTC	Peter Steele Henry Whittaker George Holden	English English English
FTSJ	John Valentine Hall James Grainger Bellamy John Henry Lowndes	English English English
FTSC	Frederico Pinheiro da Silva John Henry Lowndes José da Cunha Ferreira	Brazilian English Brazilian
CFTCI	Manoel Salgado Zenha Francisco Tavares Bastos João José dos Reis	Portuguese n.a. Portuguese
CPIB	Banco Rural e Hypotecário Banco Internacional do Brasil	
CFTC	Viscount of Figueiredo Cândido da Cunha Sotto Maior	Brazilian Portuguese
CFTSF	Affonso de Lamare	n.a.

FTR - Fábrica de Tecidos do Rink; CFTC - Companhia de Fiação e Tecidos Corcovado; CPIB - Companhia Progresso Industrial do Brasil; FFTC - Fábrica de Fiação e Tecelagem Carioca; FTPG - Fábrica de Tecidos Pau Grande; FTSC - Fábrica de Tecidos de São Christóvão; FTSJ - Fábrica de Tecidos São João; FTSL - Fábrica de Tecidos São Lázaro; CFTCI - Companhia de Fiação e Tecidos Confiança Industrial; CFTSF - Companhia de Fiação e Tecidos São Félix; FFTTA - Fábrica de Fiação, Tecidos e Tinturaria Aliança; FFTTB - Fábrica de Fiação, Tecidos e Tinturaria Bomfim.

Source: A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1985, pp.98-283.

Notes: (n.a.) information not available.

mineiro entrepreneur and his carioca counterpart. Most of the textile mills established during the period

⁵⁹ Lydall, *op.cit.*, pp.80-9.

1878-1895 in the city of Rio de Janeiro were founded by foreigners. As shown in Table III.5, the Fábrica de Tecidos São Lázaro (FTSL) was founded in 1877 by José Maria Teixeira de Azevedo, a Portuguese⁶⁰. The Fábrica de Tecidos Pau Grande (FTPG) was founded in 1878 by Antônio Felício dos Santos, born in Diamantina Minas Gerais, José Rodrigues Peixoto, from Rio de Janeiro, and John Sherrington, an Englishman⁶¹. The Fábrica de Tecidos do Rink (FTR) was founded in 1879 by Frederico Glette, a German⁶². The Fábrica de Fiação, Tecidos e Tinturaria Aliança (FFTTA) was founded in 1880 by José Augusto Laranja, Joaquim Carvalho de Oliveira e Silva, both of them Portuguese, and Henry Whittaker, an Englishman⁶³. The Fábrica de Fiação, Tecidos e Tinturaria Bomfim (FFTTB) was probably founded in 1882 by Joaquim Marques da Costa, a Portuguese⁶⁴. The Fábrica de Fiação e Tecelagem Carioca (FFTC) was founded in 1884. The main promoters of the mill were three Englishmen Peter Steele, Henry Whittaker, and George Holden⁶⁵. The Fábrica de Tecidos São João (FTSJ) was probably founded in 1886 by Englishmen John Valentine Hall, James Grainger Bellamy, and John Henry Lowndes⁶⁶. The Fábrica de Tecidos de São Christóvão (FTSC) was founded in 1888 by two Brazilians, Frederico Pinheiro da Silva and José da Cunha Ferreira, and an Englishman, John Henry Lowndes⁶⁷. The Companhia de Fiação e Tecidos Confiança Industrial (CFTCI) was founded in 1885 by two Portuguese, Manoel Salgado Zenha and João José dos Reis, and Francisco Tavares Bastos, of whom there is no information about his nationality⁶⁸. The Companhia Progresso Industrial do Brasil (CPIB) was founded in 1889 by the Banco Rural e Hipotecário and by the Banco Internacional do Brasil⁶⁹. The Companhia de Fiação e Tecidos Corcovado (CFTC) was founded in 1889 by the Viscount of Figueiredo, a Brazilian, and Cândido da Cunha Sotto Maior, a Portuguese⁷⁰. Finally, the Companhia de Fiação e Tecidos São Félix (CFTSF) was founded in 1891 by Affonso de Lamare, of whom there is no information about his nationality⁷¹.

⁶⁰ Monteiro, *op.cit.*, pp.98-101.

⁶¹ *Ibid.*, pp.120-3.

⁶² *Ibid.*, pp.132-4.

⁶³ *Ibid.*, pp.143-7.

⁶⁴ *Ibid.*, pp.156-9.

⁶⁵ *Ibid.*, pp.169-76.

⁶⁶ *Ibid.*, pp.182-3.

⁶⁷ *Ibid.*, pp.193-4.

⁶⁸ *Ibid.*, pp.208-13.

⁶⁹ *Ibid.*, pp.223-9.

⁷⁰ *Ibid.*, pp.239-43.

⁷¹ *Ibid.*, pp.252-4.

A comparison between the nationality of the main promoters and shareholders of the mineiro and carioca textile industries reveals how different the mineiro entrepreneurial class was from that portrayed by the Brazilian economic historiography. Whereas a large number of carioca textile entrepreneurs were immigrants, their mineiro counterparts were mainly local entrepreneurs. The main reason accounting for this discrepancy was the larger concentration of foreigners in Rio de Janeiro. In the period 1872-1920, for example, foreigners represented no less than 20% of the carioca population, while during the same period they did not represent more than 4% of the mineiro population⁷². In addition, foreigners controlled the large sectors of commercial activities of the main urban centres. In the late 1850s, foreigners owned 62% of wholesale textiles in Rio de Janeiro⁷³. Soon, they dominated the manufacturing activities closed linked to their commercial activities, a process already observed in São Paulo⁷⁴

The mineiro electricity generating industry of the turn of the century was also mostly established by local entrepreneurs. The Companhia Mineira de Eletricidade (CME) was founded by Bernardo Mascarenhas, who was born in Taboleiro Grande, Minas Gerais, as mentioned above. Further evidence that the CME was a family and local affair is found in the following letter written by Bernardo Mascarenhas:

"I am organizing the CME, with a capital of 150:000\$000, divided into shares of 100\$000 each - I will keep 500 shares for myself, another 500 will be offered to the inhabitants of the city [Juiz de Fora] and 500 will be distributed within our family to those who want them."⁷⁵

Thus, among the 30 original shareholders, 12 belonged to the Mascarenhas family⁷⁶ and several others were prominent names of the local business community⁷⁷. The Companhia Força e Luz Cataguazes-Leopoldina

⁷² See Ministério da Agricultura, Indústria e Commercio, Recenseamento do Brasil Realizado em 1 de Setembro de 1920, (Rio de Janeiro, 1924), IV, 2nd. part, p.48 and Directoria Geral de Estatística, Relatório Anexo ao do Ministerio dos Negocios do Imperio de 1876, (Rio de Janeiro, 1877), p.15.

⁷³ L.C.T.D. Prado, "Commercial Capital, Domestic Market and Manufacturing in Imperial Brazil: The Failure of Brazilian Economic Development in the XIXth Century", University of London, unpublished Ph.D. thesis, 1991, pp.180-3.

⁷⁴ See Dean, op.cit., pp.25-40.

⁷⁵ Letter from Bernardo Mascarenhas reproduced in Mascarenhas, Bernardo Mascarenhas, p.118.

⁷⁶ The members of the Mascarenhas family and the number of shares that each one held were: Bernardo Mascarenhas (400), Policena da Silva Mascarenhas (100), Francisco Mascarenhas (78), Vitor Mascarenhas (50), Caetano Mascarenhas (50), Viriato Diniz Mascarenhas (35), Theóphilo Marques Ferreira (30), Elvira Diniz Mascarenhas (25), Pacífico Mascarenhas (20), Antônio Diniz Mascarenhas (20), Altivo Diniz Mascarenhas (15), and Antônio Augusto Mascarenhas (10), P. Oliveira, Companhia Mineira de Eletricidade: Pioneira da Iluminação Hidrelétrica na América do Sul, (Juiz de Fora, 1969), p.27.

⁷⁷ Among the original shareholders of the CME it is possible to identify the names of the following local businessmen: Francisco Baptista de Oliveira, the baron of Santa Helena - who together with Francisco Baptista de Oliveira founded the first bank in Minas Gerais, the Banco Territorial e Mercantil de Minas -, João Baptista de Oliveira e Souza - Francisco Baptista de Oliveira's father -, Frederico Ferreira Lage and Alfredo Ferreira Lage - sons of Mariano Procópio Ferreira Lage, founder of the CUI. Companhia Mineira de Eletricidade, Ata da Primeira Reunião dos Acionistas da Companhia Mineira de Eletricidade, Instalação

(CFLCL), in its turn, was established by two Brazilians and one Portuguese: Norberto Custodio Ferreira, born in Rio Novo, Rio de Janeiro⁷⁸; José Monteiro Ribeiro Junqueira, born in Leopoldina, Minas Gerais⁷⁹; and João Duarte Ferreira, born in Coimbra, Portugal, who came to Brazil in 1872⁸⁰.

A review of the origin of entrepreneurs who established the electricity generating industry in the cities of São Paulo and Rio de Janeiro also reveals a sharp difference with Minas Gerais. In the cases of São Paulo and Rio de Janeiro, the first electricity generating companies established at the turn of the century were founded by foreigners. The São Paulo Tramway, Light and Power Company (SPTLPC) was promoted by Francesco Antonio Gualco, an Italian businessman, and Frederick Pearson, an US engineer and capitalist. The company was founded in 1899⁸¹. The Rio de Janeiro Tramway, Light and Power Company Ltd. (RJTLPC) was promoted by Alexander Mackenzie, who was certainly a foreigner, and founded five years later by a group of Canadian capitalists⁸².

A further important aspect of the social origin of the mineiro entrepreneur is that the most prominent entrepreneurs of the nineteenth-century seem to have come from the ruling class and traditional families. Mariano Procópio Ferreira Lage, founder of the CUI, was born into a wealthy and prestigious family from Barbacena. His father, Mariano José Ferreira Armond, also born in Barbacena, was assigned a piece of land by the Portuguese government in 1794 and became an important farmer - the Fortaleza de Sant'Ana farm was huge and one of the most important farms in the Mata zone. In 1820, Mariano José was elected town councillor in Barbacena and later a provincial deputy⁸³. Mariano José was as wealthy as prestigious. In 1861 he hosted the Emperor Dom Pedro II and his entourage, as he had done previously with the Emperor D. Pedro I⁸⁴. Other close relatives of Mariano Procópio were wealthy and important. His sister, Maria José Ferreira Lage, married their cousin, Honório Augusto José Ferreira Armond, who was the second Baron of Pitanguy. Honório's father, Marcelino José Ferreira Armond - the first Baron of Pitanguy -, was Mariano José's stepbrother, an important political chieftain in Barbacena, and a wealthy farmer who had a

da Assembléia Geral e Constituição da Sociedade, reproduced in *ibid.*, pp.25-6.

⁷⁸ "O Falecimento do Dr. Norberto Custodio Ferreira", in Jornal Cataguases, (Cataguases), 17 February 1935, p.1.

⁷⁹ "Dr. José Monteiro Ribeiro Junqueira", in Gazeta de Leopoldina, (Leopoldina), 19 May 1946.

⁸⁰ L.S. Costa, Cataguases Centenária: Dados para a sua História, (Cataguases, 1977), p.541.

⁸¹ Panorama do Setor de Energia Elétrica no Brasil, ed. R.F. Dias, L.M.M. Cabral, P.B.B. Cachapuz, and S.T.N. Lamarrão, (Rio de Janeiro, 1988), pp.34-5.

⁸² *Ibid.*, pp.34-9.

⁸³ W.L. Bastos, Mariano Procópio Ferreira Lage: Sua Vida, Sua Obra, Descendência, Genealogia, (Juiz de Fora, 2nd ed. 1991).

⁸⁴ *Ibid.*, p.204.

fortune estimated at £400,000 in 1850⁸⁵.

Like his father, Mariano Procópio Ferreira Lage himself was a man of power and influence. Mariano Procópio was elected national deputy for Minas Gerais in 1861 and again in 1869. He was also the director of the Dom Pedro II railway (EFDPII) from 1869 until his death in 1872 and the director of the customs⁸⁶. In 1849, he was nominated an official of the Order of the Rose by the Emperor D. Pedro II⁸⁷. It also seems that he had enjoyed some intimacy with the Royal family, as can be inferred from the following letter sent to him in 22 April 1871:

"The Minister and Secretary of the Affairs of the Empire informs the Illustrious Deputy Mariano Procópio Ferreira Lage that His Majesty the Emperor invited him to attend at the Royal chapel on the 26th of this month at 11 o'clock to the high mass, beginning on the 25th at 6 o'clock in the afternoon, which will be celebrated in memory of Her Highness the Princess D. Leopoldina, Duchess of Laxe."⁸⁸

Mariano Procópio was very wealthy. When he died in 1872 he left a fortune of approximately 900 Contos (£93,600)⁸⁹.

Bernardo Mascarenhas - who founded several textile mills, a bank, an electricity generating company, and took part in several other enterprises -, was also born into a wealthy and prestigious family. His father, Antônio Gonçalves da Silva Mascarenhas, started as a merchant in the central part of Minas Gerais and later became a farmer and financier. When Antônio died in 1884 he was certainly one of the richest men in Minas Gerais. As a wealthy landowner Antônio enjoyed great political prestige. Although he had never participated directly in political activity, some of his sons did⁹⁰.

Antônio Gonçalves da Silva Mascarenhas had thirteen children: Antônio Cândido, Antonino, José, Custódia, Escolástica, Francisca, Victor, Pacífico, Caetano, Bernardo, Maria Teodora, Sebastião, and Francisco⁹¹. Most of them also became very wealthy and came to wield political influence. Antônio Cândido, Bernardo, Caetano, Victor, Pacífico, and Francisco, were partners in the Cedro and Cachoeira mills, and later in the CCC. Antonino, the second son, was a merchant, a muleteer and owned the Capim Branco farm in

⁸⁵ R.F. Burton, Viagem aos Planaltos do Brasil (1868), (São Paulo, 1941), I, p.147.

⁸⁶ Bastos, Mariano Procópio Ferreira Lage, p.16.

⁸⁷ "Receipt to Mariano Procópio Ferreira Lage signed by J.A. Brito, 29 March 1849", Biblioteca Nacional - Sessão de Manuscritos - Catálogo de Documentos Biográficos - Pasta C 1034-57.

⁸⁸ "Letter to Mariano Procópio Ferreira Lage from the Minister and Secretary of the Affairs of the Empire, the 22 April 1871". Biblioteca Nacional - Sessão de Manuscritos - Catálogo de Documentos Biográficos - Pasta C 1034-57.

⁸⁹ Bastos, Mariano Procópio Ferreira Lage, pp.172-3.

⁹⁰ Vaz, op.cit., p.34-40.

⁹¹ Ibid., pp.48-51, 71.

Sete Lagoas⁹². José, the third son, was established as merchant in Curvelo. Custódia married Luís Augusto Viana Barbosa, a farmer and an industrialist, as mentioned above. Escolástica was married to Quintiliano Soares Diniz, a farmer from Curvelo⁹³. Moreover, Pacífico - the eighteenth child - and Sebastião - the twelfth child - graduated in medicine and both became politicians. Pacífico was elected Vice-President of Minas Gerais in 1902 and Sebastião was several times elected national deputy for Minas Gerais⁹⁴. The Mascarenhas family was and remained very wealthy, prestigious and politically powerful.

Francisco Baptista de Oliveira, a famous businessman in Juiz de Fora, was born in Entre-Rios de Minas on the Santa Cruz do Salto farm which belonged to his father. Francisco's paternal grandfather, Gervásio Joaquim de Souza, had been a prestigious merchant and farmer in Entre-Rios de Minas where he was also the leader of the Conservative Party. He had fourteen children, among them, João Baptista de Oliveira e Sousa, Francisco's father. João Baptista, was also born in Entre-Rios and had been a merchant and cattle rancher. Francisco's maternal grandfather, Francisco Ribeiro da Silva, was a farmer, Lieutenant-Colonel of the National Guard, town councillor, district judge, and leader of the Conservative Party in Entre-Rios de Minas. He was granted the title of Knight of the Order of the Rose by the Imperial government. He had eleven children, among whom was Maria da Natividade e Oliveira, João Baptista's cousin and Francisco Baptista de Oliveira's mother⁹⁵.

The paternal grandfather of Américo Teixeira Guimarães, the promoter of the CCM, was Antônio Teixeira Guimarães, owner of the Nova and the Paraiso farms. His father, João da Matta Teixeira, was the main shareholder of the CCM and an established capitalist. Furthermore, as João da Matta Teixeira was wealthy and owned land, it is reasonable to conclude that he also was a farmer and that this must have been his main activity⁹⁶.

José Monteiro Ribeiro Junqueira, one of the founders of the CFLCL, was the son of a farmer from Leopoldina, José Ribeiro Junqueira, and belonged to a traditional family from southern Minas Gerais. José Monteiro Ribeiro Junqueira himself had a long political career. After graduating in law he was elected state deputy and re-elected four years later. He was also elected Mayor of Leopoldina, federal deputy, and senator. In 1931, he became Secretary of Agriculture for the state of Minas Gerais⁹⁷.

⁹² D.A. Giroletti, "Formação do Empresário Industrial", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1991, p.4.

⁹³ Tamm, *op.cit.*, p.87-151.

⁹⁴ *Ibid.*, p.87-151.

⁹⁵ W.L. Bastos, Francisco Baptista de Oliveira um Pioneiro: Sua Vida, Sua Obra, Sua Descendência, Genealogia, (Juiz de Fora, 1967), p.144-69.

⁹⁶ Companhia Cachoeira dos Macacos, "Ata da Assembléia Geral dos Subscritores de Ações da Sociedade Anonyma Cachoeira dos Macacos para Constituição da mesma", reproduced in Freitas, *op.cit.*, p.23.

⁹⁷ Gazeta de Leopoldina, (Leopoldina), 19 May 1946.

Norberto Custódio Ferreira, another founder of the CFLCL, was a public prosecutor in Ponte Nova and from 1895 to 1897 he was elected town councillor in Cataguazes⁹⁸.

Francisco José de Andrade Botelho, founder of a textile mill in Brumado, Minas Gerais, came from an important mineiro family. His paternal great grand-father, Francisco Ignacio Botelho, was a prestigious and wealthy farmer from Lavras. According to the Revista do Arquivo Público Mineiro of 1911:

"Among the most traditional families of this town [Lavras] which still had representatives, are the Botelhos, (...). The founder of the family Botelho was Francisco Ignacio Botelho, who died in this town on the 4th of August of 1796. He was the son of Francisco José Botelho and Thereza Maria Joanna, born in Carvilhan, Portugal."⁹⁹

Furthermore, one of Francisco José de Andrade Botelho's brothers, Fidélis, was elected senator of the empire in 1888¹⁰⁰.

João Antônio dos Santos, one of the founders of the Biribiry mill, was the bishop of Diamantina¹⁰¹ and belonged to an important local family. One of his nephews, Antônio Felício dos Santos, was a doctor in the city of Rio de Janeiro, a Liberal Party deputy from 1867 to 1886, one of the founders and the first president of the Associação Industrial, and one of the founders of the Fábrica de Tecidos Pau Grande¹⁰².

Francisco Leite Ribeiro's grandfather, José Leite Ribeiro, was born in Portugal in 1723 and emigrated to Minas Gerais to wash for gold in partnership with another Portuguese. With the wealth José derived from mining he invested in land and raised cereals, cane and cattle. When he died in 1801, he was a wealthy man. Francisco's father added to the wealth of the family by trading between Rio de Janeiro and the family base in São João d'El Rey, Minas Gerais. Francisco Leite Ribeiro himself began in mining near São João d'El Rey. He moved to Barbacena in 1805 where he was briefly occupied in tax farming. Then he moved to the border with Rio de Janeiro where he acquired 17 land grants after 1817. He devoted himself to the cultivation of coffee and by 1822 he was considered the largest farmer in Minas Gerais. When he died in 1845 he left a fortune of 1.087:000\$000 Contos (£115,113), including 225 slaves. In the 1860s, Francisco's son, Joaquim Vidal Leite Ribeiro, took part in banking in Juiz de Fora. In 1871, Joaquim moved to Rio de Janeiro, where he died in 1883, leaving a fortune of over 2.000:000\$000 Contos (£179,600), largely in public debt bonds¹⁰³.

Hence, biographical data reviewed above strongly supports the conclusion that most pioneer mineiro

⁹⁸ "O Falecimento do Dr. Norberto Custodio Ferreira", in Jornal Cataguases, (Cataguases), 17 February 1935, p.1.

⁹⁹ Reproduced in Guimarães, op.cit., p.14.

¹⁰⁰ Ibid., pp.11-31.

¹⁰¹ Versiani, op.cit., pp.50-1.

¹⁰² Monteiro, op.cit., p.122.

¹⁰³ P. Cammack, "State and Federal Politics in Minas Gerais, Brazil", University of Oxford, unpublished Ph.D. thesis, Oxford, 1980, pp.55-6.

entrepreneurs came from the ruling class and traditional families. They and their relatives were wealthy and politically influential. This is in clear opposition to what is known about the social origins of the pioneer British entrepreneurial class. In Britain, only a relatively small proportion of the pioneer industrialists came from the upper or lower classes. Most of them, came from the middle ranks of society, usually with mercantile connections¹⁰⁴.

Finally, it is interesting to take a brief look at the intellectual formation of one of the most prominent and successful entrepreneurial families of nineteenth-century Minas Gerais: the Mascarenhas family. In several important respects, the intellectual formation of the Mascarenhas family conforms with the Protestant ethic described by Weber. As mentioned above, Antônio Gonçalves da Silva Mascarenhas (Bernardo Mascarenhas' father) had thirteen children: nine sons and four daughters. Their formation began at home through an ascetic life-style, based on religious principles, and directed towards work - as a mean to achieve self-fulfilment -, discipline, sobriety, and independence. Their father's success in business was an example to be followed. Their entrepreneurial training also began at home, in their father's muletrain, retail store and farm, and in the daily contact with suppliers, customers and slaves, under the supervision of their father and elder brothers, in the case of the younger sons. Antônio Cândido, for example, began working in his father's retail store. Antonino began taking charge of his father's muletrain, while Caetano started overseeing the slaves of the São Sebastião farm. Furthermore, all thirteen children studied in the best boarding schools of Minas Gerais. After graduation, each son received a sum of 26 Contos, as an anticipation of their inheritance, in order to establish themselves as businessmen. Most of the sons followed their father becoming merchants, muleteers, financiers and farmers. Most of them also became industrialist. Furthermore, two of them - Pacífico and Sebastião - became doctors. Moreover, there is evidence to believe that this intellectual formation was not peculiar to the Mascarenhas family, since it met the spirit of the time and expressed very well the development of the Brazilian social and economic capitalist formation¹⁰⁵.

This analysis of the social and ethnic background of the mineiro entrepreneur has shown that a large and important proportion of the mineiro entrepreneurial class does not conform with the description contained in the general Brazilian literature. There are important contrasts with the entrepreneurs of São Paulo and Rio de Janeiro. The most obvious is the smaller importance of immigrants and coffee planters in the formation of the mineiro entrepreneurial class as a whole. As Cammack stressed:

"some of the most successful families in Minas in the nineteenth-century, in economic terms, owed nothing (...) to coffee"¹⁰⁶.

Therefore, apart from a few prominent cases in the iron industry and apart from the Mata zone, where immigrants made up the largest proportion of the local industrial class, Brazilians born into the ruling and traditional families, usually not connected with coffee-growing activity, seem to have been the main source

¹⁰⁴ P.L. Payne, British Entrepreneurship in the Nineteenth Century, (2nd. ed., 1988), p.21.

¹⁰⁵ Giroletti, Formação do Empresário Industrial, pp.3-15.

¹⁰⁶ Cammack, op.cit., p.57.

of entrepreneurs in nineteenth-century Minas Gerais. The social background of pioneer mineiro businessmen also differs from that of the pioneer British entrepreneurial class. The latter was mainly recruited among the middle ranks of society. However, the peculiarities of the mineiro entrepreneurial class are not restricted to the ethnic and social aspects. As it is going to be shown in the following section, there are important differences in what concerns the economic influences on the formation of the mineiro entrepreneur. Finally, the analysis of the Mascarenhas family, points to the existence of a "spirit of capitalism" within the mineiro elite.

3.2 - Economic Background:

This section examines the economic background of the mineiro entrepreneur. It investigates the main economic influences on the formation of the mineiro entrepreneurial class, the career pattern of mineiro businessmen and the activities which represented their main sources of capital.

As mentioned above, the Brazilian economic historiography has suggested - based mainly on the paulista experience - that the main sources of entrepreneurship and capital in nineteenth-century Brazil was either the trading house, mainly the export and import businesses¹⁰⁷, or coffee-growing, which was the basis for process of economic development which spread to a wide range of other businesses¹⁰⁸. Although trading and farming constituted the main sources of entrepreneurship and capital in nineteenth-century Minas Gerais, they were different owing to the particular nature of the mineiro economy. Firstly, Minas Gerais was landlocked, and trade was mainly oriented to local markets dealing with a limited number of basic items such as coffee, salt, bacon, cattle, tobacco, cereals, cotton, etc. Import and export activities were concentrated in Rio de Janeiro, Santos, and São Paulo. Secondly, coffee cultivation was confined to the southern parts of the province, the Mata and the South zones. Thirdly, in other regions of the province, especially the central and northern parts, a different range of activities were being undertaken. These ranged from gold-mining to cattle-raising and farming¹⁰⁹. Thus, coffee growers and merchants dealing with export and import were not as important in the formation of the mineiro entrepreneurial class as they were in São Paulo.

Nevertheless, there is evidence suggesting that the coffee economy - directly or indirectly - provided part of the funds invested in the establishment of mineiro industry. Mineiro coffee growers were responsible, among others, for the establishment of the CUI in 1852¹¹⁰. As mentioned above, the company was organized

¹⁰⁷ Dean, *op.cit.*

¹⁰⁸ See W. Cano, Raízes da concentração industrial em São Paulo, (São Paulo, 3rd. ed. 1977), chapter II; J.M. Cardoso de Mello, O capitalismo tardio: contribuição à revisão crítica da formação e desenvolvimento da economia brasileira, (São Paulo, 1982), pp.96-106; and Z.M.C. Mello, Metamorfoses da Riqueza: São Paulo, 1845-1895, (São Paulo, 1985), chapters II and IV.

¹⁰⁹ Cammack, *op.cit.*, pp.43-50.

¹¹⁰ Arantes, *op.cit.*, 41-5.

by Mariano Procópio Ferreira Lage, who was a farmer himself, and several other coffee growers. Mariano Procópio's father, Mariano José Ferreira Armond, owned one of the most important farms in the Mata zone - the Fortaleza de Sant'Ana farm. The farm produced coffee and cereals, and raised cattle. Nevertheless, the lack of suitable means of transport for the production of the farm was one of the largest problems faced by Mariano José. This seems to have been the original motivation for the building of the União e Indústria turnpike, carried out by his son. Mariano Procópio started working in the Fortaleza de Sant'Ana farm and later established an import and cloth wholesaler firm (the partnership Ferreira Lage, Maia & Cunha) in Rio de Janeiro. Nevertheless, his career as merchant was short-lived. Soon he went to Europe and to the USA in search of the new road building technology invented by MacAdam. He also examined the systems of toll roads there. On his return he established the CUI¹¹¹.

Moreover, coffee growers of the Mata zone itself financed the construction of several branches of the União e Indústria turnpike. The company report of 1861 stated that local farmers were paying the wages of the workers engaged in the construction of the branch to the town of Mar de Hespanha¹¹². In a letter to the president of the province of Minas Gerais (Vicente Pires da Motta), the chairman of the CUI (Mariano Procópio Ferreira Lage) stated that:

"It is certain that the road built by the CUI (from Petropolis to Juiz de Fóra), although rendering important services, needs to be complemented by branches which will facilitate the transport of goods of several centres of production to the stations of the company.

There are in this situation several coffee-growing counties located between Juiz de Fóra, Parahybuna, and Parahyba, which I will list - indicating the names of those farmers who are most interested and can, helped by the provincial government, supervise and contribute financially to the construction."¹¹³

It is interesting to point out that the process of funding of the União e Indústria turnpike was similar to that of the first railways in São Paulo. According to Lewis, most of the first paulista railways were financed by direct local private investment, funds which were derived mainly from the rural sector, more specifically the coffee sector. As the paulista case suggests, the struggle of mineiro coffee growers to build the União e Indústria turnpike indicates a substantial degree of entrepreneurial initiative and the existence of funds available to be invested elsewhere¹¹⁴. Nevertheless, contrary to what happened in the case of the

¹¹¹ Bastos, Mariano Procópio Ferreira Lage, pp.15-270.

¹¹² Companhia União e Indústria, Relatorio da Assembléia Geral dos Acionistas, (1861), p.7.

¹¹³ Mariano Procópio Ferreira Lage, then, listed the names of the following farmers: Candido Alves Coutinho, Joaquim Gomes Leal and Antonio Gomes de Siqueira, and their neighbours, interested in the construction of the branch from the Parahybuna station until the farm owned by Francisco Gomes de Oliveira; the Baron of Prados and his neighbours, interested in the construction of the branch from Jaguary, where there were large coffee farms, to the Simão Pereira station; Gervasio Antonio da Silva and Manoel José Pires, interested in the construction of the branch from the Espírito Santo parish to the Mathias station; and, Marcellino Gonçalves da Costa and his son José Anastacio da Costa Lima, interested in the construction of the branch from the São Francisco parish to the Juiz de Fora station. See Companhia União e Indústria, Relatorio da Assembléia Geral dos Acionistas, (1861), p.7, 17-8.

¹¹⁴ Lewis, op.cit., pp.35-55.

paulista railways, the União e Indústria turnpike was, shortly after the conclusion of its construction, taken over by the State¹¹⁵. State intervention in the CUI was not due to the technology gap - which in the case of turnpikes was certainly much less acute than in the case of railways -, but to the diminishing interest on the part of the mineiro entrepreneurial class to invest more funds in the company after the construction of the EFDPII. Moreover, State intervention reveals the difficulties that mineiro entrepreneurs had to fund more capital intensive enterprises. This fact seems to corroborate Gerschenkron's view that depending on the degree of backwardness, and the supply of capital required, State action may be essential¹¹⁶.

Table III.6 - Distribution of the mineiro industry between the coffee-growing and non-coffee-growing regions in 1907.

REGIONS	COFFEE	NON-COFFEE	UNKNOWN	TOTAL
Establishment				
Number	342	160	22	524
%	65.3	30.5	4.2	100.0
Capital				
Contos	11,774	13,568	1,172	26,515
%	44.4	51.2	4.4	100.0
Workers				
Number	3,751	5,162	508	9,421
%	39.8	54.8	5.4	100.0
Production				
Contos	17,815	12,891	1,537	32,244
%	55.2	40.0	4.8	100.0
Capital per Establishment	34.42	84.80	53.27	50.60
Workers per Establishment	10.96	32.26	23.09	17.97
Production per Establishment	52.09	80.57	69.86	61.53

Source: J.H. Lima, Café e Indústria em Minas Gerais (1870-1920), (Petrópolis, 1981), p.89.

Further evidence that the coffee economy provided part of the funds invested in the mineiro industry is the fact that although some industries - such as iron and textiles - were mostly concentrated in

¹¹⁵ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1865), p.5.

¹¹⁶ A. Gerschenkron, Economic Backwardness in Historical Perspective: a book of essays, (Cambridge, 1962).

the central part of Minas Gerais, a large number of small factories started to emerge in the latter part of the nineteenth century in several coffee-growing counties. In 1861, Juiz de Fora - one of the most important mineiro coffee counties¹¹⁷ - was already the third largest county in tax revenue, surpassed only by São João Del Rey and Ouro Preto in the Metalúrgica zone¹¹⁸, and one of the main industrial centres of the province. In 1870, there were 34 industrial establishments in Juiz de Fora and seven years later 80¹¹⁹. Moreover, of the 20 largest mineiro counties in terms of industrial output in 1907 nine were located within the coffee-growing zones (7 in the Mata and 2 in the Sul) and 11 in the non-coffee-growing zones (10 in the Metalúrgica zone and 1 in the Oeste zone). The largest county in terms of industrial output was Juiz de Fora, followed by Sete lagoas and Belo Horizonte both located within the Metalúrgica zone. In addition, 65% of the mineiro industries in 1907 were established in coffee-growing regions, whereas only 30% of them were established in the non-coffee-growing regions, as shown in Table III.6. However, of the total capital invested in the mineiro industry only 44% was invested in the industries established in the coffee-growing regions, whereas more than 50% was invested in the industries established in the non-coffee-growing regions. In terms of the number of workers employed, the industries established in the coffee-growing regions employed only 40% of the total industrial workforce, whereas the industries established in the non-coffee-growing regions employed nearly 55%. Furthermore, the industries established in the coffee-growing regions produced 50% of the total industrial output, whereas the industries established in the non-coffee-growing regions produced 40%. Thus, although the industries established in the coffee-growing regions in 1907 were more numerous and productive, the industries established in the non-coffee-growing regions were more capital intensive and employed more workers per establishment. The fact that a large number of industries were established in the mineiro coffee-growing regions is undisputable evidence of the participation of the coffee economy in the establishment of the mineiro industry.

However, the coffee economy which developed in the southern parts of the province did not have a great impact on the rest of the mineiro economy¹²⁰. In the Mata zone itself, one of the major coffee-growing regions of Minas Gerais, farmers were responsible for only 3% of the industries established in Juiz de Fora (the most important industrial centre of the region) in the period 1858-1912. It was immigrants and Brazilians not connected with the coffee-growing activity who owned more than 90% of the industries established in Juiz de Fora in the period 1858-1912¹²¹. The capital invested by Brazilians was originally accumulated in the trading business or in their activities as professionals, or even in a combination of

¹¹⁷ See D.A. Giroletti, A Industrialização de Juiz de Fora, 1850-1930, (Juiz de Fora, 1988), pp.27-31.

¹¹⁸ *Ibid.*, p.47.

¹¹⁹ Giroletti, A Industrialização de Juiz de Fora, p.50.

¹²⁰ J.H. Lima, Café e Indústria em Minas Gerais (1870-1920), (Petrópolis, 1981), pp.101-2.

¹²¹ Arantes, *op.cit.*, p.159.

them¹²².

Immigrants (who were responsible for the establishment of more than 66% of the industries founded in Juiz de Fora during this period) usually did not fit into the "bourgeois immigrant" concept¹²³. Most of them did not have capital and started working as labourers, craftsmen or even as farm workers¹²⁴. Grieese, for example, was a German immigrant originally hired to work at the CUI. In 1858 he founded the first industry established in Juiz de Fora manufacturing carts and coaches¹²⁵. During the same year, Wreied, a German brickmaker hired by the CUI, associated himself with a tanner to establish what became the largest tannery of the city¹²⁶. Ten years later, his stepson (Krambeck), himself an immigrant who was originally a carpenter and a farm worker, took control of the tannery and expanded the business successfully¹²⁷. In 1865, Martin Kascher, who also worked as a craftsman at the CUI, established a workshop to make coaches¹²⁸. Antônio Meurer, the son of immigrants, started as salesman and representative of the breweries from Juiz de Fora. Later he established a small shop and became a farm trader. In 1898, he established a mill to manufacture socks¹²⁹.

In other parts of Minas Gerais domestic commercial activities and mixed farming (not connected with coffee-growing activity) were the starting point in the career of most entrepreneurs. For example, in the case of the iron industry which throughout the nineteenth century was concentrated in the central part of the province¹³⁰, as shown in Maps 4 and 5, there is evidence that most of the foundries were established by farmers. According to Eschwege, by the time of his arrival in Minas Gerais in 1811 most of the foundries belonged to blacksmiths and large farmers¹³¹. Moreover, the capital invested in the setting-up of the Patriótica foundry, founded by Eschwege himself, was divided in 10 shares, each share representing 1,000 Cruzados of the initial capital. Eschwege subscribed two shares, the Conde de Palma (the governor of Minas Gerais) one, and a large and important mineiro family the remainder. Although there is no direct information

¹²² Giroletti, Industrialização de Juiz de Fora, p.92.

¹²³ For a further discussion of the concept of the "bourgeois immigrant", see Dean, op.cit., pp.59-81.

¹²⁴ Arantes, op.cit., pp.87-8.

¹²⁵ Ibid., pp.98-9.

¹²⁶ Ibid., p.100.

¹²⁷ Ibid., p.100.

¹²⁸ Ibid., p.101.

¹²⁹ Ibid., p.102.

¹³⁰ According to Libby, most of the iron foundries were situated within the Metalúrgica region. Libby, op.cit., pp.152-60.

¹³¹ W.L. von Eschwege, Pluto Brasiliensis, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979), II, p.203.

MAP 4 - MINAS GERAIS LOCATION OF IRON FOUNDRIES, 1854-1858.



Source: D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), p.157.

MAP 5 - MINAS GERAIS LOCATION OF IRON FOUNDRIES, 1863-1866.



Source: D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), p.158.

about the activities of both the Conde de Palma and the family, there is evidence that they owned land:

"We had to choose the most appropriate place [to set-up the foundry] (...).

The region of the Prata, (...), was not as rich in woods. Nevertheless, there was the advantage that the administration of the future foundry would be under the close supervision of its most important shareholders, who had their properties in the neighbourhood."¹³²

Moreover, it is reasonable to believe that at least part of the capital invested by Eschwege may have been accumulated in his activity as manager of iron foundries. As mentioned before, Eschwege worked in the Figueiró dos Vinhos foundry in Portugal before coming to Minas Gerais¹³³. However, most of the capital invested in the establishment of the Patriótica foundry seems to have come from farming.

Further evidence that farmers established most of the mineiro foundries set-up in the first three-quarters of the last century is provided by the fact that these foundries began as integral parts of farms. In 1886, for example, a newspaper advertised the selling of a foundry located in an estate in the Diamantina county which included, among other things, extensive grass for cattle, thirty head of cattle, corn plantation, and several fruit trees¹³⁴. Even the São Miguel de Piracicaba mill, the most successful and one of the largest foundries of this period, was considered by its owner (Monlevade) as an integral part of his farm¹³⁵. Therefore, as Libby suggests, it is reasonable to conclude that most of the small foundries established until the 1880s were also an integral part of farms¹³⁶.

One of the few foundries not to be established by farmers was the Morro do Pilar. The Morro do Pilar foundry was financed by the Imperial government:

"Manuel Ferreira da Câmara decided to build, at the expenses of the King [of Portugal], a large iron foundry in Minas Gerais, for which purpose he did not lack neither power nor money. He got both things from the government, who allowed him to use the former [power] and to withdraw the latter [money] from the cashier of the diamond mining business."¹³⁷

Therefore, the Morro do Pilar was the only foundry established in the first three-quarters of the nineteenth century to be financed by the State.

The larger foundries (the Esperança and Burnier) which were founded in the latter part of the century were not established by farmers. The Esperança was established by two engineers of the railway Central do Brasil (Amaro da Silveira and Henrique Hargreaves), a Swiss metallurgist (Alberto Gerspacher),

¹³² Ibid., p.247.

¹³³ Gomes, História da Siderurgia no Brasil, pp.79-85.

¹³⁴ Libby, op.cit., p.183.

¹³⁵ Ibid., p.151.

¹³⁶ Ibid., p.152.

¹³⁷ Ibid., p.207.

and Carlos da Costa Wigg, the main shareholder, of whom there is no information about his activities¹³⁸. The Burnier foundry was established by Carlos da Costa Wigg and the son of Alberto Gerspacher (José Gerspacher), who had been the technical director of both (the Esperança and the Burnier) foundries¹³⁹. These are examples of employees/managers who acquired skills (and capital) working for others and then set themselves up in business, and supports the view that one of the main sources of entrepreneurs are people who have been previously in employment¹⁴⁰.

Thus, there is evidence that in the first three-quarters of the last century most of the iron foundries were established by farmers. This fact corroborates Lydall's view that a large proportion of the new industrial entrepreneurs who emerge in the early stages of industrialization come from the group made up by farmers. According to the author, this is explained by the fact that small manufacturing workshops could be established on farms¹⁴¹, as was the case of several mineiro foundries set-up in the first part of the century. Moreover, it is interesting to point to the importance of the managerial ability in Monlevade's success as an entrepreneur. The São Miguel de Piracicaba foundry was for more than forty years managed by Monlevade, obtaining the best results among all the foundries in Minas Gerais. After Monlevade's death in 1872 his family assumed the control of the foundry but the results were never the same and the foundry was finally sold to the Companhia Nacional de Forjas e Estaleiros (CNFE) at the beginning of the 1890s¹⁴². This seems to corroborate those authors who advocate management ability as one of the entrepreneurs' main characteristics¹⁴³.

The textile industry, which was also concentrated in the central part of Minas Gerais, was established mostly by farmers (not connected with coffee-growing activity) and merchants. Among the founders of the Cedro mill, Antônio Cândido Mascarenhas was a farmer - he owned the Rasgão farm -, a merchant and a capitalist, as shown in the following letter:

"I have, in partnership with two brothers, imported the machinery to establish a textile mill. By the time the mill will be set-up it will cost us more than we have. (...) It is for this reason that I write to you, my cousin, to inform you that your debts, including interests to this date, amount to 1,618 Contos. I also ask you from then on to pay what you owe me on a monthly basis".¹⁴⁴

¹³⁸ Suzigan, *op.cit.*, p.258-9.

¹³⁹ *Ibid.*, p.259.

¹⁴⁰ Lydall, *op.cit.*, p.83.

¹⁴¹ *Ibid.*, p.82.

¹⁴² J.A. Paula, "Dois Ensaios sobre a Gênese da Industrialização em Minas Gerais: a Siderurgia e a Indústria Têxtil", in Anais do II Seminário sobre a Economia Mineira, (Belo Horizonte, 1983), p.31.

¹⁴³ See J.B. Say, Tratado de Economia Política, (São Paulo, 1983) and F. Quesnay, Quesnay's 'Tableau Économique', (1972).

¹⁴⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.2", "Letter from Antônio Cândido Mascarenhas to Joaquim Pereira Lopes, 3 August 1870".

Caetano and Bernardo Mascarenhas started their entrepreneurial careers in a partnership fattening cattle for sale and trading in salt. The funds used by Bernardo and Caetano to start their partnership were drawn from a trust of 26 Contos which each son received from their father. With the change in the route of the muletrains and the decrease in the movement of muletrains due to the Paraguay War, the salt trade was not as attractive as before. The two brothers then decided to change business and with the profits they have earned in the salt and cattle business (around 108 Contos) they decided to establish the Cedro mill. It seems that the idea to invest in a textile mill was mainly Bernardo's, because he was the intellectual organizer of the mill. The domestic cloth production their father's farm (São Sebastião) was very profitable, even though the quality was poor and the process of production backward. Therefore, cloth production was a familiar activity for both of them. Later, Caetano came to own the Nova Estância farm in Pirapora and Bernardo would invest in an electricity generating company, a bank, another textile mill, and so on¹⁴⁵.

The analysis of the establishment of the Cedro mill shows that its founders possessed several of the characteristics of the entrepreneur described in chapter 2. It shows that the three Mascarenhas brothers were capitalists, that they possessed the foresightness and willingness to act and assume risk, and that they took advantage of changes in the business environment to act soundly and in an entrepreneurial way.

Among the founders of the Cachoeira mill, farmers and merchants were well represented. The funds for the establishment of the mill came from different sources. As happened to the founders of the Cedro mill, the three Mascarenhas brothers involved in this entrepreneurship also received a trust of 26 Contos from their father when they came of age¹⁴⁶. Furthermore, before the establishment of the Cachoeira mill Victor Mascarenhas had been a merchant in Curvelo and manager of the São Sebastião farm. Later he became one of the owners of the São Sebastião textile mill and of the São Sebastião farm¹⁴⁷. His brother Pacífico Mascarenhas was a local doctor, who later became a farmer. There is no information about Francisco de Paula Mascarenhas' activities before the establishment of the Cachoeira mill. However, he later became a farmer, a merchant, and took part in several other industrial undertakings. As a farmer, he came to own the Periperi farm. As a merchant, he became partner in a retail store (Carvalho, Libano & Mascarenhas) in Rio de Janeiro at the beginning of the 1880s. As an industrialist, besides the Cachoeira mill, he established the Periperi textile mill and was also partner in a hat factory (Machado & Mascarenhas) in Curvelo. Finally, he was shareholder and one of the founders of the CME and the Banco de Crédito Real de Minas Gerais, both enterprises organized by his brother Bernardo. Finally, Luis Augusto Vianna Barbosa was the owner of the Cachoeira farm where the Cachoeira mill was set-up¹⁴⁸.

Later the founders of both the Cedro and the Cachoeira mills were joined by Theóphilo Marques

¹⁴⁵ Vaz, *op.cit.*, p.42-3.

¹⁴⁶ Tamm, *op.cit.*, p.86.

¹⁴⁷ *Ibid.*, pp.87, 100-2, 109-10.

¹⁴⁸ *Ibid.*, pp.87-208.

Ferreira, a merchant, and Antônio Joaquim Barbosa da Silva, a lawyer, in the establishment of the CCC¹⁴⁹. Thus, the funds invested in the Cedro mill, the Cachoeira mill, and the CCC came mainly from trading business and farming (not connected with coffee-growing activity).

The Brumado mill was established in 1872 by capital accumulated in the trading business. Its founder, Francisco José de Andrade Botelho, was a mineiro who lived in Rio de Janeiro working as merchant in the partnership Botelho, Irmão & Andrade, before founding the textile mill. The Botelho, Irmão & Andrade firm was a partnership with his uncle and one of his brother. As was common among merchants of this time, Francisco travelled frequently to the hinterland of Minas Gerais as a representative of his firm. He was already a wealthy man when he arrived in Pitangui, in western Minas Gerais, and met Francisca Alvares da Silva. Soon after, they got married and Francisco decided to live in Pitangui. He quit the partnership in Rio de Janeiro, but Pitangui was a too narrow market for a retail store like the one he possessed in Rio. Thus, he decided to establish a textile mill stimulated by the good results of the Cedro mill. The most suitable and available place to build the mill was found in the neighbouring district of Brumado¹⁵⁰.

The main shareholder and founder of the SAIM, established in 1875, was Azarias de Souza Dias, who was also a farmer¹⁵¹. Among the remaining 23 shareholders of the mill mentioned by the Almanach Sul Mineiro in 1874, there is information about the activities of only 5 of them: Antônio Candido de Souza Dias, a farmer and a capitalist; Antônio Candido Teixeira, a district judge, a farmer, and a capitalist; and Antônio Domingos de Souza, Marcos de Souza Dias, and Gabriel Domingos, all of them farmers¹⁵². Thus, it is reasonable to conclude that the funds invested in this mill had been accumulated mainly in farming activities. However, it is important to point out that the mill was situated in a coffee-growing region (the Sul zone) and the farmers mentioned above might well had been coffee growers. Apart from the fact that one of the partners (João Antônio dos Santos) was the bishop of Diamantina, there is no information about the activities of the other four partners prior to the establishment of the Biribiry mill in 1876. There is also no information about the activities of the founders of the União Itabirana mill established in 1876¹⁵³.

Among the founders of the Filatório Montes Claros, Manoel and Donato Rodrigues, who subscribed 53.3% of the capital, were both farmers from Grao Mogol, a county close to Montes Claros. Antônio Narciso Soares started his entrepreneurial career as a miner and diamond trader in Diamantina. Then, he moved to Montes Claros where he established himself as a local trader and later as a farmer. Gregório Velloso also started as a local trader and, subsequently, became a farmer. Finally, Angelo de Quadros

¹⁴⁹ Vaz, op.cit., p.93.

¹⁵⁰ Guimarães, op.cit.

¹⁵¹ B.S. Veiga, Almanach Sul Mineiro, (Campanha, 1874), p.148.

¹⁵² *Ibid.*, pp.146-51.

¹⁵³ Versiani, op.cit., pp.50-2.

Bittencourt had a farm in Campo Grande, in the county of Montes Claros¹⁵⁴. Thus, the capital invested in the Filatório Montes Claros was accumulated in the trading business, farming, and diamond mining.

Although there is no information about the activities of the founders of the Marzagão mill, it is telling that the mill was established on the Marzagão farm in the vicinity of Sabará¹⁵⁵. There is no information about the activities of the founders of the Cassú, the Paulo Moreirense, the Industrial Ouro Preto, the Pedreira, the Bom Jardim, and the Viçosa mills¹⁵⁶.

The São Sebastião mill was established by Antônio Gonçalves da Silva Mascarenhas, who was the youngest son of a Portuguese immigrant, Antônio Gonçalves Mascarenhas, who arrived in Brazil in 1778. Although the information about Antônio Gonçalves Mascarenhas is not very precise, it is said that he became a protégé of a prosperous muleteer, with whom he started to work. Years later, Antônio Gonçalves Mascarenhas became his partner and, when the muleteer decided to retire, his heir. With his own muletrain and three slaves, Antônio Gonçalves Mascarenhas made frequent trips to the hinterlands of Minas Gerais, where he would sell salt and olive-oil, and would bring back to Rio de Janeiro textiles, sugar and bacon. In 1792, he married an Indian brought up by his protector. They had four children, although only three survived: José, Caetano and Antônio Gonçalves da Silva Mascarenhas. When the youngest was almost seven years old his father decided to take the whole family with him in his trips. In 1811, Antônio Gonçalves Mascarenhas and his wife got ill and died in the middle of one of those trips¹⁵⁷.

After the death of his parents, Antônio Gonçalves da Silva Mascarenhas was taken in by his godfather, José Teixeira da Fonseca Vasconcelos, the Viscount of Caeté. Later, he became administrator of Viscount of Caeté's land and subsequently of other estates. In 1824, Antônio Gonçalves da Silva Mascarenhas established himself as a merchant in Taboleiro Grande, in the central part of the province, which was the main passage for all muletrains heading to the hinterlands of Minas Gerais. Antônio Gonçalves da Silva Mascarenhas' business grew rapidly and at the age of thirty four - by then a wealthy man - he bought the land which came to be known as the São Sebastião Farm. He then sold the store and became a prosperous farmer and financier. In 1884, Antônio Gonçalves da Silva Mascarenhas established the São Sebastião mill on his farm¹⁵⁸. Thus, although the fortune accumulated by Antônio Gonçalves da Silva Mascarenhas previously to the establishment of the São Sebastião mill originated from different sorts of activities, it is reasonable to conclude that the funds invested in the mill were mainly accumulated in trading and farming.

Very little is known about the activities of the founders of the São Vicente mill, which was

¹⁵⁴ Ibid., pp.81-2.

¹⁵⁵ Ibid., pp.75-6.

¹⁵⁶ Ibid., pp.76-7, 89, 91-3.

¹⁵⁷ Vaz, *op.cit.*, p.34.

¹⁵⁸ Ibid., p.34-40.

established in 1885 and a few years later was acquired by the CCC¹⁵⁹. The main shareholders of the CCM were João da Matta Teixeira and Jeronymo Francisco França, who were local farmers. João da Matta Teixeira is also mentioned in the report of the meeting of shareholders for the establishment of the CCM as a capitalist¹⁶⁰. Thus, the CCM was a farmers' enterprise.

Although there is no information about the activities of the founders of the União Lavrense mill, the first two directors of the mill were traders: Comendador José Duarte da Costa Negrão, a trader who lived in Rio de Janeiro at the time of the establishment of the mill, and Manoel Hermeto Corrêa da Costa, a local trader. Thus, it is reasonable to conclude that at least part of the capital invested in the União Lavrense mill originated in the trading business. However, it is not possible to say if the trading business of Comendador José Duarte da Costa Negrão, who lived in Rio de Janeiro, was or was not connected with the import and export trade¹⁶¹.

The Santa Bárbara mill was initially planned by João da Matta Machado, a diamond trader from Diamantina, who also had a diamond-cutting workshop. After his death, his sons and sons-in-law, together with Antônio Moreira da Costa, the Baron of Paraúna, set-up a partnership to establish the mill. Among João da Matta Machado's sons, one was a law student in Sao Paulo (Pedro da Matta Machado) and the other (Alvaro da Matta Machado) was a member of the Provincial Assembly at the time of the establishment of the mill in 1886. Among his sons-in-law, Francisco Ferreira Corrêa Rabelo worked as a lawyer, magistrate, and teacher, and was also a politician. Pedro José Verciani was an engineer who lived in Rio de Janeiro at the time of the establishment of the mill, and João Antônio Lopes de Figueiredo was a local doctor in Diamantina. Finally, Antônio Moreira da Costa, the only partner outside the Matta Machado family, had been engaged all his life in the diamond business. Thus, as Versiani points out, although the capital invested in the establishment of the Santa Bárbara mill came from the different activities carried out by its owners, a significant part of it may have come from the activities related with the diamond business¹⁶².

The São Roberto mill was promoted by Quintiliano Alves Ferreira, the Baron of São Roberto, who was engaged in a number of local businesses, like the manufacture of hats and earthenware, and diamond-cutting¹⁶³.

The Tecelagem Mascarenhas mill was established by Bernardo Mascarenhas, who started his entrepreneurial career in a partnership with his brother Caetano, as mentioned above. Later, the two brothers decided to invest the money they have accumulated in a textile mill. However, they did not have enough

¹⁵⁹ Ibid., pp.102-3.

¹⁶⁰ Companhia Cachoeira dos Macacos, "Ata da Assembléia Geral dos Subscritores de Ações da Sociedade Anonyma Cachoeira dos Macacos para Constituição da mesma", reproduced in Freitas, *op.cit.*, p.23.

¹⁶¹ Versiani, *op.cit.*, p.88.

¹⁶² Ibid., pp.86-8.

¹⁶³ Ibid., p.91.

funds and needed a capitalist partner. Their father did not agree with the idea, because they were very young (Bernardo was 20 and Caetano was 23 years old) and a textile mill was a complicated matter¹⁶⁴. Their brothers were equally unsupportive, except Antônio Cândido who reluctantly agreed to join them, but imposed the condition that the mill had to be established in Taboleiro Grande instead of Juiz de Fora, as originally planned. The Cedro mill was thus set-up in Taboleiro Grande¹⁶⁵. Some years later the Cedro mill was merged with the Cachoeira mill into the CCC. However, Bernardo was never happy with his life in Taboleiro Grande, which was too small for his entrepreneurial talents. Therefore, with the death of his father in 1887, Bernardo decided to move to Juiz de Fora and set-up a textile mill there as he had previously intended. One year after his arrival in Juiz de Fora he established the Tecelagem Mascarenhas¹⁶⁶. It is reasonable to conclude that the funds invested in this mill had originated partially from the capital made in the Cedro mill and in the CCC, and in part from what he had inherited from his father, funds accumulated in trading and farming.

The Industrial Mineira mill was established in Juiz de Fora by five Englishmen (Andrew Steele, John Steele, Peter Steele, William Moreth, and Henry Whittaker). Most were traders living in the city of Rio de Janeiro, except William Moreth who lived in Petrópolis¹⁶⁷.

Among the textile mills established during the 1890s, the CTS, also established in the central part of Minas Gerais, was founded by Manoel José de Souza Moreira, his sons, Manoel Gonçalves de Souza Moreira and Augusto Gonçalves de Souza Moreira, and his son-in-law, Antônio Pereira de Mattos. Manoel José de Souza Moreira, the main promoter and largest shareholder, was both a farmer and a local trader. He married one of the daughters of a wealthy local farmer (Manoel Gonçalves Cançado), from whom they inherited the Cachoeira farm where the CTS was later set-up. He also owned a large merchant house, Moreira & Filhos, in Santana do São João Acima. Manoel Gonçalves de Souza Moreira, Manoel José de Souza Moreira's eldest son and the second largest shareholder of the CTS, was also a local trader working in partnership with his father in Moreira & Filhos. His brother, Augusto Gonçalves de Souza Moreira, was a doctor who at the time of the establishment of the mill was a member of the Constituent Assembly of the state of Minas Gerais¹⁶⁸. Antônio Pereira de Mattos was a travelling salesman for large merchant houses from Rio de Janeiro, before getting married to one of Manoel José de Souza Moreira's daughters¹⁶⁹.

There is little information about the activities of the promoter of the São Joanense mill, Antônio Moreira da Costa Rodrigues, or about the activities of the founders of the Itabira do Campo, the Jequitahy,

¹⁶⁴ Vaz, *op.cit.*, p.42-3.

¹⁶⁵ *Ibid.*, p.43.

¹⁶⁶ Mascarenhas, *Bernardo Mascarenhas*, pp.79-86, 123-9.

¹⁶⁷ Versiani, *op.cit.*, p.82.

¹⁶⁸ Souza, *op.cit.*, p.101-15, 123-7, 194-98.

¹⁶⁹ *Ibid.*, pp.170-3.

the São João Nepomuceno, the Perpetua, and the Itinga mills¹⁷⁰.

The Companhia Industrial Pitanguense was established by experienced industrialists. For example, Luiz Augusto Vianna Barbosa, who was originally a farmer and one of the founders of the Cachoeira mill and the CCC. Furthermore, when he sold his shares of the CCC he invested the funds in the purchase of the Brumado mill¹⁷¹. There is no information about the activities of Antônio Mascarenhas Barbosa, one of Luiz Augusto Vianna Barbosa's sons. However, his other son, Sérgio Mascarenhas Barbosa, was an industrialist. There is also no information about the activities of the second largest shareholder, Francisco Bahia da Rocha. His two sons, Francisco and Américo Bahia da Rocha, were an industrialist and a trader respectively. Together, Luiz Augusto Vianna Barbosa, Francisco Bahia da Rocha, and their sons, held more than 80% of the shares of the company. Among the other ten shareholders of the company, three were clergymen, two were farmers, two were traders, one was a magistrate, and the activities of the remaining two are not known¹⁷². Here again it is possible to observe the presence of the commercial and agricultural capital in the establishment of a textile mill, although a large proportion of the funds invested in this case came from the textile industry itself.

The Melancias mill was also established by experienced industrialists as the mill was set-up by a group of investors who were already associated with other textile undertakings in Minas Gerais. Among the three largest shareholders, Jeronymo Francisco França and João da Matta Teixeira were both directors and two of the main shareholders of the CCM at the time of the establishment of the Melancias mill. The third, Theóphilo Marques Ferreira, had been one of the founders of the CCC and its general manager for several years¹⁷³.

The promoter and major shareholder of the Companhia Progresso Fabril, Carlos Vaz de Mello, was a politician from Viçosa who at the time of the establishment of the mill was a member of the Constitutional Republican Party's executive committee. The first two directors of the mill, José Tinoco and Augusto Ferreira Brant, held 10% and 12% of the shares of the company respectively. The former was a farmer and a capitalist, whereas the latter was a local trader¹⁷⁴.

The main promoter of the Cachoeira Grande mill was a farmer from the central part of Minas Gerais, Antônio Ferreira Alves da Silva. Anxious about the impact of the abolition of slavery on his agricultural operations, Antônio Ferreira Alves da Silva decided to establish a textile mill. Lacking experience in the textile business, he associated himself with the founders of the CCM, João da Matta

¹⁷⁰ Versiani, *op.cit.*, pp.128-243.

¹⁷¹ *Ibid.*, pp.167-71.

¹⁷² Companhia Industrial Pitanguense, Lista Nominativa dos Srs. Subscritores, (1894), in Minas Gerais, 5 January 1894, p.7.

¹⁷³ Versiani, *op.cit.*, p.165.

¹⁷⁴ Companhia Progresso Fabril, Estatutos, (1893), in Minas Gerais, 23 May 1893, pp.7-8.

Teixeira, Américo Teixeira Guimarães, and Herculino França. Thus, the capital invested in the Cachoeira Grande mill came mainly from farming and the textile industry itself¹⁷⁵.

Finally, the São Domingos mill was established by seven people, among them the members of the Moreira Penna family, who were the main shareholders. Namely Affonso Augusto Moreira Penna, then Governor of Minas Gerais, his brothers Domingos Moreira Teixeira Penna and José Moreira Teixeira Penna, both of whom were farmers¹⁷⁶.

Thus, although on the whole coffee capital played a very minor role in the establishment of the mineiro textile industry, a substantial part of the capital invested in the industry was accumulated in farming. Trading was another important source of capital and several mills established in the county of Diamantina were financed mainly by capital accumulated in the diamond business. It is also important to point out that towards the end of the century several textile enterprises were being financed by capital accumulated in the industry itself.

Comparison between the origin of the funds invested in the establishment of the mineiro and the carioca textile industry reveals important similarities and differences. Most of the textile mills established in Rio de Janeiro during the period 1878-1895 were also financed by merchants. However, while it seems that mineiro merchants were of a more generalist nature and engaged mainly in up-country trading, their carioca counterparts were more specialized, dealing mainly with cloth, and engaged more specifically in the import-export trade. As shown in Table III.7, the FTSL was founded in 1877 by a merchant, José Maria Teixeira de Azevedo, engaged in the import-export trade¹⁷⁷. The FTPG was founded in 1878 by Antônio Felício dos Santos, a doctor from Minas Gerais whose father and uncle established the Biribiry mill in Diamantina, José Rodrigues Peixoto, a doctor and grocer from Rio de Janeiro, and John Sherrington¹⁷⁸. The FTR was founded in 1879 by a merchant engaged in the import-export trade of cloth. The FFTTA was founded in 1880 by José Augusto Laranja, a merchant, Joaquim Carvalho de Oliveira e Silva, a cloth wholesaler, and Henry Whittaker, a technician¹⁷⁹. The FFTTB was founded by a merchant engaged in the cotton trade¹⁸⁰. The main promoters of the FFTC were Peter Steele, an Englishman living in Rio de Janeiro and engaged in the import-export trade of cloth, Henry Whittaker, a technician who was also a partner in the FFTTA, as mentioned above, and George Holden, an Englishman¹⁸¹. The FTSJ was founded by three

¹⁷⁵ Versiani, *op.cit.*, pp.174-5.

¹⁷⁶ Companhia Industrial São Domingos, Ata da Assembléia de Instalação, (1894), in Minas Gerais, 21 February 1894, p.7.

¹⁷⁷ Monteiro, *op.cit.*, pp.98-101.

¹⁷⁸ *Ibid.*, pp.120-3.

¹⁷⁹ *Ibid.*, pp.143-7.

¹⁸⁰ *Ibid.*, pp.156-9.

¹⁸¹ *Ibid.*, pp.169-76.

Table III.7 - The city of Rio de Janeiro: activity of the main promoters of the textile companies established in the period 1878-1895.

COMPANY	MAIN PROMOTERS	ACTIVITY
FTSL	José Maria Teixeira de Azevedo	Merchant
FTPG	Antônio Felício dos Santos José Rodrigues Peixoto John Sherrington	Doctor Doctor n.a.
FTR	Frederico Glette	Merchant
FFTTA	José Augusto Laranja Joaquim C. de Oliveira e Silva Henry Whittaker	Merchant Merchant Technician
FFTTB	Joaquim Marques da Costa	Merchant
FFTC	Peter Steele Henry Whittaker George Holden	Merchant Technician n.a.
FTSJ	John Valentine Hall James Grainger Bellamy John Henry Lowndes	Merchant Merchant Merchant
FTSC	Frederico Pinheiro da Silva John Henry Lowndes José da Cunha Ferreira	Merchant Merchant Doctor
CFTCI	Manoel Salgado Zenha Francisco Tavares Bastos João José dos Reis	Merchant n.a. Merchant
CPIB	Banco Rural e Hypotecário Banco Internacional do Brasil	Bank Bank
CFTC	Viscount of Figueiredo Cândido da Cunha Sotto Maior	Banker and Merchant Merchant
CFTSF	Affonso de Lamare	Merchant

FTR - Fábrica de Tecidos do Rink; CFTC - Companhia de Fiação e Tecidos Corcovado; CPIB - Companhia Progresso Industrial do Brasil; FFTC - Fábrica de Fiação e Tecelagem Carioca; FTPG - Fábrica de Tecidos Pau Grande; FTSC - Fábrica de Tecidos de São Christóvão; FTSJ - Fábrica de Tecidos São João; FTSL - Fábrica de Tecidos São Lázaro; CFTCI - Companhia de Fiação e Tecidos Confiança Industrial; CFTSF - Companhia de Fiação e Tecidos São Félix; FFTTA - Fábrica de Fiação, Tecidos e Tinturaria Aliança; FFTTB - Fábrica de Fiação, Tecidos e Tinturaria Bomfim.

Source: Monteiro, *op.cit.*, pp.98-283.

merchants engaged in the import-export trade of cloth, John Valentine Hall, James Grainger Bellamy and John Henry Lowndes¹⁸². The FTSC was founded in 1888 by Frederico Pinheiro da Silva, a merchant, John Henry Lowndes, an merchant who was one of the founders of the FTSJ, and José da Cunha Ferreira, a doctor¹⁸³. The CFTCI was founded in 1885 by Manoel Salgado Zenha, a grocer, Francisco Tavares Bastos, of whom there is no information about his activities previous to the establishment of the mill, and João José

¹⁸² *Ibid.*, pp.182-3.

¹⁸³ *Ibid.*, pp.193-4.

dos Reis, one of the largest merchants established in the city of Rio de Janeiro in the second half of the last century¹⁸⁴. The CPIB was founded by two banks: the Banco Rural e Hipotecário, and the Banco Internacional do Brasil¹⁸⁵. The CFTC was founded in 1889 by the Viscount of Figueiredo, a banker and merchant engaged in the import-export trade, and Cândido da Cunha Sotto Maior, a merchant engaged in the import-export trade of cloth¹⁸⁶. Finally, the CFTSF was founded in 1891 by a merchant, Affonso de Lamare¹⁸⁷.

Thus, comparison between the origin of the funds invested in the mineiro, the carioca, and the paulista textile industries reveals important differences. In the first case, the capital invested originated in the generalist up-country trade business, in the diamond business, and in farming (not connected with the coffee-growing activity). In the second case, the main source of capital was the import-export trading business, dealing mainly with cloth, whereas the capital invested in the paulista industry came mainly from the-coffee-growing activity¹⁸⁸.

The electricity generating industry, established in the last decade of the nineteenth century was financed in a similar way, investors transferred capital from trade, farming, manufacturing, banking and so on. As already mentioned, the CME was organized in 1888 by Bernardo Mascarenhas, who started in the trading business and then invested in the textile industry. Subsequently, Bernardo would invest in the electricity generating industry. The funds used in setting-up the CME came from different sources, as in the case of the Tecelagem Mascarenhas. Part of the funds came from the capital accumulated in the textile industry and part from what Bernardo inherited which had in turn been accumulated in trade and farming. Moreover, it is important to point out that Bernardo was the only one, among the nine brothers, who never came to own land. Bernardo later would take part in the establishment of the Companhia Construtora Mineira, the Sociedade de Imigração, the Banco de Crédito Real de Minas Gerais, the School of Commerce of Juiz de Fora, and the Companhia de Tecidos de Juta, a short-lived enterprise¹⁸⁹.

Furthermore, among the 30 original shareholders in the CME, 12 belonged to the Mascarenhas family¹⁹⁰, individuals who in a way or another have accumulated their funds in trade, manufacturing, and

¹⁸⁴ Ibid., pp.208-13.

¹⁸⁵ Ibid., pp.223-9.

¹⁸⁶ Ibid., pp.239-43.

¹⁸⁷ Ibid., pp.252-4.

¹⁸⁸ Suzigan in his work about the origins of the Brazilian industry comes to the same conclusions in what regards the origin of the funds invested in the mineiro and the carioca textile industries. For a brief discussion about the origins of the capital invested in the textile industry established in different parts of Brazil until the beginning of the twentieth century see Suzigan, op.cit., pp.122-45, and Stein, op.cit., pp.41-3.

¹⁸⁹ Vaz, op.cit., pp.42-3.

¹⁹⁰ The members of the Mascarenhas family are: Bernardo Mascarenhas, Policena da Silva Mascarenhas (Bernardo's mother), Francisco Mascarenhas, Vitor Mascarenhas, Caetano Mascarenhas, Viriato

farming¹⁹¹. Moreover, one of the main promoters, a shareholder, and one of the first directors of the CME, Francisco Baptista de Oliveira, began working with his father in his retail store in Entre-Rios. In 1882, he moved to Juiz de Fora where he founded a famous and well known retail store in the Mata zone ("Casa da Barateza")¹⁹². Oliveira met Bernardo Mascarenhas with whom he became close friend and partner in several enterprises at the beginning of 1886. In 1887, he and the Baron of Santa Helena (who was also one of the original shareholders of the CME¹⁹³) founded the first bank in Minas Gerais, the Banco Territorial e Mercantil de Minas¹⁹⁴. Two years later, Oliveira was one of the founders of the Banco de Crédito Real de Minas Gerais. He was also partner of Bernardo Mascarenhas in the Baptista, Mascarenhas, Bicalho & Companhia, a short-lived enterprise aimed at exploring gold mines in Sabará. He was one of the founders and owners of a local newspaper from Juiz de Fora, O Diário de Minas. Finally, in 1891, again in a partnership with Bernardo Mascarenhas, he founded the School of Commerce of Juiz de Fora¹⁹⁵.

Thus, the funds invested in the CME came from trade, manufacturing, banking, and farming. It is also reasonable to believe that coffee capital could also have featured in the company since the CME was established in one of the largest coffee-growing counties of Minas Gerais (Juiz de Fora).

The CFLCL was established in 1905 by Norberto Custódio Ferreira, José Monteiro Ribeiro Junqueira, and João Duarte Ferreira. In 1889, Norberto Custódio Ferreira established his law office in Cataguazes. In 1898, he was invited to open the first branch of the Banco de Crédito Real de Minas Gerais in the Mata zone in Cataguazes. In 1905, he was one of the founders of the CFLCL. In 1908, he was invited to establish and manage a branch of the Banco do Brasil in the city of Santos, the most important port in Brazil. In the following year he was promoted director of the bank, a position that he maintained until his retirement in 1925. He also owned rich farms where he grew coffee and bred cattle¹⁹⁶. After attending schools in Barbacena, Petrópolis and Rio de Janeiro, José Monteiro Ribeiro Junqueira went to São Paulo where he also read law. He graduated in 1894 and returned to Leopoldina where, after working provisionally as a public prosecutor, he established his office. One year after graduating, José Monteiro Ribeiro Junqueira established with his partner in the law office the local newspaper, Gazeta de Leopoldina. In 1905, together

Diniz Mascarenhas, Theóphilo Marques Ferreira, Elvira Diniz Mascarenhas, Pacífico Mascarenhas, Antônio Diniz Mascarenhas, Altivo Diniz Mascarenhas, and Antônio Augusto Mascarenhas, Oliveira, Companhia Mineira de Eletricidade, p.27.

¹⁹¹ Ibid., p.27.

¹⁹² Bastos, Mariano Procópio Ferreira Lage, p.21.

¹⁹³ Ibid., p.27.

¹⁹⁴ Bastos, Mariano Procópio Ferreira Lage, p.22.

¹⁹⁵ Ibid., pp.23-5.

¹⁹⁶ "O Falecimento do Dr. Norberto Custodio Ferreira", in Jornal Cataguases, (Cataguases), 17 February 1935, p.1.

with Noberto Custódio Ferreira and João Duarte Ferreira, he founded the CFLCL. In 1909, he established the Companhia Leiteira Leopoldinense, which became the main milk supplier of the city of Rio de Janeiro. In 1912, together with his brother, Custódio Junqueira, and his brother-in-law, Francisco de Andrade Botelho, he established the bank "Ribeiro Junqueira, Irmão & Botelho". In 1924, he established the São José sawmill. Two years later he established the Companhia Fiação e Tecidos Leopoldinense¹⁹⁷. João Duarte Ferreira was born in Coimbra, Portugal, and came to Brazil in 1872. He started working as an employee of the Leopoldina Railway and later he became partner in the Joaquim Estolano da Silveira firm. In 1891, he established the first coffee-mill of Cataguazes (one of the largest centres of coffee production at this time), which boosted decisively his wealth. In 1893, he established the Banco of Cataguazes and in 1905 he was one of the founders and the largest shareholder of the CFLCL and of the Companhia de Fiação e Tecelagem de Cataguazes. João Duarte Ferreira became one of the wealthiest men in Minas Gerais and his fortune included, among other things, coffee farms, coffee, sugar and rice mills, a sawmill, the Banco Construtor, and the Grande Hotel Villas¹⁹⁸.

Thus, the establishment of the CFLCL was financed by capital accumulated in different activities - in manufacturing, banking, and law practices. Furthermore, it is reasonable to conclude that at least part of the capital invested in the CFLCL originated in farming, as the father of one of the founders of the CFLCL, José Monteiro Ribeiro Junqueira, was a farmer in Leopoldina¹⁹⁹. However, farming in this case probably means coffee-growing since Leopoldina was situated in one of the largest centres of coffee production of Minas Gerais²⁰⁰. It is also important to point out the importance of the coffee economy in the establishment of the CFLCL. Apart from the indirect contribution (the formation of a local consumer market, the funds for investment in infrastructure, and so on) that coffee-growing activity may have had to the establishment of the CFLCL, one of the founders' main sources of wealth previous to the establishment of the company was coffee milling.

A comparison of the process of funding of electricity generating companies in the cities of São Paulo and Rio de Janeiro, on the one hand, and in Minas Gerais, on the other, reveals important differences. The STLPC and the RJTLPC were financed by Canadian capital²⁰¹ since the scale of the consumer market in the cities of São Paulo and Rio de Janeiro was such that the capital required could not be easily supplied locally without the intervention of the State. In the case of the mineiro electricity generating companies, the respective consumer markets were smaller and local sources of capital were enough and available. In the

¹⁹⁷ "Dr. José Monteiro Ribeiro Junqueira", in Gazeta de Leopoldina, (Leopoldina), 19 May 1946.

¹⁹⁸ Costa, op.cit., p.541.

¹⁹⁹ "Dr. José Monteiro Ribeiro Junqueira", in Gazeta de Leopoldina, (Leopoldina), 19 May 1946.

²⁰⁰ In 1905, for example, Leopoldina was the 8th largest producer of coffee in the Mata zone. See Lima, op.cit., p.36.

²⁰¹ D. McDowall, The Light: Brazilian Traction, Light and Power Company Limited, 1899-1945, (Toronto, 1988), pp.48-79.

end, the restricted dimension of the markets instead of working as a limitation imposed by the mineiro business environment, worked as the necessary condition for the local investment in this particular industry. Furthermore, from the data presented above it is possible to observe that shareholders of both the CME and the CFLCL were either friends or members of the same family (or professions), further evidence of the local and personal nature of business affairs in Minas Gerais as late as the beginning of the twentieth century. In contrast, the paulista and carioca electricity generating companies had a more depersonalized ownership structure.

This analysis of the main economic influences on the formation of the mineiro entrepreneurial class has revealed important differences with the paulista and carioca entrepreneurial classes. The participation of coffee planters, the so-called "bourgeois immigrant", and merchants dealing with import-export trade was much lower in Minas Gerais than in São Paulo and Rio de Janeiro. In the Mata zone - a major coffee-growing region -, coffee planters only had a small participation in the establishment of local industrial enterprises. It was immigrants, with very limited resources and thus cannot be classified as "bourgeois immigrant", and Brazilians unconnected with coffee-growing who were responsible for the establishment of more than 90% of the industries founded in Juiz de Fora during the period. Moreover, funds invested in the iron and textile industries, concentrated in the central parts of Minas Gerais, originated mainly in farming, again unrelated to coffee, in generalist up-country trade, and in the diamond business. The analysis of the mineiro electricity generating industry has revealed that the funds came from a variety of sources - farming (included coffee-growing), manufacturing, banking, and the practice of the legal profession. However, comparison with the funds invested in the paulista and carioca electricity generating companies has shown that, whereas the funds invested in the mineiro companies derived from local sources, those invested in the paulista and carioca companies derived from foreign sources.

Conclusion

This section opened with an appraisal of theories of entrepreneurship and the debate about the origin and the nature of the Brazilian entrepreneur. Generally speaking, the study of the mineiro businessman has shown that he possessed most of the characteristics described by the economic literature. He was an employer of factors of production and a capitalist (or at least owned part of the capital invested). Most of his life was devoted to the management of his businesses. He was a leader and an innovator - as evidenced by the careers of men like Bernardo Mascarenhas and Mariano Procópio Ferreira Lage who pioneered several industries in Minas Gerais. They were willing to assume risks. Furthermore, mineiro entrepreneurs introduced new goods (like electricity) or a new quality of a good (like a macadamized turnpike). They introduced new methods of production (like the industrial production of cloth). They exploited new markets, like the virtually inaccessible mineiro market for iron products. Moreover, they had an intellectual formation based on principles which were very close to the ethos of the first European entrepreneurs in several relevant respects. However, their businesses were restricted to the small-scale and/or light industry and cautious attempts to invest in infrastructure ended with the intervention of the government, as in the case of the União e Indústria turnpike.

The analysis of the social background of the mineiro entrepreneur has shown that he had a different social and ethnic background to entrepreneurs from São Paulo and Rio de Janeiro. Immigrants were less important in the formation of the mineiro entrepreneurial class. Therefore, apart from the iron industry - where foreign entrepreneurs had a small but important participation in the establishment of the industry - and apart from the Mata zone - where immigrants were responsible for the establishment of the majority of the industries founded before 1900 -, locals constituted the main source of entrepreneurs in nineteenth-century Minas Gerais. The CUI was organized by Mariano Procópio Ferreira Lage, who was born in Barbacena, and several local farmers. The mineiro textile industry was also established mainly by local entrepreneurs, in marked contrast to entrepreneurs who established the carioca textile industry. Even the first mineiro electricity generating companies, which were established in the Mata zone, were also established by local entrepreneurs. The CME was founded by Bernardo Mascarenhas and other local businessmen, whereas the CFLCL was established by two Brazilians and one Portuguese. The case of the mineiro electricity generating companies also contrasts with that of the electricity generating companies established in the cities of São Paulo and Rio de Janeiro, where the first electricity generating companies were founded and promoted by foreigners. Furthermore, several of the most prominent nineteenth-century mineiro entrepreneurs came from ruling traditional families.

The analysis of the main economic influences on the formation of the mineiro entrepreneurial class has shown that although trade and farming constituted the main sources of entrepreneurship and capital in Minas Gerais as in São Paulo, they were of a different nature owing to the peculiarities of the mineiro economy. Minas Gerais was landlocked, and import and export trade was concentrated in Rio de Janeiro, Santos, and São Paulo. Moreover, coffee cultivation was confined to the southern parts of the province and elsewhere a different range of activities were undertaken, notably gold mining, cattle-raising, and the

production of food staples. However, the mineiro coffee economy did provide - directly or indirectly - part of the funds invested in the mineiro industry. Coffee growers were directly responsible, among others, for the establishment of the CUI. The company was organized by Mariano Procópio Ferreira Lage, himself a farmer, and several coffee growers of the Mata zone who also financed the construction of several branches of the União e Indústria turnpike.

Nevertheless, farmers were responsible for only a small part of the industries established in the coffee-growing parts of Minas Gerais in the period 1858-1912, in a clear indication that coffee-growers were not as important in the formation of the mineiro entrepreneurial class as they were in São Paulo. It was immigrants and Brazilians unconnected with coffee who owned most of the industries established in the southern parts of Minas Gerais. Moreover, immigrants usually did not fit into the "bourgeois immigrant" concept as most did not possess capital before arriving in Brazil.

In other parts of Minas Gerais up-country trade of a more generalist nature and food production farming represented the starting point in the career of most entrepreneurs. In the case of the iron industry, for example, which throughout the nineteenth century was concentrated in the central part of the province, most of the foundries set-up in the first three-quarters of the century were established by farmers as an integral part of the rural economy. However, in the latter part of the century, the larger ironworks (the Esperança and the Burnier foundries) were not established by farmers, but by professionals and established industrialists.

Yet the main sources of capital for the mineiro textile industry, also concentrated in the central part of Minas Gerais, were trade, ranching and agriculture, and the diamond business. Towards the end of the century several textile mills were financed by capital accumulated in the industry itself. The process of funding of the mineiro textile contrasts with Rio de Janeiro and São Paulo. In the case of Rio de Janeiro, most of the mills established during the 1878-1895 period were financed by more specialized merchants engaged in the-import-export trade, dealing mainly with cloth. In the case of São Paulo, capital came mainly from the coffee sector.

Finally, the mineiro electricity generating industry was financed by capital drawn from a number of different activities. Funds invested in the CME and the CFLCL came from trade, manufacturing, banking, and farming. There is evidence that coffee capital could also have contributed to the funding of these companies as they were established in one of the largest coffee-growing counties of Minas Gerais (the Mata zone). Furthermore, part of the funds invested in the CFLCL derived directly from the coffee economy, as one of the founders' main source of wealth, previous to the establishment of the company, was coffee-milling. Comparison with the electricity generating companies established in São Paulo and Rio de Janeiro has shown that they were financed by foreign, not local capital. Thus, the analysis of the mineiro entrepreneur has revealed the existence of a great deal of entrepreneurial initiative and the availability of local sources of capital. The general social attitude towards entrepreneurship seems to have been mostly positive as most entrepreneurs came from the local elite. The main restrictions to the development of a more dynamic and conducive business environment seems to have been of an economic nature, lack of direct

access to international markets, inefficient means of transportation, and a scattered and diluted consumer market.

PART II - THE ORGANIZATION OF THE FIRM

Introduction

One of the key indicators of the emergence of modern capitalism is the rise of large business enterprises operating many distinct units and managed by a hierarchy of salaried executives. This section is divided into two chapters. The first reviews the literature on organization theory. It examines different forms of organizational structures, their origins and implications. The second chapter investigates the structure of several business enterprises in nineteenth-century Minas Gerais. These are grouped in four different economic sectors: the iron industry; transport; the textile industry; and the electricity supply industry. This investigation assesses the degree of structural development of mineiro firms in the nineteenth century and relates it to the prevailing business environment, in the light of the literature examined.

Chapter 4 - A BRIEF REVIEW ON THE LITERATURE ON ORGANIZATION THEORY

The theory of organizations can be divided into several themes, according to the aspect that authors elect as the most important to understand or to prescribe the effectiveness of the organizations¹. A large number of authors have written extensively on each theme related to business organization, rendering the field a body of science in itself. To attempt to review all writers or even to cover each of the constituent themes in the literature would be a huge task and one that is beyond the scope and purposes of this thesis. Therefore, only those theories most suitable to the study of organizations in the nineteenth century will be considered. Several important and relevant theories were put aside either because they are based on modern organizations, and hardly fit into the experience of nineteenth-century mineiro organizations, or because they focus on themes for which there is very little information available. The authors considered in this thesis examine the structural differences they have identified, and investigate the causes of these various forms of organization and explore their implications. Furthermore, they have a historical approach which proved to be very useful for the analysis of the case of Minas Gerais.

One of the classic authors in the study of organizations is Max Weber. Although his main concern is with political organizations (as regimes)², his concepts are applied in this thesis to the study of corporations and family businesses. Max Weber's main contribution to the study of organizations is his theory of authority structure. He identifies three different forms of organizations based on how authority is exercised within them, each of which is expressed in a particular administrative apparatus - charismatic, traditional, and bureaucratic³. They are presented along an evolutionary scale: from the most personalized and least efficient to the most depersonalized and efficient type.

In the first type of organization - "charismatic" - authority rests on the specific and exceptional character of an individual person. Authority is exercised by only one person, based on his qualities of leadership. Charismatic authority is sharply opposed to both bureaucratic and traditional forms of authority in the sense that it is not a form of everyday control of action. Whereas bureaucratic authority is rational in the sense of being bound to intellectually analysable rules, and traditional authority is bound to the precedents handed down from the past and to this extent is also oriented to rules, charismatic authority is irrational in the sense of being foreign to all rules. The only basis of legitimacy is the personal charisma of the leader. The basis of authority is in the characteristics of one person and commands are based on that person's inspiration. Typical examples of this kind of organization are small-scale revolutionary movements

¹ In their introductory book on the organizational theory Pugh and Hickson, for example, divide the subject according to the following themes: the structure of organizations; the organization in its environment; the management of organizations; decision-making in organizations; and people in organizations. See D.S. Pugh and D.J. Hickson, Writers on Organizations, (4th ed. 1989).

² See M. Weber, The Theory of Social and Economic Organization, (New York, 1947).

³ *Ibid.*, p.328.

either religious or political in form, but many economic enterprises have had "charismatic" founders⁴. Some of the most important mineiro firms of the last century, for example, were founded by charismatic industrial pioneers such as Bernardo Mascarenhas (founder of the Companhia Cedro e Cachoeira, Companhia Mineira de Eletricidade, Banco de Crédito Real de Minas Gerais, among others) and Mariano Procópio Ferreira Lage (founder of the Companhia União e Indústria).

In the second type of organization - "traditional" - authority and order are based on custom and precedent, and it is very common for the most important posts to be filled with members of a ruling family or clan. Selection and appointment is thus based on kinship rather than expertise. The person or persons exercising authority are designated according to traditionally transmitted rules. Obedience is not owed to established rules, but to the person who occupies a position of authority by tradition or who has been chosen for such a position on a traditional basis. It is interesting to point out here that most of the firms examined in this thesis were in this sense traditional, since occupants of managerial positions often came from the founding families and kinship was thus a basic requirement for appointment. In traditional organizations administrative staff is recruited among slaves, coloni, or conscripted subjects. Nevertheless, traditional regimes tend to restrict the development of rational economic activity for the following reasons: they place serious obstacles in the way of formally rational regulations; the absence of a staff of officials with formal technical training; there is a wide scope for arbitrariness on the part of the leader and his administrative staff; and there is an inherent tendency to the regulation of the economic life. For these reasons, only certain types of capitalist organizations are able to develop under the dominance of a traditional regime: a certain amount of capitalistic mercantile trade, capitalistic organization of tax farming, and the sale or lease of offices, for the provision of supplies for the state, the financing of wars and, under certain circumstances, capitalistic plantations⁵.

In the third type of organization - "bureaucratic" - authority is based on expertise. In such organizations the officials' sphere of competence is clearly defined, offices are arranged in a hierarchy, there is a set of written rules and procedures, administrative acts are formulated and recorded in writing, a clear separation is made between personal and business affairs, and appointment is based on expertise. Bureaucratic administration means fundamentally the exercise of control on the basis of knowledge. The whole administrative staff is appointed and function according to the following criteria: 1. candidates are selected on the basis of technical qualifications; 2. the office is filled by a free contractual relationship; 3. individual officials are personally free and subject to authority only with respect to their impersonal official obligations; 4. officials are free to resign from their offices; 5. officials are remunerated by fixed salaries in money and the salary scale is primarily graded according to rank in the hierarchy; 6. the office is treated as the sole, or at least the primary, occupation of the incumbent; 7. occupations in the organization constitute

⁴ Ibid., pp.358-63.

⁵ Ibid., pp.341-58.

a career; 8. the official is subject to strict and systematic discipline and control in the conduct of the office⁶. Several firms examined in this thesis had a clear bureaucratic structure where employees were organized in a hierarchical way, and their remuneration being fixed according to their ranking in the hierarchy and to a salary scale.

According to Weber, in modern society the capitalistic entrepreneur is the only person who has been able to maintain at least relative immunity from subjection to the control of rational bureaucratic knowledge. All the rest of the population have tended to be organized in large-scale corporate groups which are inevitably subject to bureaucratic control. The bureaucratic type of organization has become dominant because technical knowledge, through the development of modern technology and business methods in the production of goods, has become completely indispensable and bureaucracy is technically the most efficient form of organization possible. Bureaucracy is superior not only in technical knowledge, but also in the knowledge of the concrete fact within its own sphere of interest, which is usually confined to the interests of a private business - capitalistic enterprise. Furthermore, Weber points out that capitalism in its modern stages of development strongly tends to foster the development of bureaucracy. Capitalism is the most rational economic basis for bureaucratic administration and enables it to develop in the most rational form. Moreover, capitalistic development has created an urgent need for stable, strict, intensive, and calculable administration. It is this need which gives bureaucracy a crucial role in our society as the central element in any kind of large-scale administration. Only by reversion in every field - political, religious, economic, etc. - to small-scale organization would it be possible to any considerable extent to escape its influence⁷.

Thus, the close connexion established by Weber between the development of modern capitalism and bureaucracy is a useful tool for assessing the business environment in nineteenth-century Minas Gerais, the emergence of increasingly bureaucratic organizations being a key indicator of the emergence of more advanced stages of capitalism. Furthermore, although these pure types of organizations - charismatic, traditional, and bureaucratic - are distinctions which are useful for analysing organizations, any real organization may be a combination of them, as the analysis of mineiro firms will show. A good deal of charisma was required to overcome the obstacles and prejudices against modern entrepreneurship, and traditionalism continued to be the rule in several aspects of the life of the mineiro firms. Nevertheless, as the nineteenth century witnessed the demise of the colonial regime in Brazil - and its institutions such as slavery, metropolitan monopoly, unequal commercial treaties, etc. - it also witnessed the emergence of firms in Minas Gerais with increasingly bureaucratic structures.

Chandler refined Weber's concepts when he restricted his analysis to capitalistic organizations of an economic nature. Chandler examined the organizational evolution of business enterprises in the USA in the last century and at the beginning of this. He identified basically two types of organizations, according to the complexity of their administrative structure and to the scope of their activities. Thus, firms were

⁶ Ibid., pp.329-36.

⁷ Ibid., pp.337-41.

divided into traditional and modern business enterprises: the latter were further divided into three types - firms dominated by families, by financiers, or by managers. These divisions are determined by the relationships between owners and administrators in respect to the means of production and distribution.

In a traditional firm the administrative structure is embryonic or non-existent and owners are responsible for all basic activities: economic; administrative; operational and entrepreneurial. In contrast, the modern business enterprise has a clearly defined administrative structure, employing a hierarchy of middle- and top-salaried managers. This more developed administrative structure is a reflection of the scale of the operation of these firms, which usually operate on a national basis and have several units and divisions⁸. Modern firms dominated by families, or modern family firms, are large firms with a complex administrative structure, but whose founding entrepreneurs and whose family members, or their representatives, continue to be part of top-level management. When the modern firm relies largely on outside financing for its establishment and initial growth, bankers and other financiers participate in top-level management decision-making. Finally, modern managerial firms are the ones which are able to generate funds necessary for expansion, and top-level management decisions are made by salaried managers who own few of the companies' shares⁹.

Chandler, like Weber, describes the development of organizations along an evolutionary scale: from the most traditional to the most modern. It is also important to point out the correspondence between the classifications of the two authors. In other words, the more modern in Chandlerian terms, the more bureaucratic in Weber's view.

Chandler's framework is as useful a tool for classifying mineiro organizations as it is for assessing the business environment within which they were located. According to him, an economy or economic sector in which traditional firms predominate can be considered as an instance of traditional or personal capitalism. Those in which entrepreneurial or family firms predominate are considered as an instance of family capitalism, and so on, successively, until the most advanced stage, managerial capitalism. Therefore traditional, family and financial capitalism proved to be transitional stages in the evolution of modern business enterprise and of modern capitalism. All advanced market economies have moved from traditional, personal capitalism towards managerial capitalism since the middle of the nineteenth century¹⁰. Thus, the investigation of mineiro firms in the light of Chandler's framework will be useful to indicate the stage of development of the mineiro business environment.

Other aspects important for the study of the mineiro business environment are the historical dynamic factors observed by Chandler in the growth of the US economy and its business system during the

⁸ A.D. Chandler, The Visible Hand: The Managerial Revolution in American Business, (Cambridge, MA., 1977), pp.1-12.

⁹ A.D. Chandler, "The United States Seedbed of Managerial Capitalism", in Managerial Hierarchies: Comparative Perspectives on the Rise of Modern Industrial Enterprises, ed. A.D. Chandler and H. Deams (Cambridge, MA., 1980), p.13.

¹⁰ *Ibid.*, p.13.

late nineteenth and early twentieth centuries. Until the last decades of the nineteenth century, the forces behind the growing complexity of the US business enterprises were the rise of the railway, the development of concentrated urban markets for industrial and consumer goods, and the emergence of mass-production technology. From the beginning of the twentieth century onwards, the advent of electrification and the internal combustion engine, and the rise of organized research and development became the most important factors in the development of US business enterprises¹¹.

Until the establishment of the railways and the telegraph and until coal had become a widespread source of energy; and until most firms supplied only local markets - as in nineteenth-century Minas Gerais; the extension of the business activity in the US economy did not require the creation of multi-division enterprises and extensive and complex administrative structures. As long as traditional methods and sources of energy - such as wood, wind and water, man and beast - were used in production and transport the daily output of each individual firm could easily be supervised by the owners, assisted by one or two managers:

"Using century-old business methods, traditional, small, owner-managed enterprises had little difficulty in carrying out production and distribution in the United States."¹²

Notwithstanding the fact that the growth of the US economy in the earlier part of the nineteenth century had brought a rapid increase in the number of firms and the spread of activities over a wide geographic area, the result was not an increase in the size of firms. Firms became more numerous, more specialized, but not more sophisticated in managerial terms. Most produced and distributed only a single line of goods, and carried out a single function, such as wholesaling, retailing, manufacturing, or banking. The coordination of the activities of thousands of small businesses was almost entirely brought about by the invisible hand of the market.

With the establishment of the railways and the telegraph and with the widespread use of steam power, the first modern enterprises quickly emerged in the USA. They first appeared in transport and communications, then in distribution, and finally in production. The use of new technologies increased the speed and volume of production and of movement of goods creating a need for managerial hierarchies to supervise, monitor, and coordinate the processes of production and distribution:

"In transportation and communication, managers began to coordinate the movement of goods from one commercial center to another. In distribution, new mass-marketing enterprises, which relied on new means of transportation and communication, administered the flow of goods from processors or producers to retailers or ultimate consumers. In manufacturing the new mass producers came to coordinate the flow from the extraction of raw material through production to distribution to retailers or final consumers."

In sectors which were dominated by a few great modern multi-division corporations, top-level managers

¹¹ T.K. McCraw, The Essential Alfred Chandler: Essays toward a Historical Theory of Big Business, (Boston, 1991), p.11.

¹² Chandler, "The United States Seedbed of Managerial Capitalism", pp.14-5.

started to make the decisions that had previously been made by the owners of thousands of small firms¹³.

Up to the beginning of the twentieth century, the basic innovations in the US economy were more in the creation of new forms of organization and new ways of marketing. By the end of the last century, the great modern corporation, carrying on the major industrial processes, namely purchasing, manufacturing, marketing, and finance - all within the same organizational structure - had become the basic business unit. From 1903 onwards, the dominant stimuli for innovation in US industry were primarily new products and processes. Changes in organizational methods and marketing techniques were largely responses to technological changes¹⁴.

Chandler suggests that a comparable transformation has occurred in other advanced market economies, but more slowly and more recently. The rapidity of the change has differed among sectors and nations, but managerial capitalism now dominates the central producing and distributing sectors of every major market economy. Nevertheless, the development of modern business enterprise in Europe suggests a history quite different from that of the USA, which in its turn may point to different patterns of business development elsewhere like Minas Gerais. In continental Europe, for example, central government played a much larger role in designing, building, and operating the transport and communication infrastructure. As a result, administrative techniques and personnel may have been transferred directly to business from government bureaucracies in a way that would not have been possible in the USA, where no large government offices existed before the beginning of the twentieth century. The most important difference, however, was that mass markets developed more slowly in Europe, as it did in Brazil. The smaller, slower-growing European consumer market reduced manufacturers' incentives to build large organizations. Where large, multi-division enterprises did appear, they remained small enough to be managed at the top level by a small number of owners. As a result, family capitalism continued to flourish. Cultural and social factors, such as class distinctions and legal differences, also appear to have played a role in delaying the advent of the large managerial enterprise and, with it, managerial capitalism¹⁵.

A closer examination of the British and German experiences will illustrate even better the differences with the US pattern of business development and shed light on the mineiro experience. Although difference in size and rate of growth of the British and the US markets may explain many of the evident contrasts between their corporate structures, it only partially explains the contrasts between the two countries. To begin with, the size and rate of growth of the domestic market is not the best indicator of potential or actual demand. Britain, for example, exported a large proportion of its output for most of the twentieth century and, consequently, British firms faced a somewhat wider market than its domestic alone might suggest. Moreover, the nature of the British domestic market - highly compact and urbanized -, explains the absence of some types of vertical integration evident in the USA. The "invisible hand" of the market in

¹³ Ibid., p.15.

¹⁴ Chandler, The Visible Hand, p.69.

¹⁵ Chandler, "The United States Seedbed of Managerial Capitalism", pp.35-9.

Britain secured the economies of speed gained by the visible hand of the manager in the USA. Large urban markets and efficient market institutions in Britain not only served as an alternative to complex administrative structures, but also made it possible for smaller firms to coordinate and oversee operations and to allocate resources effectively.

Thus, despite the fact that in some periods domestic market in Britain was better suited than the US counterpart to the development of modern corporations, they did not evolve and the characteristics associated with the modern corporate economy were still rare in Great Britain in 1919. Large corporations in almost all industries were less common than in the USA and corporate development in Great Britain presented distinctive national characteristics, with the loose holding company and the family firm remaining much more common structures. The pattern of family-dominated enterprise survived longer in Britain - as it did in Minas Gerais - than in the USA, in part because many of the enterprises were still small enough to be managed by family share-holder-directors - as nineteenth-century mineiro firms - and in part as a result of cultural factors. Furthermore, the persistence of family control was also a matter of deliberate policy on the part of the controlling families, since there was a lack of alternative resources available for management in Britain¹⁶.

Legal differences also account for part of the contrast in corporate development between Britain and the USA. Cartels and restrictive practices were legal in Britain - as well as in continental Europe - until the middle of the 1950s and in important respects they were an alternative to merger that was open to European entrepreneurs but closed to their counterparts in the USA. In Britain firms could maintain their single-unit structures whereas, at the same time, reducing competition by joining a cartel. Furthermore, imperialism, foreign investment, the social and the educational systems, as well as Great Britain's comparative advantages, also attract their shares of the blame for delaying the rise of modern corporate capitalism. In conclusion, the contrasts between Britain and the USA resulted from a combination of factors that include cultural attitudes, values, ideologies, and social structure as well as the nature of markets and the available technology¹⁷. The British experience suggests that a different combination of these same factors may have given rise to an even different pattern in Minas Gerais.

The rise of the modern business enterprise in Germany was closely related to the development of modern industrialism, as was the case in the USA. During the German first phase of industrialization - from 1840 to the economic crisis of 1873 - the establishment of the railways and the related development of manufacturing brought the first massive investments in industry. Growth was made possible due to an increasingly integrated market, enlarged by the expansion of means of transport, and the attainment of

¹⁶ For a more detailed discussion about the problem of lack of managerial capacity in Britain until the first decades of the twentieth century see L. Hannah, The Rise of the Corporate Economy, (2nd. ed. 1983), pp.70-89.

¹⁷ L. Hannah, "Visible and Invisible Hands in Great Britain", in Managerial Hierarchies: Comparative Perspectives on the Rise of Modern Industrial Enterprises, ed. A.D. Chandler and H. Deams (Cambridge, MA., 1980), pp.41-76.

economic and political unity. Industrialization in Germany thus began half century after Britain and roughly at the same time as in the USA. The second phase of Germany's industrialization occurred between 1873 and 1913, by the end of which the country had finally overcome its relative economic backwardness, overtaking all other continental European countries and surpassing even Great Britain in some important respects. It is during the second phase of industrialization that the modern business enterprise emerged in Germany. In 1887 and 1907 almost no traditional firms (firms managed by the owners) were represented among the largest enterprises. Managerial enterprises (firms managed by managers solely) had clearly increased in number during this period. However, as late as 1907 most of the 100 largest corporations were still of an entrepreneurial type (firms managed by managers at their lower and middle levels, and by the owners at the top-level). Managerial firms were even rarer among the smaller companies.

There were striking similarities between the development of modern business enterprise in Germany and in the USA. In both cases, the largest manufacturing firms were clustered in capital-intensive, technologically advanced industries, especially those producing iron, steel and other metals, machinery, instruments, and transport equipment. This is even more marked when the two economies are contrasted with that of Britain, where most of the largest firms produced consumer goods, like textiles and food. However, there were important differences between Germany and the USA in what concerned the market for which firms intended their products. Most of the large US firms produced goods for the mass market, whereas German large firms usually produced according to customer specifications. The competitive strength of the German firms lay in technical virtuosity, whereas that of their US counterparts was in marketing skills and services. Furthermore, there were considerable differences in the proportions of managerial, entrepreneurial, and personal enterprises between Germany and the USA. Entrepreneurial corporations were more important in the former than in the latter country during the First World War. The major growth of the managerial corporation in Germany occurred after the War and even then many entrepreneurial firms remained among the 100 largest, as it was also the case of Minas Gerais.

Nevertheless, the size of the markets were not a significant factor in explaining the differences and similarities observed in the cases of Germany and the USA, otherwise the pattern of corporate development in Britain and Germany would be more similar. Neither do legal differences also account adequately for the differences in the patterns of corporate growth in Germany, Britain and the USA. Although the legal tolerance of cartels were similar both in Germany and in Britain, integrated concerns originated in much the same way in Germany and in the USA, despite their legal differences.

Several factors were involved in bringing about these differences between Germany and Great Britain. Organizational and managerial skills were available earlier in Germany than in Britain, partly because they were developed earlier in the public bureaucracy and were adapted to commercial enterprises. There were also differences in attitudes and values on the part of businessmen, in the educational systems, and in social and cultural traditions. Furthermore, due to their technical education many German entrepreneurs had a preference for "organization" and "production" over "market". However, other factors favoured very early expansion, diversification, and integration of German firms and explain more powerfully

and comprehensively for the differences between Germany and Britain. Industrialization started relatively late and Germany was at first somewhat more backward than Britain and other parts of Western Europe. Then, industrialization took place more rapidly in Germany than in Britain. Moreover, the most important industries in the German Industrial Revolution - railways, chemicals, the manufacture of machinery, and some raw-materials production - had few if any predecessors, whereas the leading industry in British industrialization - textiles -, had a well-developed tradition dating back to early modern times. Thus, when German entrepreneurs tried to imitate and catch up to the British industries, they had to found businesses almost from the scratch.

Therefore, Germany's status as a latecomer to industry had three significant consequences for the history of the modern German corporation, which could also be applied to the case of nineteenth-century Minas Gerais. First, German entrepreneurs in important areas could not count on a well-developed industrial and commercial tradition to build their businesses. Because specialized middlemen to provide raw materials and markets for their products did not exist in sufficient numbers, industrial firms had to fulfil these functions themselves, within their own organizations and with their own employees, if they did not want to give up their plans altogether. This is why large-scale, highly integrated, diversified firms existed in the first phase of German industrialization and even earlier. Second, Germany's relative backwardness led the first industrial enterprises to early diversification. Since they manufactured goods for precarious markets, they preferred not to risk their survival on a single product line. Finally, since there was virtually no established competitors, manufacturer pioneers in relatively undeveloped industrial areas had little to fear when exploring new markets or introducing new product lines. Consequently, the patterns of expansion, diversification, and integration which developed in Germany seem to have lacked parallels in Britain and the USA, but not in nineteenth-century Minas Gerais as it is going to be shown in the next chapter. Small, highly specialized, single-function personal enterprises were more clearly dominant in the first phase of industrialization in Britain and the USA than in Germany. Furthermore, British and US manufacturers relied on independent middle-men to the supply of raw materials and the distribution of finished goods, a practice was much less common among the first German and mineiro producers.

Other consequences of Germany's relative backwardness, which also facilitated early expansion, integration, and diversification, were the increasing importance of joint-stock companies and the strength of investment banks. Both institutions emerged as requirements of industrialization under conditions of relative economic backwardness¹⁸. Joint-stock companies usually encountered fewer barriers to rapid expansion than did family enterprises. Investment banks not only accelerated the expansion, integration, and diversification of manufacturing enterprises, but their strength was also related to the weakness of the middleman. Because the independent merchant was much less important in funding manufacturing firms in Germany than in Britain, this task was more often undertaken by banks. It seems that a strong tradition of independent middlemen mediating among highly specialized production companies, and between them and

¹⁸ For a thorough discussion about the role of banks in Germany's industrialization see A. Gerschenkron, Economic Backwardness in Historical Perspective: A Book of Essays, (1962), pp.11-22.

consumers, according to the laws of the market posed an obstacle to the rapid diversification and integration of manufacturing firms. This obstacle was much less a factor in Germany than in Britain, because of Germany's comparative backwardness at the beginning.

Despite the evidences of the British and the US cases, large-scale enterprise and high degrees of functional integration and product diversification do not necessarily indicate advanced or late stages of development. As the experience of Germany, Japan, and East Central Europe - and even that of Brazil - suggest, large-scale enterprises may well result from the attempt to make up for relative backwardness and they function as islands of modernity in a sea of traditional small and medium-sized enterprises¹⁹.

To conclude, Max Weber identifies three general types of organization based on how authority is exercised within them, each type being expressed in a particular administrative apparatus. The "charismatic" type is where authority is exercised by one person only and is based on the personal qualities of the leader. The "traditional" type is where authority and order are based on custom and precedent. Selection and appointment is based on kinship rather than expertise. In the "bureaucratic" type of organization authority is based on expertise. According to Weber, in modern society the bureaucratic type has become dominant because it is technically the most efficient form of organization possible.

Chandler advances Weber's concepts by applying his analysis to capitalistic organizations of an economic nature. Chandler identified basically two types of organizations, according to the complexity of their administrative structure and to the scope of their activities: the traditional and the modern business enterprises. In a traditional firm the administrative structure is embryonic or non-existent and owners are responsible for all of basic activities. The modern business enterprise, by turn, has a clearly defined administrative structure, employing a hierarchy of middle- and top-salaried managers. This more developed administrative structure is related to the larger scale of the operation of these firms. They usually operate on a national basis and have several units and divisions. A comparable corporate evolution has occurred in other advanced market economies, but more slowly and more recently.

Drawing on the historical experience of the USA, Britain, and Germany, Chandler, Hannah and Kocka show how different patterns of corporate structure emerge, shared by social and cultural factors. They also show the influence of different relative degree of economic backwardness and the importance of the local business environment in setting the pattern of organizational development.

Drawing upon the experience of more developed countries, the authors considered in this chapter point to several aspects of the business environment to explain the changes in the structure of firms and the differences found in the pattern of organizational development of each country examined. The following aspects are of particular relevance for the study of corporate development in nineteenth-century Minas Gerais: the size of firms and markets, the degree of development of the channels of distribution, the scale of production/operation, the nature of economic activities carried out by firms, and the role played by

¹⁹ J. Kocka, "The Modern Industrial Enterprise in Germany", in Managerial Hierarchies: Comparative Perspectives on the Rise of Modern Industrial Enterprises, ed. A.D. Chandler and H. Deams (Cambridge, MA., 1980), pp.77-116.

entrepreneurs and their families, or representatives, in the administrative life of the firms examined in the following chapter.

Chapter 5 - THE MINEIRO FIRM IN THE NINETEENTH CENTURY

As mentioned above, one of the key indicators of the emergence of the modern stage of capitalism is the rise of modern corporate business enterprises. However, even a brief glance at the pattern of corporate development in Minas Gerais during the last century reveals that most firms were traditional and small family affairs. Their limited scale never required the development of a more complex organization of the firm and mineiro entrepreneurs continued to manage their firms with old-century techniques and with the help of a small number of people. The few exceptions which emerged were due mostly to the nature of the industry rather than the firm itself. Thus, this chapter analyses the organization of the mineiro firm through an examination of the scope of the activities and the administrative structure of several firms in four different sectors: the iron industry; transport; textiles; and the electricity generating industries.

5.1 - The Scope of the Activities:

To assess the scope of the activities of the business enterprises, the analysis will have to examine the size of the firms (measured in terms of the scale of production/operation, the number of workers, the number of units operated, and the economic functions fulfilled by the same company) and the nature of their marketing activities (assessed through the nature and size of the consumer markets, the range of products offered, and channels of distribution).

5.1.1 - The size of the firm:

Owing to the fact that the firms investigated here vary in nature, it is important to make some remarks before beginning the analysis of the size of firms in nineteenth-century Minas Gerais. Concerning the number of units operated by each firm, it is important to point out that whereas industries like iron foundries, textile mills, and hydroelectric power plants, tend to concentrate their activities in only one site, road-construction and transport firms tend to have their activities spread over several sites. The implication of this fact is that a multi-site transport firm does not necessarily imply bigness owing to the nature of an individual firm, but to the nature of the industry itself. Therefore, this has implications for the organizational structure which has to be more institutionalized, bureaucratic (and less personalized). However, in other industries this can be a clear indication of the size of the firm. Furthermore, the size of the work-force employed by each company must be analysed in the light of the more or less labour-intensive nature of each particular industry.

Until the 1880s, the mineiro iron industry was dominated by a large number of very small firms. From then onwards, a small number of larger firms began to emerge and predominate. Throughout the nineteenth century, iron firms were single-unit enterprises operating only one foundry. The only exception was the Companhia Nacional de Forjas e Estaleiros (CNFE), which in the early 1890s took over the São Miguel de Piracicaba, the Esperança, and the Burnier foundries. However, the CNFE was based in Rio de Janeiro and a few years after having taken control of the above-mentioned foundries the company went

bankrupt¹. Furthermore, all the mineiro foundries during this period carried out a single economic function - the production of iron.

Table V.1 - Comparison of the methods of production of pig iron in nineteenth-century Minas Gerais.

METHOD	CONSUMPTION OF CHARCOAL (tons)	CONSUMPTION OF ORE (tons)	NUMBER OF WORKING DAYS	PRODUCTION OF PIG IRON
<u>Cadinho</u>	7.0	1.0	27 days	100 kilos
Italian	5.5	1.0	18 days	120 kilos
Catalan	3.0	1.0	13 days	320 kilos

Source: J.A. Paula, "Dois Ensaios sobre a Gênese da Industrialização em Minas Gerais: a Siderurgia e a Indústria Têxtil", in Anais do II Seminário sobre a Economia Mineira (Belo Horizonte, 1983), p.34.

The scale of production of the iron firms during the first three-quarters of the last century was limited by the technology employed by them. Basically, there were three methods of production employed by the iron foundries: the "cadinho" method, the "Italian" method, and the "Catalan" method. The first was the simplest and did not require a skilled work-force. Due to its simplicity, it was the commonest method used by four-fifths of the mineiro foundries². As shown in Table V.1, output was very limited compared with that of the other two methods. To produce 100 kilos of pig iron by the cadinho method required 3 labourers working 27 days, 7 tons of charcoal, and 1 ton of ore of high quality. Although the second method of production - the Italian - was used less, it was more efficient than the cadinho, producing 120 kilos of pig iron, consuming 5.5 tons of charcoal and 1 ton of ore in 18 working days³. Nevertheless, it required a more skilled work-force, since the process involved the operation of a blast-furnace which required more care in the regulation of the quantity of air to maintain the right temperature. Furthermore, it also required a regular series of successive heating and hammering operations to yield a good final product. Finally, the Catalan method was the most complex process. It required even more skill from the labourers for measuring the quantity of ore and charcoal as well as for making a perfect linkage of the heating and hammering operations. Furthermore, the employment of this method was only feasible if the work was supervised by a manager who had a good knowledge of metallurgy⁴. The Catalan method was the most productive. It yielded 320 kilos of pig iron, required only 3 tons of charcoal and 13 working days. Even so, its scale of production was very limited when compared with the more modern indirect process of production employed

¹ J.A. Paula, "Dois Ensaios sobre a Gênese da Industrialização em Minas Gerais: a Siderurgia e a Indústria Têxtil", in Anais do II Seminário sobre a Economia Mineira, (Belo Horizonte, 1983), p.38.

² D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), pp.147-8.

³ Paula, op.cit., p.32-3.

⁴ Libby, op.cit., pp.148-9.

by the South Wales ironworks - then the most advanced in the world -, using mineral fuel and steam power⁵. As shown in Table V.2, the least productive ironwork in South Wales in 1812 produced a total of 35 tons per week per blast furnace.

Table V.2 - Output of pig iron in blast furnace in South Wales ironworks, 1812.

WORKS	TOTAL BLAST FURNACES	TOTAL OUTPUT/WEEK (Tons)	AVERAGE OUTPUT/WEEK PER FURNACE (Tons)
Cyfarthfa & Ynysfach	6	340	57
Dowlais	5	200	40
Nantyglo	3	165	35
Plymouth	4	160	40
Penydarren	3	150	50
Ebbw Vale	3	135	45
Clydach	2	130	65
Aberdare	3	105	35
Beaufort	2	90	45
Sirhowy	2	80	40

Source: Adapted from M. Atkinson and C. Barber, The Growth and Decline of the South Wales Iron Industry, 1760-1880, (Cardiff, 1987), p.9.

Table V.3 also provides a clear picture of the scale of production of the iron industry in Minas Gerais. In 1821, the estimated number of iron foundries in Minas Gerais was 31. There were almost three times that number in 1853. By 1864 the number of firms had almost doubled. From then onwards, the number of companies started to decrease as railways reached the hinterlands of Minas Gerais, bringing with them foreign competition. In 1883, for example, there were only 80 foundries. For 1893, there are two estimates of the number of foundries. The first estimate shows an increase to 100. The second estimate differentiates between small and large foundries but lists only 51 of the former. Nevertheless, the long-term tendency of the number of small foundries to decrease is clear, and they were to disappear almost entirely in the following decades⁶.

Although these are only rough estimates, they are useful for drawing a more precise picture of the scale of production of the mineiro iron firms. The annual average output per foundry in 1853 and 1880, for example, was about 27 tons. In 1893, according to the first estimate in Table V.3, it was 20 tons. These average output figures are compatible with the annual output of 29 tons forecast by Eschwege for the small

⁵ M. Atkinson and C. Barber, The Growth and Decline of the South Wales Iron Industry, 1760-1880, (Cardiff, 1987), pp.4-6.

⁶ F.A.M. Gomes, História da Siderurgia no Brasil, (Belo Horizonte/São Paulo, 1983), p.148.

foundries in Minas Gerais⁷. Comparison between Tables V.2 and V.3 shows clearly how limited the scale

Table V.3 - Estimated number of iron foundries in nineteenth-century Minas Gerais, their annual output, and their annual and weekly averages.

YEAR	NUMBER OF WORKS	ANNUAL OUTPUT (tons)	AVERAGE ANNUAL OUTPUT	AVERAGE WEEKLY OUTPUT
1821	31	-	-	-
1853	84	2250	26.8	0.5
1855	105	-	-	-
1864	140	-	-	-
1880	110	3000	27.3	0.5
1881	120	-	-	-
1883	80	-	-	-
1893	100	2000	20.0	0.4
1893	51* 4**	-	-	-

Source: Adapted from D.C. Libby, *Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX* (São Paulo, 1988), p.154.

* Number of small foundries

** Number of large mills

of production of the mineiro ironworks was. In 1812, the least productive South Wales foundry produced an average of 35 tons per week. More than 40 years later mineiro foundries were producing an average of only 0.5 tons per week. In 1893, this average reduced even further to 0.4 tons. Furthermore, in 1880, the import of wrought iron into the port of Rio de Janeiro was more than 6,000 tons⁸, more than double the combined output of all 110 mineiro foundries. In other words, to supply the market represented by the import of iron into Rio de Janeiro alone, it would have been necessary to double the existing number of foundries in 1880.

Table V.4 - Average net output of the US Iron and Steel Industry for 1860-1880.

YEAR	NUMBER OF ESTABLISHMENTS#	ANNUAL NET OUTPUT (tons)	AVERAGE OUTPUT (tons)
1860	627	919,770	1,466.9
1870	808	1,865,000	2,308.2
1880	1,005	4,295,414	4,274.0

Source: W.T. Hogan, *Economic History of the Iron and Steel Industry in the United States*, (Lexington, 1971), I, pp.14,91-3.

The number of establishments includes blast furnaces, mills for the production of bar, sheet, and railway iron, wire mills, forges, and steel-plates mills.

Comparison with the US iron industry is also revealing. In 1880, the US iron industry produced more than 4.2 millions tons of iron, as shown in Table V.4. To produce the same quantity, at least 154,000

⁷ W.L. von Eschwege, *Pluto Brasiliensis*, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979), II, p.261.

⁸ Paula, *op.cit.*, p.37.

foundries like the ones existing in Minas Gerais in 1880 would have been required. Furthermore, average output per foundry in the US in 1880 was nearly 4,300 tons, more than 159 times the annual average output of the mineiro iron foundry. Thus, only an industry dominated by large firms, with complex administrative structures, could have handled the enormous quantity of activities involved in the coordination, planning and appraisal of such production. Therefore, in terms of scale of production, iron foundries in Minas Gerais in the first three-quarters of the nineteenth century were very small. Compared with the South Wales and the US works, they were almost craft units.

An analysis of the scale of production of individual firms is also very illustrative. In the early 1880s, José Cândido da Costa Sena, an engineer from the Mining School of Ouro Preto, visited and described several foundries located in the Metalúrgica Zone, between Ouro Preto and Serro. Altogether, he surveyed 21 foundries producing from 694 to 803 tons of iron per year⁹, an average of 33 to 38 tons per year (or 0.6 to 0.7 tons per week) per foundry.

Table V.5 - Annual output in kilos of the Patriótica and the Morro do Pilar foundries, 1813-1821.

YEARS	PATRIOTICA	MORRO DO PILAR
1813	14.6	n.a.
1814	14.7	n.a.
1815	18.8	5.8
1816	16.7	17.1
1817	13.5	11.7
1818	n.a.	13.8
1819	24.2	10.3
1820	18.1	37.3
1821	n.a.	5.0

Source: Adapted from W.L. von Eschwege, Pluto Brasiliensis, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979), II, pp.212, 251 and 304.

Among the largest foundries the São Miguel de Piracicaba foundry produced 450 kilos of iron per day in 1853. At this time, it was the only foundry in Minas Gerais to use the Catalan method¹⁰. The Patriótica foundry had 4 small furnaces employing the cadinho method. Table V.5 shows its annual output from 1813 to 1820, the years of Eschwege's administration. The highest level of output was 24.2 tons in 1819 - a figure which was two-thirds of the weekly output of the smallest South Wales foundry -and the lowest level 13.5 tons in 1817. The figures for 1818 are not known. The average output for the whole period is 17.2 tons per year, less than one-third of the installed capacity of 58.8 tons¹¹. At the Morro do Pilar foundry the story was not very much different. According to Eschwege, although the output of the Morro

⁹ J.C. Costa Sena, "Viagem de Estudos Metallurgicos no Centro da Provincia de Minas", in Annaes da Escola de Minas, (Ouro Preto, 1881), No.1, pp.117-41.

¹⁰ Ibid., p.112.

¹¹ Eschwege, op.cit., pp.247-52.

do Pilar was planned to be much higher, its actual output was scarcely higher than that of his own foundry¹². Comparison between the two foundries presented in Table V.5 shows that, apart from the years 1816 and 1820, the annual output of the Morro do Pilar was always less than that of the Patriótica. Furthermore, for the period 1815-21, the average output of the Morro do Pilar was 14.4 tons, 19% less than the average output of Eschwege's foundry.

Thus, during the first three-quarters of the last century, iron firms in Minas Gerais were characterized by their low scale of production, both in terms of the installed capacity and of the actual output. Compared with the South Wales and the US ironworks, even the largest firms in Minas Gerais were very small in this particular respect.

Table V.6 - The Esperança foundry: annual output and variation in percentage year by year, 1899-1914.

YEAR	VARIATION IN % YEAR BY YEAR	ANNUAL OUTPUT (Tons)	YEAR	VARIATION IN % YEAR BY YEAR	ANNUAL OUTPUT (Tons)
1899		80	1907	(+) 14.9	1,901
1900	(+) 845.0	756	1908	(-) 1.7	1,868
1901	(+) 9.3	826	1909	(+) 14.2	2,134
1902	(+) 52.3	1,258	1910	(+) 24.6	2,658
1903	(+) 8.1	1,360	1911	(+) 22.7	3,262
1904	(+) 25.7	1,710	1912	(+) 6.2	3,463
1905	(-) 23.7	1,304	1913	(+) 15.5	4,000
1906	(+) 26.8	1,654	1914	(-) 45.5	2,181

Source: Adapted from C.M. Peláez, *História da Industrialização Brasileira: Crítica à Teoria Estruturalista no Brasil*, (Rio de Janeiro, 1972), p.146.

For the rest of the nineteenth century, the scale of production of the iron industry increased as larger works began to emerge. Nevertheless, output continued to be small in comparative terms. The largest works existing during this period were the Esperança and the Burnier foundries. Until 1896, the Esperança had an installed capacity of 5 tons per day, or 1,700 tons per year¹³. Although there is no more information about its installed capacity, figures of annual output of the Esperança foundry are not very impressive. As shown on Table V.6, in 1899 annual output totalled only 80 tons. This very low level of output seems to reflect the fact that the control of the foundry was passed to a group of banks after the bankruptcy of the CNFE. In the following year the foundry was sold to Joaquim Queiroz Júnior¹⁴ and output increased considerably to 756 tons per year. In 1902, output increased by more than 50% compared to 1,258 tons. In 1909, output reached the 2,000 tons per year mark and by the outbreak of the First World War, output stood at 4,000 tons per year. Compared with the average output of individual US iron firms these figures are indeed not very impressive. In 1896, the installed capacity of the Esperança foundry was less than half of

¹² Ibid., pp.207-213.

¹³ Gomes, *História da Siderurgia no Brasil*, pp.141-46.

¹⁴ C.M. Peláez, *História da Industrialização Brasileira: Crítica à Teoria Estruturalista no Brasil*, (Rio de Janeiro, 1972), p.145.

the average output of the US industry in 1880 (4,274 tons per year). In 1900, output of the Esperança foundry was less than 18% of the US average output in 1880. Finally, the 1880 US average output was still 7% larger than the output of the Esperança foundry in 1913. The Burnier foundry was not an exception. Its initial installed capacity amounted to 5 tons per day, or around 1,700 tons per year¹⁵. Unfortunately there is no information about its annual output. Nevertheless, the figures for both the Esperança and the Burnier foundries are indisputable evidence that the "technology gap" was closing towards the end of the century. At the beginning of the nineteenth century mineiro ironworks were minute compared with the then world leader (South Wales). By the end of the century the Esperança capacity alone was half that of the US average. Thus, although the ironworks which emerged in the latter part of the nineteenth century represented an evolution in terms of the scale of production of this industry, in comparative terms, iron firms were still only as large as the US ironworks had been three or more decades earlier and as large as the smallest South Wales foundry of the first decade of the last century, as listed in Table V.2.

Owing to the scarcity of information, it is nearly impossible to state precisely the average number of workers employed by mineiro foundries before 1880. Nevertheless, from the scattered information available, it is possible to say that very few foundries in this period employed more than 20 people. From 1831 to 1840, for example, there were 24 foundries spread across several districts of the Metalúrgica-Mantiqueira zones, where the bulk of the industry was situated¹⁶. There is information about the work-force of only 22 foundries. Altogether, they employed 168 slaves and 70 free workers¹⁷, an average of 10.7 workers per foundry. In 1864, from the 21 foundries established in Santa Bárbara, a district within the Metalúrgica-Mantiqueira zones, 20 firms employed a total of 178 workers, each foundry employing between 4 and 16 people¹⁸.

The exceptions to this rule were the São Miguel de Piracicaba, the Morro do Pilar, the Girau, and the Patriótica foundries, which were the largest in terms of number of workers during this period. In 1840, the São Miguel de Piracicaba foundry employed 151 slaves. It seems that this number did not change very much in 1853, when answering an inquiry about the iron industry in Minas Gerais organized by the president of the province, Monlevade mentioned that in his foundry:

"There are 150 slaves already apprenticed to the art of iron, to the making of charcoal in the European fashion, to the manipulation of iron of any form and size."¹⁹

¹⁵ Gomes, História da Siderurgia no Brasil, pp.146-7.

¹⁶ According to Libby, there is evidence that the industry was heavily concentrated in the Metalúrgica region in 1821. This concentration will be confirmed in the period 1854-58, when 80% of the foundries were located in the Metalúrgica-Mantiqueira region. The same trend was found for the period 1863-66, although the information is incomplete and scattered. Libby, op.cit., pp.152-60.

¹⁷ Ibid., p.165.

¹⁸ Ibid., p.168.

¹⁹ Gomes, História da Siderurgia no Brasil, p.111.

In 1864, the foundry employed 103 workers²⁰. The Morro do Pilar foundry, was one of the first foundries established in Minas Gerais. The foundry was short-lived. Set up in 1808 it was shut down in 1831. In 1814, it employed a total of 34 workers and in 1821 137 workers²¹. The Girau foundry employed 25 workers in 1817. In 1840, it employed 49 slaves and 1 manager. During the period 1831-1840, only the Patriótica and the São Miguel de Piracicaba foundries were larger than the Girau in terms of the size of the work-force²². The Patriótica foundry was established by Eschwege, a German engineer, in 1811. During Eschwege's days, until 1821, the Patriótica employed a total of 24 people, including Eschwege himself²³. In 1831, the Patriótica was considered the largest foundry when it employed 55 slaves²⁴.

Further evidence of the small size of mineiro iron firms emerges from the analysis of the number of workers required to the operation of the foundries which employed the widespread cadinho and the Italian methods of production. According to Ferrand, the cadinho process required at least three workers per furnace: one operating the cadinhos in the furnace, one working with the hammermill, and another as assistant. Although the preparation and procurement of charcoal and ore required the work of at least 8 labourers, they could be acquired from a third party. The Italian process also required very few people in its operation. It required at least 4 workers per furnace: one operating the furnace, one the hammermill, one assistant, and another for carrying the ore. Thus, the small foundries using the cadinho method required only three permanent workers on site, whereas the foundries using the Italian method required only four permanent workers²⁵. Unfortunately, there is no information about the minimum number of workers required to operate a foundry using the Catalan process. Nevertheless, the Catalan was the least employed method of production in Minas Gerais and the foundries which employed this method were probably the least representative of the average mineiro foundry.

This brief analysis of the mineiro iron firms shows clearly how small the industry was. While the industry was made up of small foundries employing an average of 11 workers, with very few firms employing more than 20 workers and the largest employing at most 150 people. Around the 1860s, US firms had an average of approximately 64 workers, as shown in Table V.7. In 1870, the average number of workers employed by the US iron and steel industries increased to 95 and in 1880 to 139, when the US average was about the same as the largest foundries in Minas Gerais. Thus, the mineiro iron industry of the first three-quarters of the nineteenth century was small in every respect: economic functions, scale of

²⁰ Libby, op.cit., p.168.

²¹ Eschwege, op.cit., pp.209-13.

²² Libby, op.cit., pp.163-4.

²³ Eschwege, op.cit., pp.247-254.

²⁴ Libby, op.cit., p.162.

²⁵ P. Ferrand, "A Indústria de Ferro no Brasil (Provincia de Minas Geraes)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.167-85.

production, number of workers employed, and the number of units operated.

Table V.7 - Average work-force in the US Iron and Steel Industry for 1860-1880.

YEAR	NUMBER OF ESTABLISHMENTS#	NUMBER OF WORKERS*	AVERAGE
1860	627	40,000	63.8
1870	808	77,000	95.3
1880	1,005	140,000	139.3

Source: Hogan, *op.cit.*, pp.91-3.

* Estimated numbers

The figures include blast furnaces, mills for the production of bar, sheets, and railway iron, wire mills, forges, and steel plates.

By contrast, the Companhia União e Indústria (CUI) was certainly a large enterprise. Basically, it fulfilled two economic functions: the construction of roads and the transport of goods and passengers. The relevance of this fact to an organizational analysis of the CUI is that the construction of large transport undertaking in the USA, for example, the Erie Canal, did not involve a lot of administrative coordination. It was more a technical than an administrative task. It was the operation of railways and canals which called for more administration, even though before the 1850s, due to their short length, the existing railways in the USA had little need for a systematic organizational structure²⁶. Thus, the fact that the CUI not only built but also operated the União e Indústria turnpike indicates that it was an enterprise of a considerable size in organizational terms.

Table V.8 - Length of the Brazilian railways in 1867.

RAILWAY	LENGTH (Kilometres)
EFDPII	197.4
São Paulo	139.0
Bahia	123.5
Pernambuco	124.9
Cantagallo	49.1
Mauá	17.5
Total	651.4

EFDPII - Estrada de Ferro Dom Pedro II.

Source: Ministerio da Agricultura, Commercio e Obras Publicas, Relatorio da Repartição dos Negocios da Agricultura, Commercio e Obras Publicas, (Rio de Janeiro, 1868), p.84.

The scale of operation of the CUI was both large and unprecedented for nineteenth-century Minas Gerais. The establishment of the company and the construction of the turnpike pre-dated any railway in the province, a time when the bulk of the transport of people and goods was made by muletrain, ox cart and horse. In 1853, the company was granted a franchise to operate a provincial road - the Paraibuna road - which extended from Barbacena to the Paraibuna river. From 1856 to 1861, the company built 144 kilometres of new carriageway linking the cities of Juiz de Fora, by the Paraibuna river in the province of

²⁶ A.D. Chandler, Strategy and Structure: Chapters in the History of the American Industrial Enterprise, (Cambridge, M.A., 7th ed. 1991), p.21.

Minas Gerais, and Petrópolis, in the province of Rio de Janeiro²⁷. In 1867, the total length of roads operated by the company was approximately 380 kilometres²⁸. To have an idea of what these figures represent, a comparison with railways in Brazil and the USA is revealing. In 1867, for example, the largest railway established in Brazil was the Estrada de Ferro Dom Pedro II (EFDPII), which was 197,4 kilometres in length as shown in Table V.8. The smallest was the Mauá railway, which was 17,5 kilometres in length. Together, all the Brazilian railways in 1867 were 651,4 kilometres in length; i.e., less than double the length of roads operated by the CUI alone during the same year. A year later, the EFDPII continued to be smaller with 216 kilometres²⁹. Moreover, most railways in the USA before the 1850s were rarely more than 160 kilometres in extent³⁰. Thus, in terms of route mileage, the União e Indústria turnpike was larger than existing railways in both Brazil and the USA.

Nevertheless, the scale of the transport of passengers and goods operated by the company does not point to a considerable operation. Table V.9 shows the passenger traffic from 1858 to 1874. From 1858 to 1860, the turnpike was not in full operation. This is reflected in the figures of the passenger traffic. In 1858, from April to December, the passenger traffic amounted to 5,499 people to and from the hinterland of Minas Gerais. For the full year of 1859, numbers rose to 8,926 and to 10,093 in 1860. The main section of the turnpike, between Juiz de Fora and Petrópolis, was inaugurated in June 1861. In the following decade passenger traffic nearly doubled from 13,505 in 1861 to 23,508 in 1871. In 1874, traffic amounted to 27,682 passengers. Nevertheless, these numbers are very small if compared with the figures of the EFDPII. In 1869, the EFDPII transported a total of 778,543 people³¹, while the CUI handled only 23,975 passengers. In other words, the CUI transported 3% of the number of passengers carried by the EFDPII in 1869.

Table V.9 also presents the figures for freight carried by the CUI from 1858 to 1874. During this period the total weight of goods transported increased by a factor of five, from 10,974 tons in 1858 to 55,861 tons in 1874. However, compared with the tonnage carried by the EFDPII, the total of freight carried

²⁷ Companhia União e Indústria, Relatório da Assembléa Geral dos Acionistas, (1861), p.5.

²⁸ Ministério dos Negócios de Agricultura, Comércio e Obras Publicas, Instruções expedidas ao Conselheiro M.C. Galvão, encarregando-o de estudos relativamente às propostas da companhia União e Indústria concernentes à Estrada de Ferro de Pedro II No.1, Secção 3, 10/10/1868, reproduced in A.O. Esteves, "Mariano Procópio", in Revista do Instituto Histórico e Geográfico Brasileiro, Vol.230, Jan-Mar, 1956, pp.232-3.

²⁹ Estrada de Ferro D. Pedro II, Relatório do Ano de 1869 Apresentado ao Ilmo. e Exmo. Sr. Conselheiro Diogo Velho Cavalcanti de Albuquerque, Ministro e Secretário de Estado dos Negócios da Agricultura, Comércio e Obras Públicas por Mariano Procópio Ferreira Lage, Director da mesma Estrada, reproduced in *Ibid.*, p.250.

³⁰ Chandler, Strategy and Structure, p.21.

³¹ Estrada de Ferro D. Pedro II, Relatório do Ano de 1869 Apresentado ao Ilmo. e Exmo. Sr. Conselheiro Diogo Velho Cavalcanti de Albuquerque, Ministro e Secretário de Estado dos Negócios da Agricultura, Comércio e Obras Públicas por Mariano Procópio Ferreira Lage, Director da mesma Estrada reproduced in Esteves, op.cit., p.251.

by the CUI was also very small. In 1868, for example, the EFDPII carried a total of 104,530 tons of goods³², against the 36,641 tons by the CUI (that is, the road handled only 35% of the freight carried by the EFDPII). Thus, although the CUI operated a large number of kilometres of roads, the scale of operation measured in terms of freight and passengers transported was not very large.

Table V.9 - Passenger and freight traffic, and percentage of goods exported in the União e Indústria turnpike, 1858-1874.

YEARS	PASSENGERS	TOTAL OF GOODS TRANSPORTED (tons)	% OF GOODS EXPORTED
1858*	5,499	10,974	68
1859	8,926	22,776	71
1860	10,093	26,970	75
1861	13,505	29,743	79
1862	14,291	20,695	59
1863	13,576	23,345	69
1864	13,962	23,802	64
1865	14,453	31,988	67
1866	14,902	32,627	65
1867	16,418	41,061	74
1868	21,969	36,641	73
1869	23,975	n.a.	-
1870	21,385	n.a.	-
1871	23,508	n.a.	-
1873	27,098	51,683	62
1874	27,682	55,861	63

Source: Compiled from Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1864, 1865, 1872, 1875).

* From April to December.

In terms of the size of its work-force, the CUI was certainly one of the largest employers in nineteenth-century Minas Gerais. In 1855, for example, the number of slaves employed by the company oscillated between 515 and 828. During that year, the company also employed several skilled workers like engineers, architects, carpenters, etc., and the overall number of workers may have reached 1,000 people³³. In 1856, the company employed 1,102 people, among them, 900 slaves and 80 free labourers. The remainder was made up of architects, drivers, horse-masters, foremen, carpenters, bricklayers, coachmen, blacksmiths, engineers, etc.³⁴. In 1857, the company employed 804 slaves and in the company report of that year the chairman of the Board, Lage, indicated that the number of free workers had increased:

³² Estrada de Ferro D. Pedro II, Relatório do Ano de 1869 Apresentado ao Ilmo. e Exmo. Sr. Conselheiro Diogo Velho Cavalcanti de Albuquerque, Ministro e Secretário de Estado dos Negócios da Agricultura, Comércio e Obras Públicas por Mariano Procópio Ferreira Lage, Director da mesma Estrada, reproduced in *Ibid.*, p.250.

³³ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), pp.13-5.

³⁴ Esteves, *op.cit.*, pp.138-9.

"The workshops are established at the Juiz de Fora station employing carpenters, blacksmiths, locksmiths, cabinet-makers, painters, and saddlers. For the same reasons presented in my report of the last year (...) I have tried to develop these establishments, increasing the number of the necessary workers with part of the 20 Germans engaged and other native labourers."³⁵

Thus, based on the figures of workers for the year 1856, when the company employed 1,102 people, it is realistic to say that the total number employed in 1857 may have been around 1,000. In 1858, according to a report by Lage to the president of the province of Minas Gerais, the company employed 2,636 workers. In the section of the road between Juiz de Fora and Paraíba 1,136 were employed - among them, 800 slaves and 336 free workers. The other 1,500 were employed in the section between Petrópolis and Paraíba do Sul. For this section of the road there is no break down of the number of workers between slave and free³⁶. In 1860, with new roads under construction, notably the section between Pedro do Rio and the Paraibuna river, the company employed 3,500 workers. Again, there is no information of how this work-force was constituted. There is no indication of the proportion of slaves, of skilled workers, of those employed directly by the company, and of those employed by contractors hired to build parts of the turnpike. Nevertheless, based on the figures of the previous years, it is quite reasonable to say that the direct work-force for 1860 could have been well over 1,000 people³⁷. In 1861, the construction of the turnpike from Petrópolis to Juiz de Fora was completed and, as no other major construction work was undertaken, the number of workers fell steadily from then onwards. In 1866, for example, the company employed a total of 344 people³⁸. By the time the company was in serious troubles and was taken over by the Imperial government, the road was being leased back to the CUI for 15 years³⁹. In the following years, as the EFDPII advanced towards the hinterland of Minas Gerais, competition became extremely tough for the CUI. Ultimately, in 1869 the turnpike was absorbed by the EFDPII⁴⁰. As a consequence, investment decreased, as shown in the company report of 1871:

"The board of directors understands that from now on the surplus revenue of the company must not be employed in the construction of roads, other than those to which the company is not obliged by the 1864 contract. Construction must be limited to those roads that, without the sacrifice of the company's revenue, the provincial governments require (...)."

Thus, it is reasonable to expect that the number of workers tended to stabilize as the demise of the company approached. For the period 1866 onwards, however, there is no information about the number of

³⁵ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), pp.21-3.

³⁶ D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980, p.30.

³⁷ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1860), p.7.

³⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1866), Annexe 12.

³⁹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1865), pp.5-6.

⁴⁰ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1869), pp.3-4.

workers employed by the company.

Finally, in terms of capital the CUI could not be considered a large enterprise. The company was organized with a nominal capital of 5.000:000\$000 Contos, but the issued capital never exceeded 3.060:000\$000 Contos⁴¹. To have an idea of the size of the capital of the CUI during its time, it is interesting to compare it with the capital of other Brazilian companies established during the same time. Of the 76 companies registered between 1850 and 1865 in the tribunal of commerce of Rio de Janeiro, only 6 had a capital larger than 10.000:000\$000 Contos and were considered large enterprises in this respect. They were one railway (the EFDPII), two banks (the Banco do Brasil and the Banco Comercial e Agrícola), two insurance companies (the Companhia Seguros Marítimos e Terrestres and the Companhia Seguros Marítimos e Terrestres Fidelidade), and the Companhia Reformadora, of whom there is no information about its activities. Furthermore, only 5 companies, with a capital between 5.000:000\$000 and 10.000:000\$000 Contos, were considered medium size enterprises. Of the remainder 65 companies, the capital of 4 was unknown and 61 were considered small companies with a capital smaller than 5.000:000\$000 Contos⁴². Thus, in terms of capitalization the CUI was considered a small enterprise.

Table V.10 - Brazilian textile mills in 1868: number of looms, workers, and annual output.

MILLS (Province)	LOOMS	ANNUAL OUTPUT (in meters)	WORKER
Todos os Santos (BA)	136	1,100,000	200
Santo Aleixo (RJ)	52	605,000	150
Nossa Senhora do Amparo (BA)	48	660,000	90
Sto. Antônio Queimados (BA)	30	352,000	90
Santa Theresa (RJ)	n.a.	n.a.	20
Modelo (BA)	39	550,000	110
Fernão Velho (AL)	40	160,600	33
Conceição (BA)	35	495,000	60
Cana do Reino (MG)	5	220,000	15
Average	48	517,825	85

Source: Adapted from Ministério da Agricultura, Commercio e Obras Publicas, Relatorio da Repartição dos Negocios da Agricultura, Commercio e Obras Publicas, (Rio de Janeiro, 1868), p.52.

The average mineiro textile of the last century could hardly be considered a large enterprise, even by Brazilian standards. Until the 1870s, only two textile mills were established in Minas Gerais: the Companhia Industrial Mineira (CIM), founded in the late 1830s, and the Cana do Reino mill, set-up in the early 1840s. Both were small and short-lived enterprises. The only information about production at the CIM dates from the end of 1840, when the mill produced about 990 meters of cloth in 20 days of work, employing 21 workers and 16 spindles. The story of the Cana do Reino mill is better documented. Although it was shut down in the 1870s, the mill was more successful than the CIM⁴³. Nevertheless, it was a very

⁴¹ Giroletti, op.cit., pp.18-9.

⁴² A.C. El-Kareh, Filha Branca de Mãe Preta: A Companhia de Estrada de Ferro D. Pedro II, 1855-1865, (Petrópolis, 1982), pp.57-8.

⁴³ Libby, op.cit., pp.216-25.

small affair even when compared with other Brazilian textile mills of its time. Table V.10 lists nine textile mills located in Bahia (BA), Rio de Janeiro (RJ), Alagoas (AL), and Minas Gerais (MG) in 1868. The size of these mills are measured in terms of the number of looms and workers employed, and the annual output. The largest mill was the Todos os Santos mill in Bahia employing 136 looms and 200 workers, with an output of 1,100,000 meters of cloth per year. The smallest was the Cana do Reino mill, employing 5 looms and 15 workers, with an output of 220,000 meters of cloth per year. On average, the textile mills listed in Table V.10 employed 48 looms, 85 workers and produced 517,825 meters of cloth per year. Thus, the Cana do Reino mill was considerably smaller than the average size of Brazilian textile mills in 1868.

Table V.11 - Minas Gerais: textile mills established in the 1870s, 1880s and 1890s.

YEAR	MILL	CAPITAL		No. OF LOOMS	NO. OF WORKERS
		Contos	£		
1872	Cedro	150	15,600	18	70
1872	Brumado	150	15,600	40	80
1875	Machadense	n.a.	-	10	n.a.
1876	BiriBiry	n.a.	-	20	n.a.
1877	Cachoeira	200	20,460	50	n.a.
1877	União Itabirana	100	10,230	28	50
Average (1870s)		150	15,472	28	67
1880	Marzagão	150	13,800	46	100
1880	Filatório Montes Claros	150	13,800	40	73
1881	Bom Jardim	233	21,250	50	140
1884	São Sebastião	189	16,273	40	75
1884	São Silvestre	200	17,220	50	60
1884	Industrial Mineira	240	20,664	73	200
1885	Cassú	150	11,610	28	60
1885	São Vicente	160	12,384	40	n.a.
1886	União Lavrense	200	15,560	176	n.a.
1886	Cachoeira dos Macacos	300	23,340	100	180
1886	Santa Bárbara	200	15,560	60	n.a.
1887	Paulo Moreirense	120	11,208	n.a.	n.a.
1888	Mascarenhas	600	63,120	30	n.a.
1888	Pedreira	200	21,040	65	n.a.
1888	São Roberto	500	52,600	60	n.a.
n.a.	Industrial Ouro Preto	200	18,800#	n.a.	n.a.
Average (1880s)		237	21,764	61	101
1891	Santanense	600	37,260	100	n.a.
1891	São Joanense	300	18,630	100	n.a.
1892	Itabira do Campo	360	18,036	100	n.a.
1893	Pitanguense	400	19,320	200	n.a.
1893	Cachoeira Grande	500	24,150	120	n.a.
1893	Progresso Fabril	150	7,245	n.a.	n.a.
1893	Melancias	100	4,830	38	n.a.
1894	São Domingos	150	6,300	n.a.	n.a.
1894	São João Nepomuceno	130	5,460	n.a.	n.a.
1895	Jequitahy	250	10,350	n.a.	n.a.
n.a.	Perpetua	n.a.	-	15	n.a.
n.a.	Itinga	n.a.	-	48	n.a.
Average (1890s)		294	15,158	90	-
TOTAL AVERAGE		244	18,723	63	99

Source: Compiled from A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), p.25; M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development 1868-1906", University of London, unpublished Ph.D. thesis, 1991), pp.70-111; Libby, *op.cit.*, pp.227-30. Notes: (n.a.) information not available.

This figure was calculated based on the exchange rate for 1890.

It was only in the final three decades of the century that a number of larger and more successful textile mills emerged in Minas Gerais. Even so, they were small or medium size firms, operating only one unit, and fulfilling a single economic function - the manufacturing of cotton. In the 1870s, 6 mills were established in Minas Gerais. The average initial capital was 150:000\$000 Contos (or £15,472) and the mills employed an average of 28 looms and 67 workers, as shown in Table V.11. In the 1880s, investment in new mills boomed with 16 firms being established. On average, they were larger than the ones established a decade earlier. Nevertheless, they did not constitute large enterprises. The average initial capital of these latter mills was 237:000\$000 Contos (or £21,764), with an average of 61 looms and 101 workers employed, as shown in Table V.11. In the 1890s, 12 new mills were inaugurated in Minas Gerais. On average, in terms of capital they were smaller than the mills established in the 1870s and 1880s. The average initial capital was 294:000\$000 Contos (or £15,158). It seems that in terms of the number of looms employed they were larger than the mills set-up in the two previous decades, with an average of 98 looms. However, it is important to point out that the average number of loom for the 1890s is biased towards the larger mills, since there is no information about the number of looms for several of the smaller mills founded during this period. Furthermore, there is no information about the size of the work-force employed by these mills. Thus, although in the long-run the mineiro textile mills tended to be larger, they did not constitute very large enterprises, at least not at the time of their establishment.

Table V.12 - Brazilian textile mills in 1881: number of looms, workers, and annual output.

YEAR	MILL (Province)	LOOMS	ANNUAL OUTPUT (in meters)	WORKER
1881	Santo Aleixo (BA)	110	1,000,000	180
1881	Petropolitana (RJ)	106	1,000,000	180
1881	Brasil Industrial (RJ)	450	3,200,000	400
1881	FFTTA (RJ)	100	2,000,000	210
1881	Fernão Velho (AL)	60	550,000	125
1881	FTR (RJ)	110	1,500,000	130
1881	FTPG (RJ)	60	500,000	110
1881	Santa Francisca (SP)	80	-	160
Average		216	1,393,000	187

FFTTA - Fábrica de Fiação, Tecidos e Tinturaria Alliança FTR - Fábrica de Tecidos do Rink; FTPG - Fábrica de Tecidos Pau Grande.

Source: Libby, *op.cit.*, p.232.

A comparison of mineiro and other Brazilian textile mills provides a better idea of the relative importance of firms in Minas Gerais. Table V.12 lists eight textile mills located in Rio de Janeiro (RJ), São Paulo (SP), Bahia (BA), and Alagoas (AL) in 1881. The size of these mills are measured in terms of the number of looms and workers employed, and the annual output. The largest mill was the Brasil Industrial, located in Rio de Janeiro, employing 450 looms and 400 workers with an output of 3,200,000 meters of cloth per year. The smallest was the Fábrica de Tecidos Pau Grande (FTPG), also located in Rio de Janeiro, employing 60 looms and 110 workers with an output of 500,000 meters of cloth. On average, the textiles mills listed in Table V.12 employed 216 looms, 187 workers and produced 1,393,000 meters per year. Thus,

they were considerably larger than any of the mills at the point when they were established in Minas Gerais in the last three decades of the nineteenth century.

Table V.13 - Mineiro textile mills in 1881-1882: number of looms, workers, and annual output of some.

YEAR	MILL	LOOMS	ANNUAL OUTPUT (in meters)	WORKER
1881	Cedro	40	220,532	130
1881	Cachoeira	60	401,323	130
1881	Brumado	20	-	80
1882	BiriBiry	40	-	130
1882	União Itabirana	28	-	42
Average		38	310,928	102

Source: Compiled from Libby, *op.cit.*, p.232; Vaz, *op.cit.*, pp.62,77.

Even a comparison of the mills listed in Table V.12 with the mineiro mills some years after their establishment, yields the same result: mineiro textile mills continued to be smaller. Table V.13 lists five of the six mills established in Minas Gerais in the 1870s. In 1881 and 1882, these five firms were certainly among the largest textile mills in Minas Gerais. Nevertheless, they were hardly half the average size of the eight textile mills listed in Table V.12. In 1881 and 1882, mineiro mills employed an average of 41 looms and 102 workers and produced an average of 310,928 meters per year. The other Brazilian mills listed in Table V.12 had approximately five times more looms, a workforce 45% larger, and an annual output five times larger than their mineiro counterparts in 1881-82. They were not only larger but also much more efficient. By 1885, things had not changed very much as the mineiro textile mills still were still not half the size of the mills listed in Table V.12. As shown in Table V.14, on average, mineiro mills in 1885 employed 49 looms, 104 workers, and produced 379,727 meters of cloth per year. These figures represented 23% of the average number of looms, 56% of the average number of workers, and 27% of the average annual output of the textile mills listed in Table V.12. Furthermore, it seems that this pattern did not change very much during the rest of the nineteenth century. In 1909, the 35 existing mineiro mills on average produced 470,000 meters per year and employed 110 workers⁴⁴.

Thus, from the previous analysis, it becomes clear that the textile industry in nineteenth-century Minas Gerais was made up of small and medium size mills, both in terms of the number of looms and workers employed, and in terms of the annual output. It is also clear that the mineiro textile mills were more labour intensive than their Brazilian counterparts.

A closer look at some individual cases will further illustrate the fact that mineiro mills were small. The Cedro mill, the first textile mill set-up in the last 30 years of the century, was a very small enterprise. It was established in 1872 employing 18 looms only. Ten years later, just before it was merged with the

⁴⁴ *Ibid.*, p.233.

Table V.14 - Mineiro textile mills in 1885: number of looms, workers, and annual output of select mills.

MILL	LOOMS	ANNUAL OUTPUT (in meters)	WORKER
Cedro	56	369,136	132
Cachoeira	110	693,955	187
União Itabirana	28	-	64
Montes Claros	40	360,000	81
Cassú	24	200,000	58
São Sebastião	40	500,000	75
Marzagão	50	135,000	80
São Silvestre	50	400,000	60
Industrial Mineira	-	-	200
São Vicente	40	-	-
Average	49	379,727	104

Source: Compiled from Libby, *op.cit.*, p.232; Vaz, *op.cit.*, pp.62, 77.

Cachoeira mill, productive capacity had increased to 40 looms, as shown in Table V.15. Nevertheless, it continued to be a small enterprise. As Bernardo Mascarenhas pointed out in a letter to his brothers regarding the establishment of the Cachoeira mill, the minimum size of a mill in the 1870s was:

"It is not wise to buy less than 50 looms, since the most expensive and indispensable spinning machines may produce yarn for 50 looms, it would be a mistake to buy 30 or 40 looms, as the difference in price is very small."⁴⁵

The annual output of the Cedro mill also reflects the limited scale of production, as shown in Table V.15. The mill started to produce in August 1872. From 1872 to 1874, output expanded from the initial 33,920 meters to 333,921, the highest level of output in the period 1872-82. Output plummeted in the following 3 years, reaching its lowest level in 1877 with 82,422 meters. This decrease in output was a consequence of the economic crisis in Brazil and disruptions in water supply to power the mill in the 1875-77 period⁴⁶. For the remainder of the period, output increased, partially as a consequence of new investments in the productive capacity, which not only became larger but most probably more efficient as well. In 1882, the Cedro mill produced a total of 231,428 meters, the highest level of output since 1877. Nevertheless, this still represented only 69% of the output in 1874. Furthermore, average output for the period 1873-82 was 200,394 meters per year. This was very small compared with the average output of 1,393,000 meters per year of the other Brazilian textile mills in 1881, as shown in Table V.12. Another interesting conclusion is

⁴⁵ Letter from Bernardo Mascarenhas on 13 April 1874 from Manchester, reproduced in P. Tamm, *Uma Dinastia de Tecelões*, (Belo Horizonte, 2nd. ed. 1960), pp.193-4.

⁴⁶ A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), p.63.

that throughout the period 1872-82 accumulated output totalled 2,003,938 meters, as shown in Table V.15. This means that the total output of the Cedro mill over an 11-year period was smaller than the output of the Brasil Industrial mill in 1881 alone, and about the same of the output of the Aliança mill in the same year, as shown in Table V.12.

Table V.15 - Cedro mill, 1872-1882: annual, accumulated, and average output, number of looms, and number of workers.

YEAR	OUTPUT (in meters)	ACCUMULATED OUTPUT	AVERAGE (1873-1882)	LOOMS	WORKERS
1872	33,920	33,920	-	18	70
1873	224,844	258,764	-	n.a.	n.a.
1874	333,921	592,685	289,382	n.a.	n.a.
1875	208,706	801,391	255,824	n.a.	n.a.
1876	185,332	986,723	238,201	n.a.	n.a.
1877	82,422	1,069,145	207,045	n.a.	n.a.
1878	116,809	1,185,954	192,006	n.a.	n.a.
1879	167,682	1,353,636	188,531	n.a.	n.a.
1880	198,342	1,551,978	189,757	n.a.	n.a.
1881	220,532	1,772,510	193,177	40	130
1882	231,428	2,003,938	200,394	40	130

Source: Compiled and calculated from Vaz, *op.cit.*, pp.62-5; G.M. Mascarenhas, Centenário da Fábrica do Cedro, 1872-1972, (Belo Horizonte, 1972), p.67, 88-90.

Notes: (n.a.) information not available.

Finally, considered in relation to its scale of production, the Cedro mill employed quite a large work-force, even though in absolute terms it did not constitute a large employer. In 1872, the Cedro mill employed a total of 70 workers, ten years later some 130 workers, as shown in Table V.15. By comparison, the Fábrica de Tecidos do Rink (FTR) located in Rio de Janeiro also employed 130 people in 1881. Nevertheless, it employed 110 looms and produced 1,500,000 meters of cloth, as shown in Table V.12. Thus, the Cedro mill could not be considered a large enterprise either in terms of the productive capacity, annual output, or number of workers employed. Furthermore, it was more labour intensive and less efficient when compared with other Brazilian textile mills.

The Cachoeira mill was established in 1877 with 52 looms, an initial productive capacity 3 times larger than that of the Cedro mill. In 1881, productive capacity had increased to 60 looms, as shown in Table V.16. Although it was one of largest mills in Minas Gerais in terms of its productive capacity, the Cachoeira mill was still considerably smaller than the largest Brazilian textile mills. As mentioned above, in 1881, the Brasil Industrial located in Rio de Janeiro possessed 450 looms.

The annual output of the Cachoeira mill was also not very large in comparison with major Rio de Janeiro mills. The Cachoeira started to produce in January 1877. Nevertheless, full production was not achieved until 1880, since the first 3 years were dedicated to running in the machinery⁴⁷. Thus, in 1877, output was 172,416 meters, as shown in Table V.16. Two years later output more than doubled to 392,517

⁴⁷ *Ibid.*, p.81.

meters, and in 1880 it totalled 410,580 meters. The upward trend observed in the previous years was not affected by the decrease in output in 1881, as output reached its highest level of the whole period in 1882. Furthermore, throughout the 1878-82 period average output was around 415,000 meters per year. This is double of the average output of the Cedro mill for the same period but still lower than the annual output of the smallest mills located in other Brazilian provinces listed in Table V.12. The highest output of the Cachoeira mill during this period was achieved in 1882 with an output of 435,438 meters. In 1881, the Fernão Velho mill, located in Alagoas, and the FTPG, located in Rio de Janeiro, produced 550,000 and 500,000 meters respectively. Furthermore, accumulated output in the period 1878-82 amounted to 2,079,976 meters, again an output smaller than that of the Brasil Industrial mill in 1881 and about the same of the output of the Aliança mill during the same year.

Table V.16 - Cachoeira mill, 1877-1882: annual, accumulated, and average output, number of looms, and number of workers.

YEAR	OUTPUT (in meters)	ACCUMULATED OUTPUT	AVERAGE (1878-1882)	LOOMS	WORKERS
1877	172,416	172,416	-	52	n.a.
1878	267,702	440,118	-	n.a.	n.a.
1879	392,517	832,635	416,317	n.a.	n.a.
1880	410,580	1,243,215	414,405	n.a.	n.a.
1881	401,323	1,644,538	411,134	60	130
1882	435,438	2,079,976	415,995	60	n.a.

Source: Compiled from Vaz, *op.cit.*, p.77; Mascarenhas, *Centenário da Fábrica do Cedro*, p.103; Libby, *op.cit.*, p.232;

Notes: (n.a.) information not available.

There is not a lot of information about the size of the work-force employed by the Cachoeira mill in the period 1877-82. As shown in Table V.16, the mill employed a total of 130 workers in 1881 rendering it one of the largest employers among the *mineiro* textile mills. Thus, the analysis of the size of the Cachoeira mill leads to the conclusion that, although the enterprise constituted one of the largest textile mills in Minas Gerais in the 1870s, its scale of operation proved to be quite limited in comparison with other Brazilian textile mills.

In 1883, the Cedro and the Cachoeira mills were merged into the Companhia Cedro e Cachoeira (CCC). The idea of the amalgamation of the two mills started with Bernardo Mascarenhas shortly after the establishment of the Cachoeira mill. During his travel to England to purchase machinery for the Cachoeira, Mascarenhas observed the formation of large industrial corporations through the merger of various mills under a single organization as a strategy to face competition and gain economies of scale. On his return, Mascarenhas proposed the merger of the two mills, but at the beginning there was some resistance among

the other owners of both the Cedro and the Cachoeira mills⁴⁸. However, in the early 1880s several textile mills - some of them larger and more modern than both the Cedro and the Cachoeira mills - were being established in the central part of Minas Gerais increasing competition in the local markets and threatening the position of both mills⁴⁹. Thus, at the end Mascarenhas' entrepreneurial wisdom succeeded and the merger of the Cedro and the Cachoeira mills resulted in the creation of the CCC⁵⁰. The merged company became one of the largest textile firms in nineteenth-century Minas Gerais. Shortly after the creation of the CCC, Mascarenhas proposed the creation of a third mill as a strategy to beat the increasing competition. In 1885, he wrote to his brother Antonino:

"Lets build our strength on the three mills of Cedro, Rio Pardo, and Cachoeira, with warehouses in each mill well stocked with a large variety of cloth. Thus, we will be respected and will be able to stop the large number of textile mills which are being planned to be built around us. Moreover, we will be able to attract the attention of the merchants due to the variety and low price of our products."⁵¹

However, Bernardo Mascarenhas' plans again encountered strong resistance from the shareholders of the CCC, who did not see the necessity of the investment since the expansion and modernization of the Cedro and the Cachoeira mills was just being concluded. Nevertheless, competition grew steadily in the following years and in 1888 the São Vicente mill, located just 6 kilometres away from the Cedro mill, was founded. If the mill succeeded it would represent a major threat to the Cedro mill. However, shortly after its inauguration production at the São Vicente came to a halt and the mill was put on sale. There were severe problems of water-power supply. Even so, the owners of the CCC decided to purchase the mill in 1891, as a rival firm was interested in its acquisition. Thus, the São Vicente mill became the third unit operated by the CCC, which was already one of the few, if not the only, multi-unit textile firm in nineteenth-century Minas Gerais⁵². There are basically two reasons which explain why the CCC was one of the few multi-site firms at this time. First, being virtually the pioneers of industrial production of textiles in Minas Gerais, the Mascarenhas brothers were able to build on their previous financial successes and reinvest in the industry, at a time when most rival firms were just beginning their first operation. Secondly, it was easier to expand through the merger and acquisition of existing mills. This is even more true if one takes into account the fact that, despite Bernardo Mascarenhas' plans, the merger of the Cedro and the Cachoeira mills and the purchase of the São Vicente mill were not the result of a long-term planning strategy. On the contrary, they were the result of pressing circumstances and existing opportunities. In other words, it was the result of a

⁴⁸ N.L. Mascarenhas, Bernardo Mascarenhas: o Surto Industrial de Minas Gerais, (Rio de Janeiro, 1954), p.70.

⁴⁹ Vaz, op.cit., p.88.

⁵⁰ Mascarenhas, Bernardo Mascarenhas, pp.70-1.

⁵¹ Letter from Bernardo Mascarenhas to Antonino Mascarenhas on 20 December 1885, reproduced in Vaz, op.cit., p.102.

⁵² Ibid., pp.102-5.

defensive strategy of merger - rather than expansionist, as in many cases in the USA⁵³ and Britain⁵⁴ for example.

Table V.17 - Annual and average output, number of looms, and number of workers of the Companhia Cedro e Cachoeira, 1883-1900.

YEAR	OUTPUT (in meters)	AVERAGE (1883-1900)	NUMBER OF LOOMS	NUMBER OF WORKERS
1883	649,516	-	100	264
1884	976,000	896,202	100	268
1885	1,063,091	1,072,737	166	319
1886	1,602,343	1,264,242	223	378
1887	2,030,262	1,439,837	223	446
1888	2,317,812	1,439,837	230	489
1889	2,159,995	1,542,717	230	485
1890	2,131,833	1,616,356	230	n.a.
1891	2,474,422	1,711,697	230	479
1892	2,292,603	1,769,788	230	n.a.
1893	2,212,802	1,810,062	230	n.a.
1894	2,392,957	1,858,636	334	n.a.
1895	2,797,990	1,930,894	339	n.a.
1896	2,332,725	1,959,596	339	n.a.
1897	2,610,441	2,002,986	339	n.a.
1898	3,086,672	2,070,716	339	n.a.
1899	3,208,228	2,137,629	339	n.a.
1900	3,347,625	2,204,851	339	n.a.

Source: Compiled from Companhia Cedro e Cachoeira, "Relatórios da Diretoria", (1883-1888); Versiani, *op.cit.*, pp.135,298; Vaz, *op.cit.*, pp.105-7,196.

Notes: (n.a.) information not available.

Soon after the merger the productive capacity of both the Cedro and the Cachoeira mills was expanded. As shown in Table V.17, at the time of its constitution the CCC had a total of 100 looms: 40 at the Cedro mill and 60 at the Cachoeira mill. In the same year, it ordered from England 50 new looms for the Cachoeira mill and 16 for the Cedro mill, as the existing productive capacity was considered inadequate and insufficient⁵⁵. As both mills were set-up in the early 1870s, machinery employed by them was certainly outdated at the time of the merger and insufficient to increase the company's expected market share. Thus, total productive capacity was expanded to 166 looms, which were in full operation by 1885. In 1886, a further expansion increased the number of looms at Cachoeira to 146 and in the Cedro mill to 77⁵⁶, bringing

⁵³ See A.D. Chandler, The Visible Hand: The Managerial Revolution in American Business, (Cambridge, MA., 1977), chapter 10.

⁵⁴ See L. Hannah, The Rise of the Corporate Economy, (2nd. ed. 1983), pp.16-23.

⁵⁵ Companhia Cedro e Cachoeira, "Relatório da Diretoria", (1883), pp.2-8.

⁵⁶ Companhia Cedro e Cachoeira, "Relatório da Diretoria", (1886), pp.1-4.

the total productive capacity of the company to 223 looms. In 1888, another 7 looms were added at Cedro⁵⁷. The expansion of the number of looms of the São Vicente mill from the existing 40 looms to 104⁵⁸ increased the productive capacity of the CCC to 334 looms in 1894. Finally, in 1895, another 5 looms were added at São Vicente⁵⁹ increasing the total number of looms to 339, in the last expansion of the productive capacity of the century.

Yet, in terms of the annual output, the CCC could still not be considered a large enterprise. As shown in Table V.17, in the first year of the existence of the company, output totalled 649,516 meters. In the following year output grew by 50%, in what could be the first signs of the expanded productive capacity. In 1885, output just broke the 1,000,000 meters barrier totalling 1,063,091 meters. In 1886, with new capacity fully operational, output again increased more than 50% and totalled 1,602,343 meters. Output would break the 2,000,000 meters per year mark in 1887 with an output of 2,303,262 meters of cloth. From 1888 to 1894, output was around the 2,300,000 meters per year. In 1894, the São Vicente mill started to produce and in the following year output rose to 2,797,990 meters. Output continued to be around the 2,500,000 meters per year until 1897. From 1898 onwards, output rose to 3,086,672 and continued above the 3,000,000 meters per year for the rest of the century.

The number of workers employed by the CCC also points to a medium-size enterprise. At the time of the constitution of the company, the number of workers employed totalled 264. In the following year, that number did not alter very much as the work-force increased only 1%, amounting to 268 people. From then onwards, the number of workers increased steadily until 1888, as Table V.17 shows. From 1885 to 1887, the work-force increased nearly 20% per year. In 1888, the pace of expansion slowed a little, but even though the work-force increased another 10% to total nearly 500. In 1889, the work-force suffered a small decrease to 485. Two years later, the company employed 479 workers. There is no information about the size of the work-force of the CCC for the rest of the century. Nevertheless, as the productive capacity and the annual output of the company increased in the last decade of the century, the work-force may also have grown slightly.

Comparison of the CCC and the Fábrica de Fiação, Tecidos e Tinturaria Aliança (FFTFA), located in Rio de Janeiro, shows clearly how large the first textile firm was. Graph V.1 compares the output of the two textile firms: Graphs V.2 and V.3 compare the number of looms and workers. In 1881, the FFTFA produced a total of 2,000,000 meters of cloth⁶⁰ whereas the Cedro and the Cachoeira mills together produced

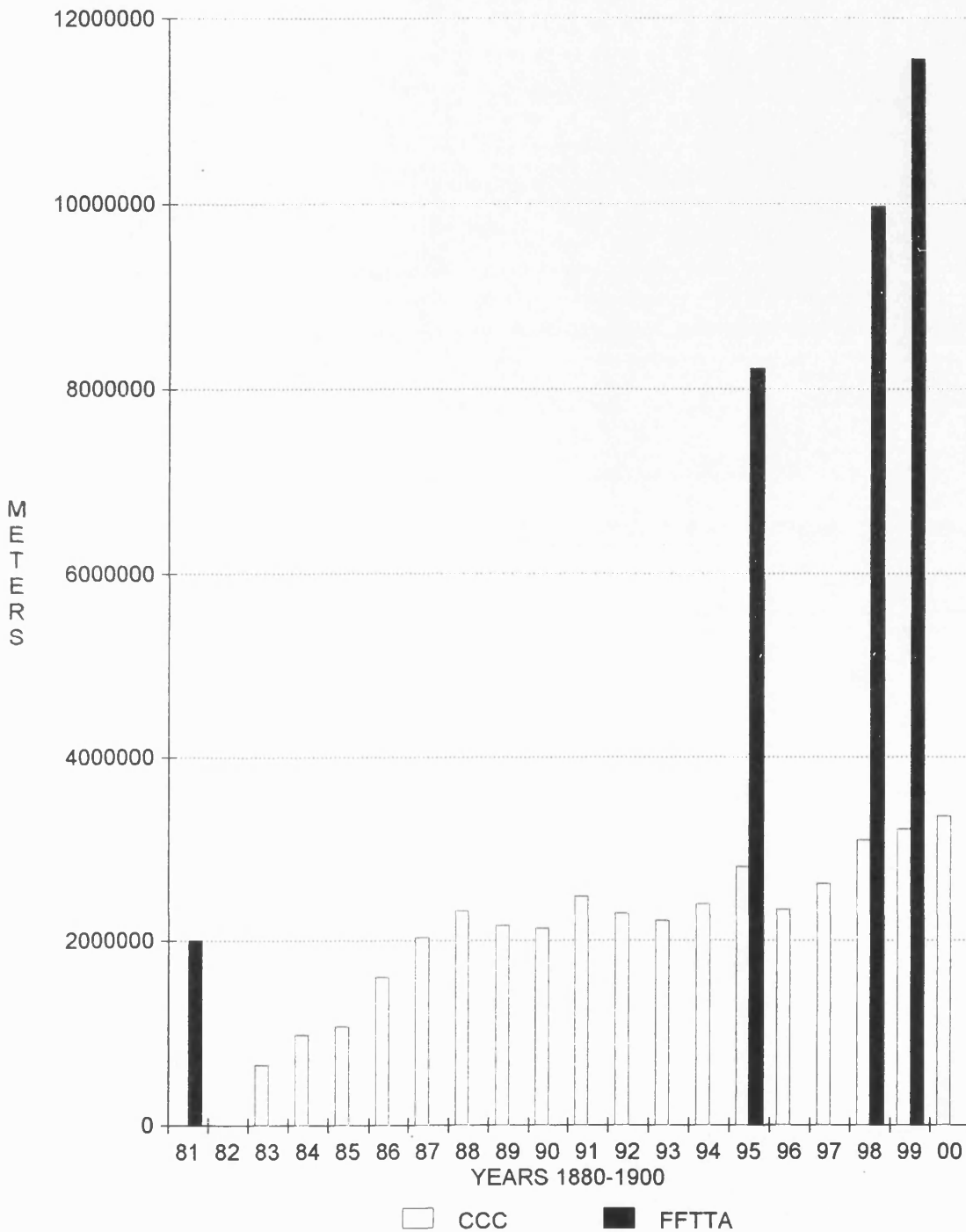
⁵⁷ M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development, 1868-1906", University of London, unpublished Ph.D. thesis, 1991, p.298.

⁵⁸ Vaz, *op.cit.*, p.106.

⁵⁹ Versiani, *op.cit.*, p.298.

⁶⁰ A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.A. thesis, Niterói, 1985, p.145.

GRAPH V.1
OUTPUT

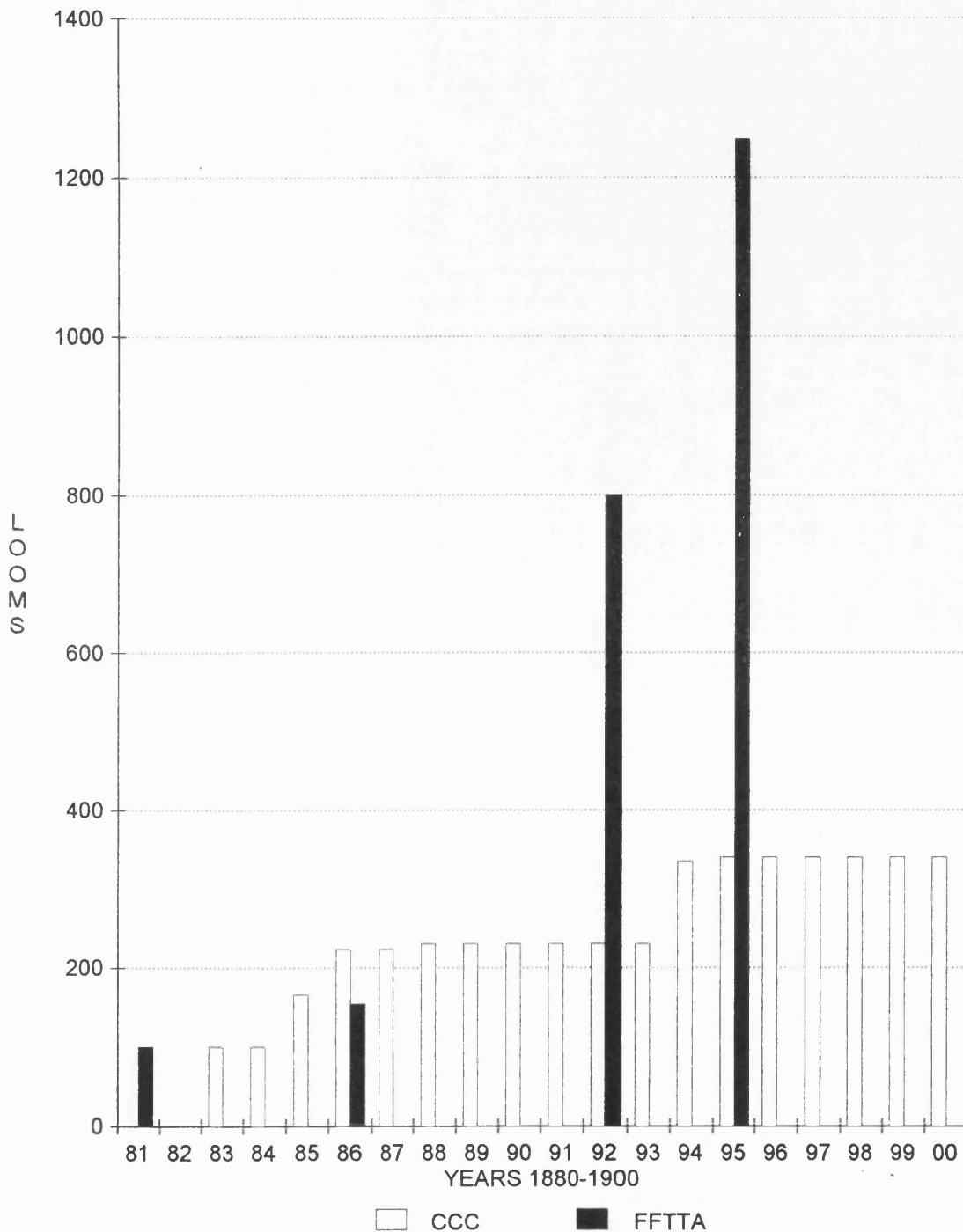


Sources: Compiled from G.M. Mascarenhas, *Centenário da Fábrica do Cedro, 1872-1972*, (Belo Horizonte, 1972), pp.252-3; A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), pp.298-302; M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development, 1868-1906", University of London, unpublished Ph.D. thesis, 1991, pp.56, 83-4, 132-7, 184-93, 272-9; A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1985, pp.143-54.

CCC - Companhia Cedro e Cachoeira

FFTFA - Fábrica de Fiação, Tecidos e Tinturaria Alliança

GRAPH V.2
No. of LOOMS

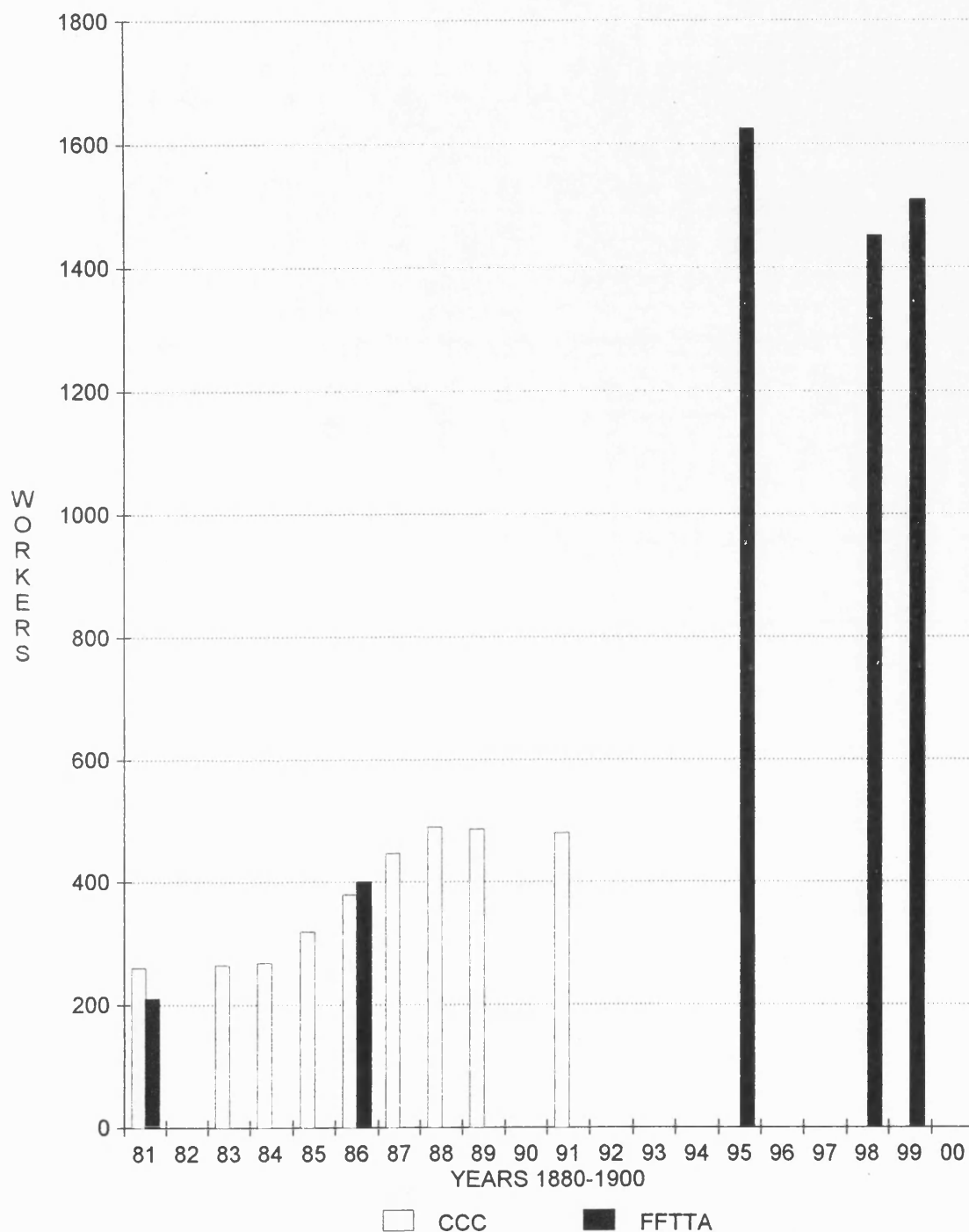


Sources: Compiled from A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), pp.298-302; M.T.R.O. Versiani, "The Cotton Textile Industry of Minas Gerais, Brazil: Beginnings and Early Development, 1868-1906", University of London, unpublished Ph.D. thesis, 1991, pp.83-4, 132-7, 184-93, 272-9; A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1985, pp.143-54.

CCC - Companhia Cedro e Cachoeira

FFTTA - Fábrica de Fiação, Tecidos e Tinturaria Alliança

GRAPH V.3
No. of WORKERS



Sources: Compiled from D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), P.232; A..M. Vaz, Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987, (Belo Horizonte, 1990), pp.195-7; A.M.F.C. Monteiro, "Empreendedores e Investidores em Indústria Têxtil no Rio de Janeiro: 1878-1895", Universidade Federal Fluminense, unpublished M.Sc. thesis, Niterói, 1985, pp.143-54.

CCC - Companhia Cedro e Cachoeira

FFTTA - Fábrica de Fiação, Tecidos e Tinturaria Alliança

a total of 621,855 meters⁶¹, as shown in Graph V.1. In other words, just over a quarter of the output of the FFTTA. In 1886, the output of the CCC was still smaller than the output of the FFTTA in 1881. Unfortunately, there is no information about the output of the FFTTA in 1886 and in 1892. Nevertheless, it is possible to imagine that the scale of production at the CCC was much smaller as its output totalled only 1,602,343 meters in 1886 and 2,292,603 meters in 1892. In 1895, the FFTTA was considered the largest textile company in Brazil producing 8,220,000 meters of cloth⁶². During the same year, the CCC produced a total of 2,797,990 meters. During the years 1898 and 1899, CCC output continued to be about a third of the size of FFTTA. In 1898, the latter produced 9,971,000 meters whereas the former produced 3,086,228 meters. In the following year, the FFTTA produced 11,560,000 meters⁶³ and the CCC 3,208,228.

As shown in Graph V.2, the productive capacity of the FFTTA in 1881 was as large as that of the Cedro and the Cachoeira mills together: 100 looms. In 1886, the FFTTA operated a total of 154 looms, whereas the CCC a total of 223 looms. In 1892, the number of looms employed by the FFTTA was more than 3 times the number of looms employed by the CCC. The former employed 800 looms whereas the latter employed 230. In 1895, the FFTTA employed 1,248 looms, more than three times the number of looms employed by the CCC during the same year - 339 looms. For the remainder of the period there is no information about the number of looms employed by the FFTTA.

Finally, in 1881, the FFTTA employed almost as many people as the Cedro and the Cachoeira mills together. The former employed 210 people whereas the latter two ones employed 130 people each. In 1886, the FFTTA employed a total of 400 workers, whereas the CCC employed a total of 378 workers. There is no information about the size of the work-force of the FFTTA in 1892. In 1895, the FFTTA employed 1,625 people⁶⁴. In 1898 and 1899, the company employed 1,452 and 1,510 workers, respectively⁶⁵. There is no information about the number of people employed by the CCC during these last three years. Thus, although the CCC was a multi-site firm, operating three different units, it could hardly be considered a large enterprise. The analysis of its scale of production and of the size of its work-force has shown that the CCC, during the last century, was about a third of the size of the largest textile mills located in Rio de Janeiro.

Finally, it is interesting to point out that, taking into account the figures of output, productive capacity, and size of the work-force of both companies for 1881 and 1886, it is clear that the FFTTA was much more efficient than the CCC. In 1881 - the only year in which there is information available about number of workers, output, and productive capacity for both companies -, production per worker at the CCC was 2,392 meters per year, whereas at the FFTTA was 9,524. During the same year, production per loom

⁶¹ G.M. Mascarenhas, Centenário da Fábrica do Cedro, 1872-1972, (Belo Horizonte, 1972), p.252.

⁶² Monteiro, op.cit., p.154.

⁶³ Versiani, op.cit., p.264.

⁶⁴ Monteiro, op.cit., pp.145, 149, 151-2, 154, 268.

⁶⁵ Versiani, op.cit., p.264.

at the CCC totalled 6,218 meters per year and 20,000 meters at the FFTTA. In 1886, taking the figures of the FFTTA for 1881, the CCC continued to be less productive. Productivity per worker at the CCC reached 4,239 meters while productivity per loom amounted to 8,254. However, comparing the figures of production per worker of the CCC in 1891 and the FFTTA in 1895 it seems that the former had become as efficient as the latter towards the end of the century. In 1891, the CCC employed 479 workers and produced 2,474,422 meters⁶⁶. Consequently, productivity per worker totalled 5,166 meters. On the other hand, production per worker at the FFTTA in 1895 amounted to 5,059 meters per year. During this year, productivity per loom was larger at the CCC (8,254 meters) than at the FFTTA (6,586 meters). The change in relative efficiency between the two companies suggests that the problem was most probably related to the efficiency of the equipment employed by the two companies, rather than to the fact that one company operated a single site factory and thus enjoyed economies of scale which smaller mills could not enjoy.

Although by 1920 Minas Gerais had the third largest installed electricity generating capacity (42,934 KW) and the largest number of power companies (72) established in Brazil, the mineiro electricity generating companies also could not be considered large enterprises. Most of these companies were small, fulfilling only one economic function, working on a municipal basis, and operating power stations of a small scale⁶⁷.

Although the Companhia Mineira de Eletricidade (CME) was a multi-sector operation - the company first began producing electricity in 1889 and some years later, in 1893, it acquired the telephone service of Juiz de Fora⁶⁸ -, the company could not be considered a large business enterprise. At the time of the inauguration of the lighting service, the company operated only one plant producing a total of 250 kW, as shown in Table V.18. In 1892, the company increased its generating capacity to 375 kW. The construction of a second power plant increased the generating capacity to 600 kW in 1896. For the remainder of the century, there was no further increase in the generating capacity.

Table V.18 - Companhia Mineira de Eletricidade, 1889-1901: power production.

YEARS	1889	1892	1896	1897	1901
POWER PRODUCTION (in kW)	250	375	600	600	600

Sources: Compiled from P. Oliveira, Companhia Mineira de Eletricidade: Pioneira da Iluminação Hidrelétrica na América do Sul (Juiz de Fora, 1969), pp.24-44; Companhia Mineira de Eletricidade, Balanco e Relatório reproduced in O Pharol, (Juiz de Fora), 27 August 1897, p.1.

Like the CME, the Companhia Força e Luz Cataguazes-Leopoldina (CFLCL) also could not be considered a large firm. It fulfilled only one economic function, i.e. the generation of hydroelectric power,

⁶⁶ Mascarenhas, Centenário da Fábrica do Cedro, p.252.

⁶⁷ Panorama do Setor de Energia Elétrica no Brasil, ed. R.F. Dias, L.M.M. Cabral, P.B.B. Cachapuz, and S.T.N. Lamarrão, (Rio de Janeiro, 1988), pp.48-54.

⁶⁸ P. Oliveira, Companhia Mineira de Eletricidade: Pioneira da Iluminação Hidrelétrica na América do Sul, (Juiz de Fora, 1969), pp.35-44.

and in 1908 the company inaugurated its first plant with a total generating capacity of 800 KW⁶⁹.

Comparison of both companies with what came to be known as the Light System is very illustrative. The Light System was constituted by the São Paulo Tramway, Light and Power Company (SPTLPC) and the Rio de Janeiro Tramway, Light and Power Company Ltd. (RJTLPC) which were foreign-owned companies. Both companies were constituted in Canada. The first in 1889 and the second in 1904. In 1901, the SPTLPC inaugurated its power plant with a generating capacity of 2,000 kW, which was expanded to 3,000 kW in February 1902, and to 4,000 kW in March of the following year. In other words, in 1901 the SPTLPC had a generating capacity more than three times larger than that of the CME in 1896, and more than twice as large as that of the CFLCL in 1908. The RJTLPC, by its turn, inaugurated its first electrical power plant - considered the largest in Brazil and one of the largest in the world - in April of 1908 with a generating capacity of 12,000 kW⁷⁰. In other words, a generating capacity 20 times larger than that of the CME in 1896, and 15 times larger than that of the CFLCL in 1908.

In terms of the size of the work-force employed, mineiro electricity generating companies of the turn of the century were also small. Although there is no information about the size of the work-force employed by the CME, the CFLCL employed in 1908 a total of 29 people⁷¹, which was a small work-force by any standard. The total number of workers employed by the company did not change considerably until the end of the 1910s, when it employed 30 people⁷².

The capital of both companies provide further evidence of their small size. The initial nominal capital of the CME amounted to 150:000\$000 Contos in 1888 (or £15,780). As mentioned above, this is about the same amount as the initial capital of the Cedro mill in 1872 (£15,600), which was a small textile mill. In 1890, capital was increased to 300:000\$000 Contos (or £28,200), and in 1894 to 800:000\$000 Contos (or £33,600). Finally, in 1911, the capital of the company was increased to 1.400:000\$000 Contos⁷³ (or £94,780). The initial capital of the CFLCL in 1906 amounted to 500:000\$000 Contos⁷⁴ (or £32,800). A further comparison with the SPTLPC puts these figures into perspective. The SPTLPC was constituted in 1889 with an initial capital of US\$ 6,000,000 (or £1,232,792⁷⁵). Furthermore, the power plant built by the

⁶⁹ Companhia Força e Luz Cataguazes-Leopoldina, 80 Anos Companhia Força e Luz Cataguazes-Leopoldina: Uma Luz, (1988), pp.1-4.

⁷⁰ Panorama do Setor de Energia Elétrica no Brasil, pp.34-41.

⁷¹ Companhia Força e Luz Cataguazes-Leopoldina, Relatorio do Gerente, (1909), p.6.

⁷² Companhia Força e Luz Cataguazes-Leopoldina, Relatorio do Gerente, (1910), p.8.

⁷³ Oliveira, Companhia Mineira de Eletricidade, pp.27-8, 39, 49-50.

⁷⁴ Suplemento Minas Gerais, Companhia Força e Luz Cataguazes-Leopoldina, (Cataguazes, 1913).

⁷⁵ The Banking Almanac, Directory, Year Book and Diary, (1889), p.563.

company, completed in 1901, alone cost 2.000:000\$000 Contos⁷⁶ (or £97,800), nearly three times the capital (in Pounds) of the CFLCL in 1906 and about the same the capital of the CME in 1911.

Thus, the mineiro electricity generating companies of the turn of the century were small firms in every respect: scale of operation, number of workers employed, capital, and range of activities.

To sum up, throughout the nineteenth century the mineiro iron industry was small in every respect. Firms were single-unit enterprises carrying on only one economic function - the production of iron. In the first three-quarters of the last century, they employed very simple and primitive technology which imposed a strict limit to the scale of production. Towards the end of the century, a few larger works emerged employing a more complex technology. Nevertheless, the scale of production remained small. Finally, the number of workers was also small with very few foundries employing more than 20 people.

The data examined also reveals that the CUI was one of the largest enterprises in Minas Gerais in the nineteenth century. The company fulfilled more than one economic function: it constructed and operated the União e Indústria turnpike. From the point of view of the length of the roads built and operated, the company was a major concern, even by the standards of the USA. The size of the work-force also points to the direction of a substantial enterprise. Yet, the scale of operations, measured in terms of freight and passenger transport, could hardly be large if compared with that of the EFDPII. The size of its capital was also considered small when compared with that of the largest Brazilian companies established in the period 1850-1865.

The analysis of the mineiro textile industry shows that the industry was made up of small and medium size firms, rarely operating more than one unit and fulfilling a single economic function - the manufacture of cotton. The scale of production of the largest mineiro textile firms proved to be only a third as large as that of the largest Brazilian textile firms. Finally, in terms of the size of the work-force, although the mineiro firms proved to be much more labour intensive than their Brazilian counterparts, their work-force tended to be smaller in absolute terms.

Finally, the CME and the CFLCL were small enterprises in terms of the scale of their operations and the size of their capital, fulfilling no more than one economic function in the specific case of the CFLCL. Although there is no information about the size of the work-force employed by the CME, the work-force of the CFLCL in 1908 points to a very small firm indeed.

5.1.2 - The market structure:

This part analyses the nature of the marketing activities of nineteenth-century mineiro firms through the examination of the nature and size of their consumer market, the range of products or services offered, and the channels of distribution used by them. Nevertheless, an analysis of the marketing of any firm must take into account the fact that, given the different nature of products and services, there are bound to be differences between companies producing tangible products - like iron foundries and textile mills - and those providing services - like transport and electricity generating companies. Utilities often enjoy monopolies

⁷⁶ F.A.M. Gomes, "A Eletrificação no Brasil", in Caderno História & Energia, (São Paulo, 1986), No.2, October, p.8.

(although sometimes temporary monopolies) whereas physical commodities are more tradable and subject to distinct forms of external pressures as the parameters of a market shift. Thus, whereas channels of distribution may be a relevant aspect in the marketing strategy of those companies dealing with tangible products, for example, it may not be so relevant to companies providing services.

Nineteenth-century mineiro iron foundries were mostly restricted to local markets which were not very large and could absorb only a small quantity of products. Evidence of the limited size of the consumer market during this period is given by Eschwege, when he made the following remarks about the possibilities of setting up a large-scale ironwork in Brazil:

"The large factories which are set-up in the interior of Brazil, (...), would end up without finding a consumer market for their production. Although raw material and salaries there [in the interior of Brazil] are half the average price on the coastal regions, these large factories would have to face obstacles such as the lack of foreign technicians and suitable means of transport to the coast, rendering their products much more expensive than the one imported from Europe.

(...) And even in the interior, they [the large factories] would not be able to expand more than what the local market can absorb.

As competition among the consumers is very small, because the population is scattered, the factories must be relatively small."⁷⁷

Furthermore, when comparing the Patriótica foundry with the Morro de Pilar and the São João do Ipanema foundries, the latter located in São Paulo, Eschwege gives further evidence about the limited size of the mineiro consumer market for iron products:

"In what concerns my foundry, (...) it produced iron in the same quantity and quality as that of the Swede's [the São João do Ipanema mill] and Câmara's foundries. The Patriótica foundry could produce more than 58 tons per year as long as it worked day and night without stopping. Nevertheless, it did not happen, first, because of the insufficient number of slaves to guarantee the production of the necessary quantity of charcoal; second, because it would not be possible to sell the whole output;"⁷⁸

And he concludes the description of his foundry by saying that:

"In Brazil it is still rewarding to establish a small foundry, with maximum annual output of 29 tons, because a larger quantity will not find a market."⁷⁹

Further, he estimates the size of the market for iron in Minas Gerais:

"This province has a population of 500,000 people, spread over an area of 18,000 square leagues. Its five-year consumption, (...), reached 36,699 arrobas [531 tons] of iron and 6,968 [101 tons] of steel, an annual average of 7,339 arrobas [106 tons] of iron and 1,376 [20 tons] of steel."⁸⁰

And he concludes by saying that it would be impossible to establish a large foundry in Minas Gerais intended to supply the province as a whole. Several small foundries were already in operation and would

⁷⁷ Eschwege, op.cit., p.258.

⁷⁸ Ibid., p.250.

⁷⁹ Ibid., p.253.

⁸⁰ Ibid., p.259.

be nearly impossible to hinder the importation from other places, especially from the coast. Even if the iron manufactured in Minas Gerais could be sold 50% cheaper than the imported one, the merchants would not be able to sell it cheap to a consumer market more than 10 to 12 miles away from the foundry. The more distant consumer preferred to import iron from the coast which would come mixed with other goods, than to buy it directly from the foundries, in which case it would be very expensive and it would give him much more trouble to transport on the backs of mules⁸¹.

Mineiro iron foundries supplied mainly mining companies, farms, and small towns. Needing replacement of components that were difficult to import, gold-mining companies became essential to the development of the foundries in Minas Gerais⁸². Mining companies had such a necessity for iron goods that some were led to try to produce them on site, as Eschwege observed:

"Among the last initiatives of smelting [iron], I have to mention the one done at the beginning of 1828, by the British mining company of Congo Soco (...). According to these letters [written by Baird, the company's civil engineer], it is possible to observe that this engineer have built a furnace 16 feet high (...). He estimated that with this furnace it was possible to produce from 2 1/2 to 3 tons of pig iron each time."⁸³

In his report to the president of the province in 1853, Monlevade provides further evidence of the importance of local demand, particularly by gold-mining companies:

"An iron point for a drill [aguilhão] is being produced for the Morro Velho mining company which will weight not less than 60 arrobas [882 kilos] when ready. Larger pieces of wrought iron (which is difficult to produce) have already been manufactured for the Congo Company, in Morro da Água Quente."

But Monlevade also hints at the importance of the market for agricultural tools and equipment as a source of demand for iron:

"I can say that, if there was not in the country this production of cheap iron to supply the gold and diamond mining, the agriculture, etc., etc., this province would be nearly abandoned."

In 1881, a study by Costa Sena, concluded that the range of products produced by the mineiro iron industry included not only parts for mining machinery and agricultural tools, but also domestic appliances, horseshoes and a variety of other items for muletrains and carriages which constituted the transport system of that time⁸⁴. Further evidence that the transport sector might have been a consumer of the iron produced in Minas Gerais is given by Esteves. He remarked that the CUI used in its workshops a great quantity of

⁸¹ Ibid., p.259.

⁸² Gomes, História da Siderurgia no Brasil, p.120.

⁸³ Eschwege, op.cit., pp.253-4.

⁸⁴ J.C. Costa Sena, "Viagem de Estudos Metallurgicos no Centro da Provincia de Minas", in Annaes da Escola de Minas, (Ouro Preto, 1881), No.1, p.125.

iron produced in Itabira, Minas Gerais⁸⁵. Among the foundries located in the Metalúrgica zone in the early 1880s, which were primarily producing for the local market, Costa Sena mentions the following: the João Carneiro's foundry, which produced 120 kilos of iron per day and sold it to other small foundries who transformed it into hoes, scythes, axes, etc.; the D. Ana's foundry, situated 3 kilometres from the João Carneiro's, produced 90 kilos of bar iron per day which was sold to smaller foundries; the Captain Vicente Pessoa's foundry, situated 8 kilometres from São Miguel, which produced 90 kilos of iron per day transformed into hoes; the D. Luisa plant, located 11 kilometres from São Miguel, producing 150 kilos of iron per day and manufacturing hoes, sickles, and axes; the Onça foundry, located around 7 kilometres from Itabira, producing 135 kilos iron per day which were used in the production of 20 hoes per day; Lieutenant João Martins' foundry, located in Lages and manufacturing hoes, scythes, and ironware; Colonel Antônio Rodrigues' foundry, situated 3 kilometres from Morro do Gaspar Soares, producing horseshoes; Colonel Jorge's foundry, situated 3 kilometres from Morro do Gaspar Soares, producing horseshoes, hoes, horseshoe nails, etc.; Capitão Modesto's plant, producing hoes; and Capitão Domingos', manufacturing hoes. Monlevade's foundry manufactured not only parts for mining machinery and tools for agriculture, it also produced more delicate objects like clocks and even a sewing machine⁸⁶. His hoes, for example, came to have a good reputation⁸⁷. Thus, the evidence presented above shows that the iron industry as a whole supplied a number of different products to different customers, such as parts for mining machinery, agricultural tools, domestic appliances, horseshoes, etc., to very local markets. However, at individual firm level, the range of products manufactured tended to be much narrower.

Until the arrival of the railways, distribution of the output was made by muletrains. Apart from duties, the lack of suitable means of transport explains why imports could not compete with the local products. Prices would increase in the same proportion as the costs of transport. Thus:

"In the greater part of the province of Minas, the price of [imported] iron has already increased 300%, since 100% are due to provincial taxes, 120% are absorbed by the costs of transport, and 80% by the merchants as profits."

The output of the mineiro foundries were mainly commercialized by a large number of small merchants spread all over the province. Besides iron goods, these merchants sold a wide range of products:

"In their shops and warehouses can be found every kind of luxury goods including wine, English beer, cheese, butter, and Dutch gin."⁸⁸

Thus, the industry did not use any specialized channel of distribution, which per se is a strong evidence of how primitive were the local consumer markets for iron products and the distribution system as well.

The fate of the CUI was linked to the prosperity of one commodity (coffee) from a single region

⁸⁵ Esteves, op.cit., p.12.

⁸⁶ Costa Sena, op.cit., pp.117-41.

⁸⁷ Libby, op.cit., p.144.

⁸⁸ Eschwege, op.cit., pp.258-9.

Table V.19 - Gross revenue provided by the transport service of passengers and goods and their percentage contribution to the total gross revenue.

YEAR	PASSENGER	%	FREIGHT	%	TOTAL REVENUE
1858*	27:051\$000	11	217:242\$595	89	244:293\$595
1859	42:014\$000	8	468:543\$205	92	510:557\$205
1860	50:319\$200	8	616:654\$454	92	666:973\$654
1861	120:342\$930	12	909:362\$792	88	1.029:705\$722
1862	154:640\$800	18	687:449\$522	82	842:090\$322
1863	146:337\$460	18	651:563\$922	82	797:901\$382
TOTAL	540:705\$390	13	3.550:816\$490	87	4.091:521\$880

Source: Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1864), Annexe 6,8,9.

(the Mata zone). Freight was the most important source of revenue of the company, as shown in Table V.19. From 1858 to 1863, for example, the gross revenue provided by the transport service as a whole amounted to 4.091:521\$880 Contos. Passenger traffic contributed 13% of the total and freight with the remainder 87%. During the same period the net revenue amounted to 911:409\$442 Contos. Seventy nine per cent of it came from freight and 21% from passenger traffic⁸⁹. The smaller importance of passenger traffic can also be observed in the case of the railways companies. The larger part of the revenue of the EFDPII, for example, also derived from freight. Although in the first 6 months of its operation freight revenue was just a fraction larger than passenger revenue, as soon as the railway started to reach the coffee-growing regions freight began to account for larger shares of the company's revenue. Thus, from 1859 onwards freight accounted for about 60% of the revenue of the EFDPII, and increased to 75% in 1865⁹⁰.

Table V.20 - Coffee freight in the União e Indústria turnpike.

YEARS	TOTAL OF GOODS TRANSPORTED (tons)	% OF GOODS EXPORTED	TOTAL OF COFFEE TRANSPORTED (tons)	% OF COFFEE OVER THE TOTAL	% OF COFFEE OVER EXPORT
1858	10,974	68	7,400	67	97
1859	22,776	71	15,908	70	98
1860	26,970	75	20,024	74	99
1861	29,743	79	23,179	78	99
1862	20,695	59	11,342	55	93
1863	23,345	69	14,495	62	90
1864	23,802	64	13,042	55	85
1865	31,988	67	19,242	60	89
1866	32,627	65	19,504	60	92
1867	41,061	74	29,139	71	96
1868	36,641	73	24,602	67	92

Source: Compiled from Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1868).

* From April to December.

⁸⁹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1864), Annexe 8 and 9.

⁹⁰ El-Kareh, op.cit., p.121.

Freight consisted of a high proportion of exports - a one way traffic which made for high operating costs -, mainly coffee. As shown in Table V.20, from 1858 to 1868, coffee accounted for over 70% of the total of goods transported by the CUI and more than 90% of the goods exported. As freight provided nearly 90% of gross revenue and as export made up two thirds of freight, and as coffee represented 90% of the goods exported, company profits were linked to the fate of coffee. A slump in coffee exports in 1862, for example, caused a decrease of 31% in the quantity of goods transported by the company during that year. The company report of 1863 made the following comment about this event:

"From the documents of the movement of goods and passengers it is possible to see that the total weight of goods carried in 1862 amounted to only 1,401,812@ 13lb (...)

A considerable difference which represents a decrease in freight of 31%, due to the lack of the main product of our agriculture [coffee], and that contributed strongly to the limited result of the respective revenue."⁹¹

Dependence on a single export (in most cases, coffee) seems also to have been the fate of the majority of the railways in Brazil. In the period 1873-1905, most of the Brazilian railways were located in the coffee-growing regions, as shown in Table V.21. In 1873, 67% of the Brazilian railway lines were set-up

Table V.21 - Length of the Brazilian railway in the main coffee-growing provinces/states, 1873-1905.

PROVINCE/STATE	LENGTH OF THE RAILWAY NETWORK (in kilometres)					
	1873	%	1883	%	1905	%
São Paulo	254	22	1,457	26	3,790	23
Minas Gerais	-		662	12	3,843	23
Rio de Janeiro	510	45	1,706	30	2,661	16
Espírito Santo	-		-		336	2
Brazil	1,129	100	5,708	100	16,782	100

Source: Adapted from H.P.Melo, *O Café e a Economia Fluminense: 1889/1920*, (Rio de Janeiro, 1993), p.11.

in the coffee-growing provinces of São Paulo and Rio de Janeiro. In 1905, the four major coffee-growing states (São Paulo, Rio de Janeiro, Minas Gerais, and Espírito Santo) accounted for 64% of the railway lines. Furthermore, in the province of Rio de Janeiro railways were built only where coffee could guarantee freight and profits for the lines⁹². Most of paulista railways established during the last century were built to cater for the coffee trade as well. The San Paulo Railway (SPR), for example, provisionally opened in 1867, linked Santos, the principal paulista port, to Jundiai, a medium-sized industrial and commercial town at the edge of the paulista coffee zone. By 1869, over a half of the freight handled by the company was made up of coffee. Moreover, it was the coffee trade above Jundiai that attracted investment to other railways, firstly to Campinas and later beyond that city to Rio Claro and Mogi Mirim⁹³. Thus, the dependence of the CUI on coffee for freight and profits, was a feature that the company shared with other major Brazilian transport

⁹¹ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1863), pp.11-2.

⁹² H.P. Melo, *O Café e a Economia Fluminense: 1889/1920*, (Rio de Janeiro, 1993), p.8. ?

⁹³ C.M. Lewis, *Public Policy and Private Initiative: Railway Building in São Paulo, 1860-1889*, (1991), pp.13-5.

companies - all were characterized by a limited market.

The mineiro textile industry in the nineteenth century also operated on a local basis. Most firms supplied mainly their immediate neighbourhood, with a few supplying larger sub-regional markets. However, the industry as a whole was restricted to those markets that could not be supplied from overseas or by producers based in Rio de Janeiro and São Paulo. Nevertheless, if the lack of adequate means of transport constituted a barrier to the penetration of foreign competition, at the same time, it limited the size of the market of the mineiro mills.

The output of the Brumado mill, for example, was consumed in Pitangui (the town where it was located) and in the neighbouring towns of the western part of the province. The Biribiry mill, located in Diamantina, and the Cassú mill, located in Uberaba, also sold their output in the immediate vicinity⁹⁴. The Companhia Cachoeira de Macacos (CCM) commercialized its output in both the immediate locality and in the neighbouring northeastern part of the province⁹⁵. The sales of the Cedro and the Cachoeira mills were also restricted to the province of Minas Gerais. Bernardo Mascarenhas gives some evidence of this when he wrote to the owners of the Cachoeira mill, proposing the statutes of the CCC:

"I have named the company - Cedro e Cachoeira - instead of the name - União Industrial. Our mills, well known and respected throughout the whole province, would disappear in the organization of the new company."⁹⁶

Nevertheless, they did not supply the whole province, as the Triângulo and the Southern zones were supplied by the mills located in São Paulo, and the Mata zone was supplied by the local production and by the mills located in Rio de Janeiro⁹⁷. These regions already enjoyed reasonably good communications with neighbouring provinces.

As output increased after the constitution of the CCC, the company tried to expand its market by penetrating other areas, as suggested by Francisco Mascarenhas in 1887:

"If we could find a good employee in the capital of Goyaz, our sales there would be very big, (...).

Uberaba is also an important and still unexplored market. If some of our customers wanted to sell there we could have a good result."⁹⁸

The company also tried unsuccessfully to penetrate Rio de Janeiro, then the most important market in Brazil.

⁹⁴ Libby, op.cit., p.233.

⁹⁵ N.A.M. Freitas, "Cia. Têxtil Cachoeira dos Macacos: Empresa que deu Origem a uma Cidade", Fundação Mineira de Arte Aleijadinho/Escola Superior de Artes Plásticas, Mimeo., Belo Horizonte, 1990, pp.27-9.

⁹⁶ Letter from Bernardo Mascarenhas on 24 January 1883 to Mascarenhas, Barbosa & Cia., reproduced in Mascarenhas, Bernardo Mascarenhas, p.71.

⁹⁷ Vaz, op.cit., p.245.

⁹⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências Bernardo Mascarenhas, 1883-1899 - No.148", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 26 April 1887".

The reasons for the failure does not seem to have been restricted simply to costs and freight charges, but also to the quality and design of the textile produced by the company. In 1887, Rodolpho Alves, a textile merchant from Rio de Janeiro, stated that after examining and comparing the products of the company with those produced by the mills from Rio de Janeiro, he did not believe that they could be sold there:

“Even if these cottons were suitable for the Rio de Janeiro market, taking into account the price paid for freight, it would be impossible to compete with the ones produced here, as competition is getting tougher everyday.”⁹⁹

In 1889, Theóphilo Marques Ferreira, then general manager of the company, outlined his marketing strategy and provided further evidence of the limits of the market supplied by the company. According to him, most customers made their purchases directly at the mills, in a clear indication of the range of the market of the company. Moreover, it seems that the company did not employ a sales staff and production was sold to a small circle of warehouses and merchants, evidence of the primitive nature of the channels of distribution. Nevertheless, as a consequence of the commercial crisis that the company was facing, that was not true anymore and the company had to open several of its own warehouses and branches throughout the province. Once again, as in the merger of the Cedro and Cachoeira mills and the purchase of the São Vicente mill, innovation was driven by crisis rather than as part of a planned strategy. The change in the marketing strategy of the CCC represented an integration of functions (production and distribution) within the company, a move similar to that made by US companies in the nineteenth century¹⁰⁰. However, such strategy does not seem to have worked as planned as all the warehouses and branches were closed down a few years later¹⁰¹.

Furthermore, Ferreira decided to send to the provinces of Paraná and Santa Catarina the manager of the branch in Ouro Preto:

“(…), who expects to sell a large amount of our products there. Also, acknowledging that Rio de Janeiro is the largest market, I sent some samples of our products to the evaluation of some of the most respected merchants from that city (...)”¹⁰²

Ferreira expected to sell at least one third of the output of the company in Rio de Janeiro¹⁰³, but he did not succeed for the reasons already suggested in the above-mentioned letter of Rodolpho Alves: high costs and unsuitable quality. As the São Vicente mill began to operate in 1894, the traditional markets of the company proved to be not large enough to absorb the increased output¹⁰⁴. Thus, the company tried once again to

⁹⁹ Companhia Cedro e Cachoeira, “Caixa de Correspondências Recebidas No.21”, “Letter from Rodolpho Alves, March 1887”.

¹⁰⁰ See Chandler, *The Visible Hand*, parts III and IV.

¹⁰¹ Vaz, *op.cit.*, pp.220-6.

¹⁰² Companhia Cedro e Cachoeira, “Relatório da Diretoria”, (1889), pp.1-2.

¹⁰³ Companhia Cedro e Cachoeira, “Relatório da Diretoria”, (1889), p.3.

¹⁰⁴ Vaz, *op.cit.*, p.246.

penetrate the market of Rio de Janeiro. In 1895, Rodolpho, Irmão & Mattos, a textile merchant from Rio de Janeiro, acknowledged the receipt of samples of the products of the São Vicente mill¹⁰⁵. Some months later, Eugenio de Azevedo & Companhia, another textile merchant from Rio de Janeiro, explained that:

"It seems that it is going to be very difficult for this company [the CCC] to sell its products in this market, since the several mills located here have stock enough to the necessities of the market. Furthermore, the prices are not competitive."¹⁰⁶

The company would not succeed in penetrating the Rio de Janeiro market until 1918, when it managed to establish contracts with the large merchants and warehouses in Rio. In the meantime, the company developed a marketing policy to preserve and expand its traditional markets, which were made up of a large number of towns located mainly in the northern part of Minas Gerais¹⁰⁷.

Thus, throughout the last century the mineiro textile industry was restricted to local markets. The CCC, for example, tried to supply a larger market but it did not succeed. The company had neither suitable products nor competitive prices to compete and operate on a national basis. Therefore, the company, like most of the mineiro textile industries, was restricted to those markets inaccessible to the foreign competition and to the products of the larger mills from São Paulo and Rio de Janeiro.

But the mineiro textile mills were not only restricted to the local markets. They were also restricted to the poorest niche of the market. They produced a limited range of products of low quality, mainly cloth for the labour force, either slave or free, and sackcloth for packing. As Stein observed, the production of these products did not require skilled workers, the machinery was simple to operate, and the market relatively secure. Furthermore, the wealthiest classes of the Brazilian society continued to consume imported cloths made of cotton, linen, silk, and wool¹⁰⁸.

The case of the CCC is illustrative in this particular respect. As the company was made up of mills which were established in rural areas, its consumer market was constituted by slaves and free people on low income. Thus, the company specialized in a type of product destined to this market: cheap and low quality textiles¹⁰⁹. There is evidence that the consumer market of the CCM was also made up of the poorest stratum of the population, as the company sold its products in the northeastern part of Minas Gerais, one of the poorest areas of the province¹¹⁰.

¹⁰⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.41", "Letter from Rodolpho, Irmão & Mattos, 12 April 1895".

¹⁰⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.42", "Letter from Eugenio Azevedo & Companhia to Aristides J. Mascarenhas, 5 August 1895".

¹⁰⁷ Vaz, op.cit., pp.245-6.

¹⁰⁸ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), p.38, 80.

¹⁰⁹ Vaz, op.cit., pp.245-61.

¹¹⁰ Freitas, op.cit., pp.27-9.

Furthermore, it seems that the mining companies constituted another important customer of the mineiro textile mills. In 1889, for example, the St. John del Rey Mining Company (SJDRMC) ordered from the CCC cloth to be used as gauze for filtering mine slummy in the production of gold¹¹¹. During the same year, the SJDRMC was also purchasing cloth for the same purpose from the CCM, as shown in the following letter:

"The cloth is well produced, but very thin and extremely smooth to retain gold. I am sending you a sample of the cloth from the Itabira mill and I think that it would be a good idea if you could weave a small piece of the same width and texture and send me a sample of it as soon as possible."¹¹²

Two years later, the storekeeper of the SJDRMC, M.J. Clemence, complained about the quality of the cloth supplied by the CCC, indication of the regular supply for the mining companies and of the poor quality of the product manufactured by the CCC:

"The 69 meters that you sent have already arrived. Nevertheless, I shall call your attention to the quality of the cloth which seems to be much inferior to the one you used to produce."¹¹³

A month later, he notified the CCC of payment for the cloth supplied¹¹⁴. Finally, in 1899, the SJDRMC ordered scraps of cotton to be used in the cleaning of the machinery¹¹⁵. Thus, during the last century, the mineiro textile mills produced low quality products, like cloth for the low income stratum of the population, and sackcloth for packing. Furthermore, the mills which were located in the mining areas, found in the mining companies what may have been an important niche of the market.

Furthermore, as the markets supplied by the mineiro textile companies were scattered over a wide area and of difficult access, the main channel of distribution were the muletrains, either belonging to the textile companies themselves or to independent merchants. At the beginning, the output of the CCM was sold by salesmen travelling with muletrains to farms, villages, and hamlets spread through their way. Later, with the extension of the railways, these salesmen would go by train until Corinto, where they would rent muletrains and head for Montes Claros¹¹⁶. In another evidence of the integration of both production and

¹¹¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.26", "Letter from M.J. Clemence to Theóphilo Marques Ferreira, 7 December 1889".

¹¹² Letter from M.J. Clemence to Américo Teixeira Guimarães on 25 October 1889, reproduced in Freitas, op.cit., p.123.

¹¹³ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.30", "Letter from M.J. Clemence to Theóphilo Marques Ferreira, 4 June 1891".

¹¹⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.30", "Letter from M.J. Clemence to Theóphilo Marques Ferreira, 31 July 1891".

¹¹⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.51", "Letter from M.J. Clemence to Aristides J. Mascarenhas, 3 June 1899".

¹¹⁶ Freitas, op.cit., pp.28-9.

distribution within the company, the CCC had its own muletrain as Francisco Bahia da Rocha, manager of the São Vicente mill, showed in his report in 1895:

"It is essential that this mill continues to employ four carts with the necessary number of oxen. Nevertheless, there is no suitable pasture (...) depleting rapidly the oxen which in a matter of days are unsuitable for the work."¹¹⁷

Further evidence of the integrated nature of the business is found in the correspondence of the general manager of the CCC. In 1898, Manoel Pimenta Figueiredo, a merchant from Capelinha, wrote offering a boy to look for the muletrain of the São Vicente mill¹¹⁸. However, the company also relied on its customers' muletrains to distribute production or consignment. Independent merchants, like Cassimiro Teixeira Collares, loaded their muletrains with cloth at the mills and travelled around the province selling it:

"Cassimiro Teixeira Collares, one of our best customers from Grão Mogol, who buys only with cash, sent here his muletrain to buy some cloth and sent cash and tobacco, that his slave muleteer has sold. However, the tobacco did not reach the expected price and the money was short 51\$754 Milreis of the total amount of the purchase, which I have debited to headquarters (...)"¹¹⁹

Mill managers also sold directly on orders. The above mentioned dealings between the CCM, the CCC, and the SJDRMC shows it clearly, as well as the following letter written by Américo Teixeira Guimarães, the general manager of the CCM:

"Concerning the 12 packs of striped material you ordered in your letter of yesterday, I am sorry to tell you that I cannot provide it. I have a customer here loading 80 packs and after that I have to provide another customer with 120 packs. Furthermore, I have several other orders received a long time ago which are already late."¹²⁰

Another important channel of distribution used by the CCC was the company's own warehouses, as mentioned above. When the commercial situation became increasingly difficult after 1886, the company reluctantly decided to establish several warehouses in an attempt to boost sales:

"Until then, all of our customers would come to the doorstep of our mills. Now very few of them appear. Thus, it became necessary to take the extreme decisions of establishing warehouses and branches in several points of the province with a large financial burden, investments, and commissions.

The warehouses were always considered by me as the last resort, because they

¹¹⁷ Companhia Cedro e Cachoeira, "Relatório e Quadro Demonstrativo de Lucros Apresentado pelo Dr. Francisco Bahia da Rocha, Gerente da Fábrica de São Vicente", (1895).

¹¹⁸ Letter from Manoel Pimenta Figueiredo to the general manager of the Companhia Cedro e Cachoeira on 15 July 1898, reproduced in D. Giroletti, Fábrica Convento Disciplina, (Belo Horizonte, 1991), p.67.

¹¹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 23 July 1884".

¹²⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.36", "Letter from Américo Teixeira Guimarães to Francisco de Paula Mascarenhas, 27 August 1893".

do not represent any guarantee of sales."¹²¹

Warehouses were established in the most important consumer markets, with their own team of salesmen¹²². The report of the board of directors of 1889 listed 6 warehouses in Ouro Preto, Formiga, Montes Claros, Calháo, Congonhas, and Pitanguy¹²³. Later on, another 7 warehouses were established in Arassuaí, Capelinha, Teófilo Otoni, Abadia, Pirapora, Diamantina, and Rio de Janeiro. The company continued to distribute through its own warehouses until the beginning of this century, when they were replaced by local merchants who acted as representatives¹²⁴. Hence, from the evidence presented above it is reasonable to conclude that mineiro textile mills relied on a diverse and somewhat sophisticated marketing structure, developed throughout the years by several crisis. The development of such strategy was an attempt to replace the "invisible hand" of the market - which in the case of nineteenth-century Minas Gerais was very precarious - by the "visible hands" of the managers.

Table V.22 - Number of street and domestic lamps powered by the Companhia Mineira de Eletricidade, 1889-1901.

YEARS	No. OF STREET LAMPS	No. OF DOMESTIC LAMPS
1889	40	-
1892	185	700
1896	-	-
1897	304	2,470
1901	337	-

Sources: Oliveira, Companhia Mineira de Eletricidade, pp.24-44; Companhia Mineira de Eletricidade, Balanco e Relatório reproduced in O Pharol, (Juiz de Fora), 27 August 1897, p.1.

The mineiro electricity generating companies of the turn of the century supplied very small markets, even if it is taken into account that markets for utilities such as electricity are different from those of tangible products like iron and textiles. Throughout the nineteenth century, the CME supplied only the city of Juiz de Fora, which was not a large market, both for the supply of electricity and for the provision of telephone service. Although demand was continuously increasing, the market for lighting in Juiz de Fora was not very large, as shown in Table V.22. In 1889, the company began supplying electricity to 40 street lamps. There is no information about the number of domestic connexions. Nevertheless, Bernardo Mascarenhas gives an idea of it in the plan that he drew the specifications of the equipment ordered to the Westinghouse Electric Company (WEC) in 1888. According to Mascarenhas' plans, the power plant would have a capacity to supply energy to 500 domestic lamps¹²⁵. In 1892, according to the company report, that

¹²¹ Companhia Cedro e Cachoeira, "Relatório da Diretoria", (1889).

¹²² Mascarenhas, Centenário da Fábrica do Cedro, p.145.

¹²³ Companhia Cedro e Cachoeira, "Relatório da Diretoria", (1889).

¹²⁴ Vaz, op.cit., p.226.

¹²⁵ Report of the technical specifications of the equipment to be supplied by the Westinghouse Company, reproduced in Oliveira, Companhia Mineira de Eletricidade, pp.29-31.

number increased to 185 street lamps and 700 domestic lamps. In 1897, the company reported to have powered 304 street lamps and 2,470 domestic lamps in 225 houses. Finally, in 1901, the company supplied electricity to 337 street lamps but there is no information about the figures for the domestic customers. Even so, the company struggled to keep pace with demand, as shown in the company report of 1892:

"As there is a great demand for light another generator was ordered, which is going to be assembled soon and will enable the company to serve the customers better."¹²⁶

Juiz de Fora also did not constitute a large market for power. The supply of power only began after the inauguration of the second plant in 1896. The first two electric engines began to operate only two years later, one of them at Bernardo Mascarenhas' textile mill - which was a separate enterprise from the CME - and the other at the Pantaleone Arcuri & Timponi establishment¹²⁷.

Finally, even though there is no information about the number of telephone lines supplied by the company, there is evidence that the market was not large. A report of the American Telephone and Telegraph Company (ATT) of 1919 attested the precariousness of the telephone service in Juiz de Fora at the time when the CME acquired the concession:

"Either because the city did not charge properly for the telephone service or because the contract did not offer the necessary guarantees, the Companhia Industrial Mineira [the former concessionaire] could not develop it and sold it to the CME."¹²⁸

In 1901, a company report stated that the revenue provided by the telephone service had decreased¹²⁹, further evidence of the precarious nature of the market in Juiz de Fora.

At the beginning, the CFLCL supplied electricity to 4 different towns - Cataguazes, Leopoldina, São João Nepomuceno, and Rio Novo -, all of them located within the Mata zone. Even so, taking into account the original generating capacity of the CFLCL of 800 KW¹³⁰, it is reasonable to conclude that these markets were very limited in size. As mentioned above, the generating capacity of the CME in 1901, which supplied only the city of Juiz de Fora, was of 600 KW. Further evidence of the limited size of the markets supplied by the CFLCL is found in the company report of 1909. According to it, in 1908 the company powered a total of 8 engines and lit 512 houses¹³¹. Unfortunately, there is no information about the number of street lamps lit by the company for this year. Nevertheless, evidence presented above leaves no doubt about the small size of the markets explored by the CFLCL. In addition, the markets explored by the

¹²⁶ Companhia Mineira de Eletricidade, Relatório da Diretoria, (1892), reproduced in *Ibid.*, pp.38-9.

¹²⁷ *Ibid.*, p.39.

¹²⁸ *Ibid.*, p.44.

¹²⁹ Companhia Mineira de Eletricidade, Relatório da Diretoria, (1901), reproduced in *Ibid.*, p.44.

¹³⁰ Companhia Força e Luz Cataguazes-Leopoldina, 80 Anos Companhia Força e Luz Cataguazes-Leopoldina: Uma Luz, (1988), pp.1-4.

¹³¹ Companhia Força e Luz Cataguazes-Leopoldina, Relatorio da Diretoria, (1909), pp.3-4.

company were also precarious. As Ivan Botelho, who became president of the company in 1963, observed:

"[at the beginning] It was not enough to light the houses. First, the company had to convince the owner of the house that the supply of light was useful. Then, the company had to do everything - to install the cables, to give the lamps - to make the people to be used of having electricity at home. The people were used to live in the dark and did not have any idea of progress."¹³²

Although this was hardly a peculiarity of the markets supplied by the CFLCL, it is undisputable evidence of its precarious and backward nature.

Comparison of both the CME and the CFLCL with the Light System is once more very illustrative. As the names of the companies which constituted the Light System suggest (the São Paulo Tramway, Light and Power Company and the Rio de Janeiro Tramway, Light and Power Company Limited), they supplied the two largest Brazilian consumer markets, i.e. the cities of São Paulo and Rio de Janeiro¹³³. Thus, the mineiro electricity generating companies were restricted to much smaller markets when compared with their paulista and carioca counterparts.

To conclude, for most of the last century the mineiro iron industry operated on a local basis supplying mining industries, farms, and small towns. It manufactured parts for mining machinery, agricultural tools, domestic appliances, horseshoes, and horsenails. Nevertheless, individual firms produced a narrow range of products. The distribution of output was undertaken by a large number of small generalist merchants spread all over the province and by muletrains until the arrival of the railway.

The analysis of the marketing activities of the CUI revealed that, as happened with the majority of the Brazilian railways, a larger proportion of its revenue came from freight which was heavily dependent on one product (coffee). Furthermore, the company did not operate on a national or provincial basis. It was limited to the Paraíba Valley in the province of Rio de Janeiro and the Mata zone in Minas Gerais, a coffee-growing region.

Most of textile firms in nineteenth-century Minas Gerais sold their products in local and sub-regional markets, and were limited to the least sophisticated end of the market. Furthermore, the most common channels of distribution were muletrains and travelling salesmen, either independent merchants or employees of the mills themselves. In the last decade of the century, the CCC resorted to the opening of a number of warehouses in an attempt to boost the distribution of its increasing output. The development of a diverse and sophisticated marketing structure was an attempt to overcome the limitations imposed by the market mechanisms.

Finally, providing new and technologically advanced services - the generation of hydroelectricity and the provision of telephone services - the mineiro electricity generating companies were restricted to small and precarious markets.

¹³² M.F. Neto, "Os Frutos da Diversificação", in Administração e Serviços, June 1982.

¹³³ Panorama do Setor de Energia Elétrica no Brasil, pp.34-41.

5.2 - The Administrative Structure:

As most firms in nineteenth-century Minas Gerais operated on a small scale, and supplied small and local markets, very few of them had even an embryonic administrative structure. Often they had no administrative structure whatsoever. They were managed personally by their owners, who made long-term and day-to-day decisions assisted by one or two managers. They were usually owned by a small number of people, often members of the same family. Consequently, appointment, especially for managerial positions, was more often based on kinship than on expertise.

The iron industry shows this clearly. Iron foundries in the first three-quarters of the last century were mainly family affairs, even the largest ones like the *Patriótica* and the *São Miguel de Piracicaba*. The only exception was the *Morro do Pilar*, which was financed by the Imperial government and organized by Manuel Ferreira da Câmara. Even so, the foundry was personally controlled by Câmara throughout its existence¹³⁴. The *Patriótica* was founded by Eschwege. In setting-up the foundry he had the help of the president of the province of Minas Gerais, Conde de Palma, who:

"Enjoyed the confidence of several important people and, mainly, of a large and important family which was courted in the whole province. He had a great influence in the ministry and soon he succeeded in getting the interest of this family to the business."

Thus, the ownership was divided in 10 shares, each share representing 1,000 Cruzados¹³⁵ of the initial capital. Eschwege subscribed to two shares, the governor one, and the large and important family the remainder¹³⁶. The *São Miguel de Piracicaba* foundry was established by Monlevade and Captain Luiz Soares de Gouveia in 1827. After Monlevade's death in 1872, his family assumed the control of the foundry until it was sold to the *Companhia de Forjas e Estaleiros* at the beginning of the 1890s¹³⁷.

In the latter part of the nineteenth century, although the size of iron firms grew they continued to be owned by very few people. The *Esperança* foundry, set-up in 1888, was established by Amaro da Silveira (an engineer of the EFDPII), Alberto Gerspacher (a metallurgist), Henrique Hargeaves (chief of the extension works of the EFDPII) and Carlos G. da Costa Wigg. The latter was the main shareholder, owning 70% of the initial capital. The *Burnier* foundry, built a few years later after the sale of the *Esperança* foundry, was established by José Gerspacher, Alberto's son, and Carlos G. da Costa Wigg, who owned 80% of the capital¹³⁸. Thus, throughout of the last century, iron foundries were owned by a small number of people and were very often family affairs.

¹³⁴ Libby, *op.cit.*, p.137.

¹³⁵ The Cruzado was the old Portuguese currency and the official Brazilian currency during the colonial period. A.B.H Ferreira, *Novo Dicionário da Língua Portuguesa*, (Rio de Janeiro, 2nd ed. 1986), p.504.

¹³⁶ Eschwege, *op.cit.*, p.247.

¹³⁷ Paula, *op.cit.*, p.31.

¹³⁸ Gomes, *História da Siderurgia no Brasil*, pp.141-7.

Furthermore, short and long-term administration was carried out by the owners themselves. Câmara, for example, personally handled all the basic activities of the firm. He supervised the production:

"Two measures of charcoal were placed in the furnace daily, and this activity was made under the supervision of Mr. Câmara, who was always present at work."¹³⁹

He planned long-term investments, like the building of a large road with the purpose of exporting iron, as Schoenewolf, a German foundry master, reported to Eschwege in 1816. He also controlled and disciplined personally the workers:

"Mr. Câmara became very angry and beat so severely a certain blacksmith that this man vomited blood for eight days. During the whole existence of the foundry, the whipping post was never empty."¹⁴⁰

Finally, appointment at the Morro do Pilar mill was clearly based on kinship, as observed by Schoenewolf:

"They have spent 2,000 Cruzados monthly and the work did not develop. Although several workers are on the pay-roll only few of them actually work, since from the manager to the last foreman, they are all relatives, not wanting to cause any harm to each other. Thus, it is impossible that this mill will ever develop."¹⁴¹

Like Câmara, Eschwege also personally handled all the basic activities of the firm, like the construction of the mill:

"A skilled carpenter, under my permanent supervision, made all the work which was finished in a year. Hence, on 12 December 1812 I was able to forge for the first time with the big hammer."¹⁴²

Similarly he often supervised production:

"The consumption of charcoal, while I personally supervised the work of the foundry, was five times less than later, as a consequence of the negligence of the managers."¹⁴³

Like Câmara and Eschwege, Monlevade was deeply involved in every aspect of his business. He personally made the plans for the construction of his foundry:

"Mr Monlevade, a respectable gentleman, a great mineralogist, a great chemist, apart from further knowledge in physics, mathematics and literature who, acknowledging the riches of this country, associated with Captain Luiz Soares de Gouveia, (...) established an iron foundry superior than any other in the country. There that gifted physicist showed his skills in the design of the buildings and in the plan of the furnace. It was he who took a pickaxe to work on the foundations."¹⁴⁴

¹³⁹ Eschwege, op.cit., p.208.

¹⁴⁰ Ibid., p.209.

¹⁴¹ Ibid., p.210.

¹⁴² Ibid., p.248.

¹⁴³ Ibid., p.251.

¹⁴⁴ Gomes, História da Siderurgia no Brasil, p.109.

And Monlevade was also involved in the daily activities of his foundry, especially in the supervision of the workers:

"If the founder [Monlevade] of the foundry [the São Miguel de Piracicaba] could maintain it throughout his life it was because he was always supervising his workers and had a legendary activity and energy which were admired by the inhabitants of the country.

As a mining engineer, he knew deeply the process which he employed and as he was continuously present at work, he could overcome his employees' indifference and obtain from them the necessary care."¹⁴⁵

Even in the larger ironworks which emerged in the last quarter of the century, owners continued to be involved in the daily management of the firm. At the Esperança foundry, for example, management was entrusted to Alberto Gerspacher, who was its technical director and one of the owners. Soon, the initial capital proved to be insufficient for further developments and the foundry was sold to the CNFE¹⁴⁶. The CNFE tried to constitute an iron trust in Brazil, but went bankrupt¹⁴⁷ and the Esperança foundry was then sold to the firm Queiroz Júnior e Leandro, whose partner, the engineer Queiroz Júnior, served as manager for several years¹⁴⁸.

Hence, throughout the century iron foundries in Minas Gerais were owner-managed, irrespectively to their size. However, the production of iron was not the only economic activity of foundry owners or even of their workers. Usually the foundries, especially the smaller ones, were part of a farm and the work in the foundry was divided with the activities of the farm. Monlevade, for example, described to the president of the province what he called the "Monlevade farm", which included the famous São Miguel de Piracicaba foundry and plantations¹⁴⁹. Furthermore, the death of the owner in many occasions meant the end of the activities of the foundry. Costa Sena, for example, mentions the existence of a well established foundry close to Conceição, in the Metalúrgica zone, which was abandoned because of the death of its owner, Eduardo Félix. He further refers to the Cubas foundry which was also abandoned as a consequence of the death of its owner¹⁵⁰. When Monlevade died in 1872, his son took control of the São Miguel de Piracicaba foundry, but as he could not find any one technically competent to operate the Catalan method he hired a master who transformed it into an Italian foundry¹⁵¹. The case of the São Miguel de Piracicaba foundry shows clearly how bad was the problem of shortage of skills in nineteenth-century Minas Gerais.

The lack of administrative structure was generalized among the iron firms in Minas Gerais. In 1814,

¹⁴⁵ Ibid., p.109.

¹⁴⁶ Ibid., pp.141-2.

¹⁴⁷ Paula, *op.cit.*, p.38.

¹⁴⁸ Gomes, *História da Siderurgia no Brasil*, p.144.

¹⁴⁹ Libby, *op.cit.*, pp.151-2.

¹⁵⁰ Costa Sena, *op.cit.*, pp.140-1.

¹⁵¹ Paula, *op.cit.*, p.31.

the Morro do Pilar foundry, for example, employed a total of 34 workers. Among them, 15 smelters, 8 blacksmiths, 6 carpenters, 2 blacks, 2 apprentices and 1 foreman. Thus, it had no administrative personnel apart from Câmara himself. In 1821, it employed one manager, one foundry master, 6 foremen, one master-blacksmith and one blacksmith, 2 master-carpenters, 28 workers for furnace and hammermill, 17 apprentices for furnace and hammermill, and 70 slaves for the coal-bunkers¹⁵². Although, the number of workers had increased from 34, in 1814, to 127, in 1820, it still employed very few managerial staff for an enterprise of its size. There was also no administrative structure in the Patriótica foundry. Until 1821, the foundry employed 20 slaves, two free Brazilians, occasionally 1 German foundry master, and Eschwege himself¹⁵³.

The CUI, by its turn, was organized on a larger basis. The nominal capital of the company was divided into 10,000 shares, although the issued capital never exceeded 6,120 shares. As the chairman of the company, Mariano Procópio Ferreira Lage was certainly one of the largest shareholders. In his will, written before a trip to Europe in 1867, Lage declared a holding of 805 shares (or 13% of the issued capital)¹⁵⁴. However, although ownership of the CUI was spread among a larger number of people, control was firmly in the hands of its founder. Until his death in 1872, Lage had a great influence on the company as its president and main executive. Furthermore, some of his relatives, like José Antonio da Silva Pinto and Lino José Ferreira Armond, were shareholders who had made important contributions to the company¹⁵⁵. Thus, because ownership of the CUI was diffused Lage was able to control the company with a relative small share participation.

Furthermore, as chairman of the company, Lage's activities were not only concerned with long-term decisions, but also with short-term decisions, like personnel management:

"The engineers of the company judge that, with this increase of personnel, they will be able to handle all the work required by the stations and roads beneath and beyond the Parahyba river. And with the assurance they gave me of not being needed to increase the number of engineers I decided to give them a gratification for the increase in the volume of work."¹⁵⁶

He was also directly involved with activities like the engagement of foreign engineers and the recruitment of workers:

"The conditions of the recruitment of slaves, (...), were the same until 31 December 1855. Before the end of the year and in order (...) to call the attention of the proprietors of slaves who wanted to let them and to stimulate free workers, I was forced to announce new conditions, increasing the wages to more than a quarter than it was established

¹⁵² Eschwege, *op.cit.*, pp.209-13.

¹⁵³ *Ibid.*, pp.247-254.

¹⁵⁴ Giroletti, *op.cit.*, pp.18-9.

¹⁵⁵ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1857), pp.38-9.

¹⁵⁶ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1856), p.14.

before."¹⁵⁷

Thus, the involvement of the founder of the company in its top administration constitutes evidence that if the CUI was a modern enterprise, in Chandlerian terms, it should be considered a modern entrepreneurial - and not managerial - firm.

Nevertheless, both the construction and operation of the turnpike União e Indústria required a wide range of professionals. From 1853 to 1860, the company payroll included engineers, architects, geometers, drivers, foremen, book-keepers, etc.¹⁵⁸. In 1865, for each one of the 10 stations located along the turnpike União e Indústria the company employed one manager, in what might have constituted a layer of management¹⁵⁹. In 1866, the administrative structure of the technical staff of the company was clearly organized in a hierarchical way. As shown in Figure V.1, it was divided in seven categories, each with a distinct status which was translated into higher and lower salaries. At the head was the chief engineer, assisted by a deputy called the first engineer. The chief engineer earned 12:000\$000 Contos and his deputy 8:400\$000 Contos per year. Then, there were four section heads, who were engineers as well, earning 6:000\$000 Contos. They were assisted by 6 first class assistants and 5 second class assistants. The formers received 4:800\$000 Contos and the latter 3:600\$000 Contos per year. Then, came 6 first class drivers, earning 3:000\$000 Contos, and 9 second class drivers, earning 2:400\$000 Contos. There was also a general traffic inspector and a chief of the workshops, both engineers: there is no information about their salaries¹⁶⁰. Thus, the existence of a clearly defined administrative structure of the technical body of the CUI is beyond any doubt.

However, the existence of this somewhat more complex administrative structure of the technical body was due to the nature of the industry rather than to the CUI itself. In 1864, for example, the EFDPII was divided in several different departments: headquarters, warehouse, traffic, telegraph, construction, rolling-stock, and stations, as shown in Figure V.2. Apart from the headquarters, which was a small department employing a total of 7 people, the others were strictly technical departments. Each was organized in a hierarchical way, with posts being divided according to seniority, and different status and salaries. Thus, as shown in Figure V.3, at the head of the traffic department, for example, was the general traffic inspector assisted by a deputy called the resident engineer. The general traffic inspector earned 14:000\$000 Contos and his deputy 6:000\$000 Contos per year. Then, there was the chief of traction, earning 5:000\$000 Contos, the chief of the traffic department accountancy, earning 3:600\$000 Contos, and the secretary, earning 3:000\$000 Contos per year. Finally, there were 5 employees, without clearly defined occupations, earning

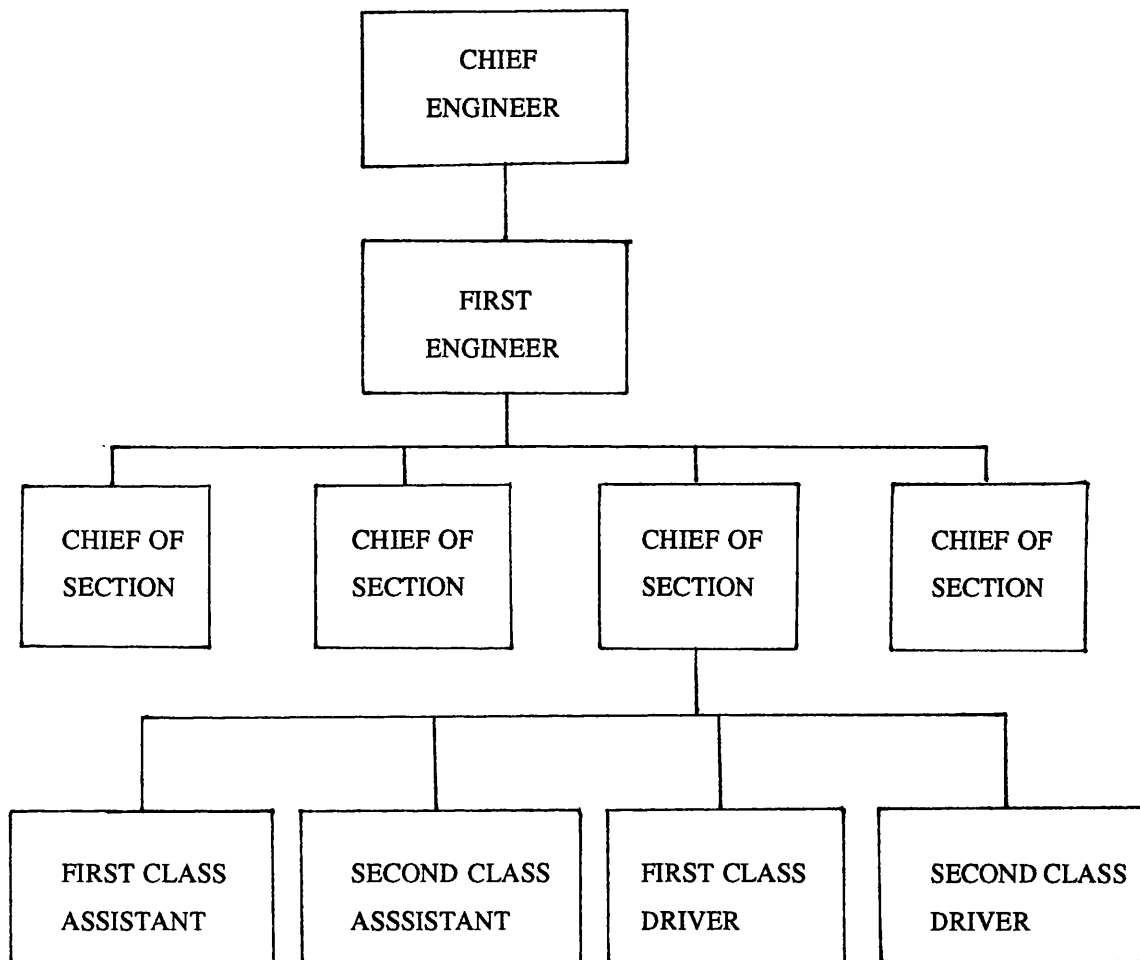
¹⁵⁷ Companhia União e Indústria, Relatório da Assembléa Geral dos Acionistas, (1856), p.14.

¹⁵⁸ Esteves, op.cit., pp. 149-52.

¹⁵⁹ Companhia União e Indústria, Relatório da Assembléa Geral dos Acionistas, (1866).

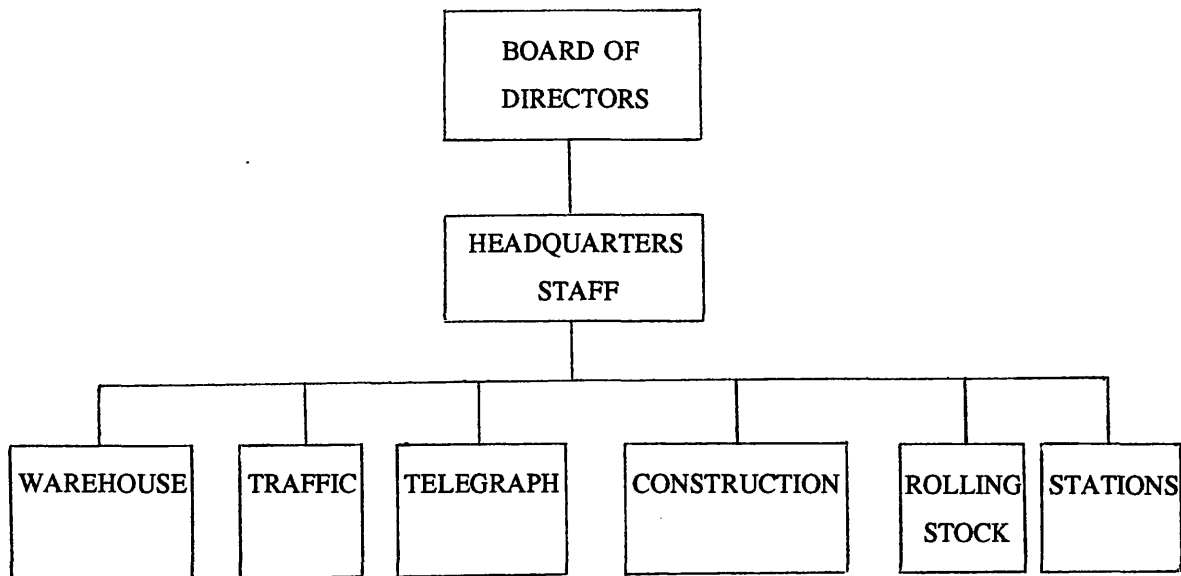
¹⁶⁰ Esteves, op.cit., p.224.

Figure V.1 - Administrative Structure of the Technical Department of the Companhia União e Indústria.



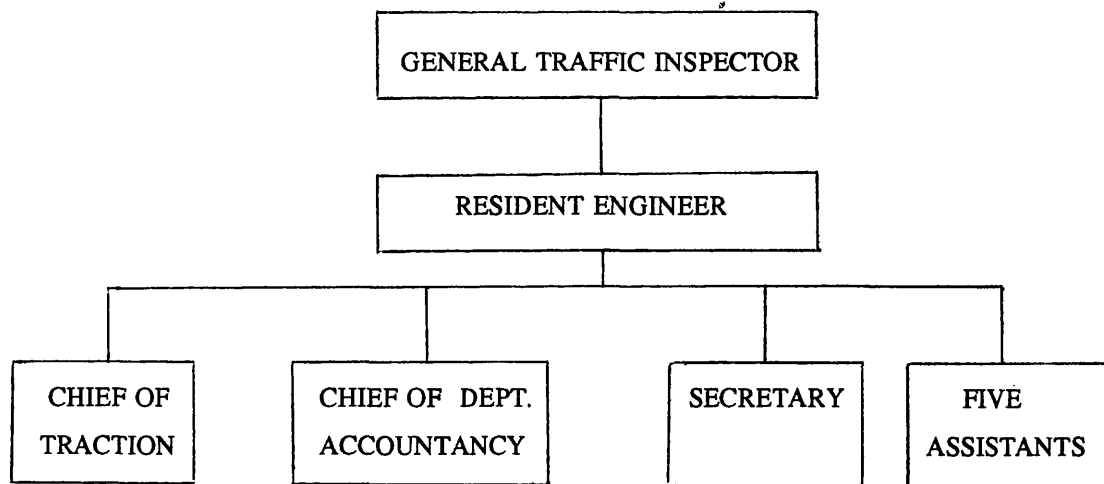
Source: Adapted from A.O. Esteves, "Mariano Procópio", in Revista do Instituto Histórico e Geográfico Brasileiro, (Rio de Janeiro, 1956), Vol.230, p.224.

Figure V.2 - D. Pedro II Railway: Administrative Structure.



Source: Adapted from A.C. El-Kareh, Filha Branca de Mãe Preta: A Companhia de Estrada de Ferro de D. Pedro II, 1855-1865, (Petropolis, 1982), pp.78-9.

Figure V.3 - D. Pedro II Railway: Traffic Department.



Source: Adapted from A.C. El-Kareh, Filha Branca de Mãe Preta: A Companhia de Estrada de Ferro de D. Pedro II, 1855-1865, (Petropolis, 1982), pp.78-9.

at most 2:200\$000 Contos per year¹⁶¹. The existence of a clearly defined administrative structure of the technical body of the EFDPII and the CUI derives from the nature of their operations.

Nevertheless, the structure of the top administration of the CUI indicates that its administrative structure was in an embryonic stage, as a study of the merger of the company and the EFDPII suggests:

"It seemed to me that the administration of so important roads, like the EFDPII and the União e Indústria turnpike, required a larger board of directors than the existing one at the CUI, constituted of only three members,"¹⁶²

And the statute of the CUI states clearly:

"A board of directors constituted of 3 members among the shareholders with more than 50 shares, and a counsel constituted by 5 members among the shareholders with more than 20 shares."¹⁶³

Further evidence of the embryonic nature of the structure of the top management of the company is confirmed in the reports of 1865, 1869, 1870 and 1875. They were all signed by the board of directors, invariably constituted by 3 members: the president, the secretary and the treasurer¹⁶⁴. Finally, it is interesting to point out that the structure of the top administration of the CUI was very similar to that of the textile companies, which were neither complex nor large firms, as seen above. The board of directors of the CCC, for example, was also constituted by three members, who ought to hold at least 50 shares of the company¹⁶⁵.

The mineiro textile industry was no exception in what concerned the lack of complexity of the administrative structure. The textile companies were family affairs, owned by a small number of people and managed exclusively by the founders and their relatives. The CCC, for example, was the result of the merger between the Cedro and the Cachoeira mills, both of them belonging to members of the Mascarenhas family. Although organized as a joint stock company, the CCC was actually family run. As shown in Table V.23, of the 9 founders of the CCC 6 were brothers, one (Luíz Augusto Vianna Barbosa) was brother-in-law¹⁶⁶, and another (Theóphilo Marques Ferreira) was married to a niece of the Mascarenhas brothers¹⁶⁷.

Apart from Antônio Joaquim Barbosa da Silva, who left the company in 1884¹⁶⁸, the group formed

¹⁶¹ El-Kareh, op.cit., pp.78-9.

¹⁶² Esteves, op.cit., p.240.

¹⁶³ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1860), p.14.

¹⁶⁴ Companhia União e Indústria Relatório da Assembléia Geral dos Acionistas, (1865, 1869, 1870, 1875).

¹⁶⁵ Companhia Cedro e Cachoeira, "Estatutos", (Cedro, 1883), pp.7-8.

¹⁶⁶ D.M. Mascarenhas, Genealogia da Família Mascarenhas, 1824-1989, (Belo Horizonte, 1990), p.183.

¹⁶⁷ Mascarenhas, Centenário da Fábrica do Cedro, p.140.

¹⁶⁸ Vaz, op.cit., p.95.

Table V.23 - Companhia Cedro e Cachoeira in 1883: individual share participation, occupation, and family connexion of the founders.

NAME (FAMILY CONNEXION)	OCCUPATION	NUMBER OF SHARES	% OF THE TOTAL
Antônio Cândido Mascarenhas (Brother)	Capitalist	658	13.16
Bernardo Mascarenhas (Brother)	Merchant	658	13.16
Caetano Mascarenhas (Brother)	Farmer	658	13.16
Francisco Mascarenhas (Brother)	Merchant	658	13.16
Pacífico Mascarenhas (Brother)	Doctor	658	13.16
Víctor Mascarenhas (Brother)	Capitalist	658	13.16
Luíz Augusto Vianna Barbosa (Brother-in-law)	Merchant	658	13.16
Theóphilo Marques Ferreira (Married to a Mascarenhas)	Merchant	353	7.06
Antônio J. Barbosa da Silva (No connexion)	Lawyer	41	0.82

Source: Compiled from Mascarenhas, Centenário da Fábrica do Cedro, p.118; D.M. Mascarenhas, Genealogia da Família Mascarenhas, 1824-1989, (Belo Horizonte, 1990), p.183.

by the founders concentrated in their hands the ownership of the company throughout the last century. As shown in Table V.24, although the number of shareholders jumped from 9 in 1883 to 49 in 1890, the founders still held 68% of the total shares of the company. In 1900, the number of shareholders increased to 139 and the remaining 7 founders (Bernardo Mascarenhas died in 1898¹⁶⁹) still possessed 44% of total number of shares.

Table V.24 - Companhia Cedro e Cachoeira, 1883-1900: individual share participation of the nine founders.

YEARS	NUMBER OF SHARES	NUMBER OF SHAREHOLDERS	PERCENTAGE OF THE FOUNDERS
1883	5,000	9	100
1884	5,000	17	94
1885	5,000	17	93
1890	5,500	49	68
1891	7,500	64	65
1895	10,000	118	51
1900	10,000	139	44

Source: Adapted from Vaz, op.cit., p.150.

Nevertheless, these figures still do not tell the whole story about the concentration of the ownership of the CCC in the hands of the Mascarenhas family. The share participation of the family as whole,

¹⁶⁹ Ibid., p.150.

including that of the founders, their brothers and sisters, their parents, and their direct descendants, is shown in Table V.25. In 1883, for example, the family owned 92% of the shares of the company. Family share ownership came to just over 90% in 1884 and 82% in 1888. The share participation of the Mascarenhas family was 62% and 56% in 1893 and 1899 respectively. At the beginning of this century, family ownership was less than 50% but they were still firmly in control.

Table V.25 - Share participation in percentage of the founders of the Companhia Cedro e Cachoeira - their brothers and sisters, parents and their direct descendants, 1883-1902.

SHAREHOLDERS	1883	1884	1888	1893	1899	1902
Antônio Cândido Mascarenhas	13.16	10.00	8.70	8.00	6.85	7.22
Luís Augusto Vianna Barbosa*	13.16	12.66	12.72	-	-	0.05
Víctor Mascarenhas	13.16	12.66	9.96	10.97	10.44	9.21
Pacífico Mascarenhas	13.16	12.40	12.78	8.01	10.50	11.23
Caetano Mascarenhas	13.16	13.16	12.00	10.86	8.54	8.95
Bernardo Mascarenhas	13.16	12.66	10.54	8.22	5.17	-
Francisco Mascarenhas	13.16	12.90	9.12	9.04	5.19	5.34
José Mascarenhas	-	0.60	-	-	-	0.26
Escolástica Mascarenhas	-	-	-	-	0.31	0.37
Francisca Mascarenhas	-	0.60	1.41	1.46	2.02	3.00
Maria Teodora Mascarenhas	-	2.74	2.72	2.76	3.10	4.04
Sebastião Mascarenhas	-	-	0.03	-	-	-
Policena Mascarenhas**	-	-	2.54	2.77	4.27	0.01
Antônio Gonçalves Mascarenhas**	-	0.02	0.01	-	-	-
TOTAL	92.12	90.40	82.53	62.09	56.39	49.68

Source: Adapted from Vaz, *op.cit.*, p.274.

* brother-in-law; ** parents.

Thus, although the CCC was one of the first companies in Minas Gerais to be formally organized as a joint stock company, in reality it was run as a private, family owned affair. One of the consequences of this fact was that throughout the last century the top administration of the company and the managerial posts were filled by members of the Mascarenhas family only. As shown in Table V.26, during the period 1883-1901 all members of the board of directors of the CCC belonged to the Mascarenhas family, either as brothers, brothers-in-law or as nephews, a trend which continued until the 1970s¹⁷⁰.

Appointment of managers reflected the real type of ownership. The requirement for managership was kinship rather than merit or expertise. As Vaz pointed out, at the CCC the appointment of managers represented more the compromise to maintain the equilibrium between the main branches of shareholders than anything else¹⁷¹. As shown in Table V.26, all the general managers of the CCC, during the period 1883-1901, belonged to the Mascarenhas family. Bernardo Mascarenhas was the first general manager of the company, from 1883 to 1887. He was replaced by Theóphilo Marques Ferreira in 1888. His successor in

¹⁷⁰ Mascarenhas, *Centenário da Fábrica do Cedro*, p.245-7.

¹⁷¹ Vaz, *op.cit.*, p.151.

the managership was Francisco de Paula Mascarenhas, who was succeeded by Aristides José Mascarenhas, a nephew of the original group of shareholders, for the remainder of the period¹⁷².

Table V.26 - List of the members of the board of directors and general managers of the Companhia Cedro e Cachoeira, 1883-1901.

PERIOD	MEMBERS OF THE BOARD	PERIOD	GENERAL MANAGER
1883	Antônio Cândido Mascarenhas	1883	Bernardo Mascarenhas
to	Bernardo Mascarenhas	to	
1888	Pacífico Mascarenhas	1887	
1888	Antônio Cândido Mascarenhas	1887	Theóphilo Marques Ferreira
to	Pacífico Mascarenhas		
1889	Theóphilo Marques Ferreira		
1889	Antônio Cândido Mascarenhas	to	
to	Pacífico Mascarenhas		
1892	Aristides José Mascarenhas		
	Antônio Diniz Mascarenhas	1893	
1892	Antônio Cândido Mascarenhas	1893	Francisco de Paula Mascarenhas
to	Aristides Mascarenhas	to	
1895	Antônio Diniz Mascarenhas	1895	
1895	Antônio Cândido Mascarenhas	1895	Aristides José Mascarenhas
to	Aristides José Mascarenhas		
1899	Viriato Diniz Mascarenhas		
	Caetano Mascarenhas	to	
1899	Aristides José Mascarenhas		
to	Viriato Diniz Mascarenhas		
1901	Caetano Mascarenhas	1901	

Source: Mascarenhas, *Centenário da Fábrica do Cedro*, p.245-7.

The same phenomenon can be observed for the remaining of the managerial posts at the CCC. As shown in Table V.27, the Cedro mill was managed by Bernardo Mascarenhas, Theóphilo Marques Ferreira, Francisco de Paula Mascarenhas, and Aristides José Mascarenhas. The Cachoeira mill had only two managers during the century: Francisco de Paula Mascarenhas and Dario Diniz Mascarenhas, another nephew of the original shareholders. Finally, the São Vicente mill was managed by Caetano Mascarenhas, Francisco de Paula Mascarenhas, and Francisco Bahia da Rocha, who was married to a niece of the original shareholders¹⁷³.

During the nineteenth-century shareholders, directors, managers, and relatives were synonyms at the CCC. Although the company was formally established as a joint stock company, ownership and managership never reflected that. On the contrary, ownership of the company was always safely in the hands of the founders and all managerial positions were filled by members of the Mascarenhas family, without exception.

The scope of the activities performed by managers reflects the stage of organizational development of the CCC and gives further evidence about the complexity of the business environment in Minas Gerais

¹⁷² Mascarenhas, *Centenário da Fábrica do Cedro*, pp.245-6.

¹⁷³ Mascarenhas, *Genealogia da Família Mascarenhas*, p.205.

Table V.27 - Companhia Cedro e Cachoeira, 1883-1899: List of factory managers.

MILLS/ YEARS	CEDRO	CACHOEIRA	S. VICENTE
1883	Bernardo Mascarenhas	Francisco de P. Mascarenhas	
1887	Theóphilo Marques Ferreira		
1891			Caetano Mascarenhas
1892		Dario Diniz Mascarenhas	Francisco de P. Mascarenhas
1893	Francisco de P. Mascarenhas		
1894			Francisco Bahia da Rocha
1895	Aristides José Mascarenhas		
1899			Caetano Mascarenhas

Source: Mascarenhas, *Centenário da Fábrica do Cedro*, pp.247-8.

in the last century. As in the iron sector, managers were involved in every aspect of the life of the company, from long-term investment decisions to daily operations. They concentrated in their hands all managerial tasks, as shown in the following letter:

"There are so many things to be done that I do not know what to do first: if I check the loads, control the services, supervise, build, answer the correspondence, etc., etc., because I have only two assistants - Satyro and Américo - who cannot abandon the work which comes from different sources."¹⁷⁴

Therefore, there was no trace of any departmentalization nor specialization of any sort. Managers, assisted by one or two persons, were responsible for several tasks - like marketing, industrial relations, finance, production, and even legal affairs - which in modern firms are the subject of specific departments. In 1884, for example, Francisco Mascarenhas, then manager of the Cachoeira mill, established the conditions of sales of the output of the mill, as shown in his letter to Bernardo Mascarenhas:

"I am also sending you letters from which you can see that Mr. Assis has guaranteed 90 days term for small customers. It would be a good idea if you write asking him not to guarantee orders [on these terms], because what is produced here it is not enough to sell by cash at the mill; he can say that here in the mill it is sold only by cash."¹⁷⁵

Francisco also administered sales made in markets closer to the mill:

"The beautiful striped cloth that you have sent me were very much appreciated in Diamantina, to such an extent that there was not enough for everybody. It would be a good idea to send me some more whenever you have the opportunity to."¹⁷⁶

¹⁷⁴ Letter from Dario Diniz Mascarenhas to Theóphilo Marques Ferreira, 17 July 1892, reproduced in Giroletti, *op.cit.*, p.223.

¹⁷⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 16 June 1884".

¹⁷⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 20 May 1885".

Furthermore, it is possible to find the manager of the Cachoeira mill in 1895 - Dario Diniz Mascarenhas - administering the accounts of customers, as he reported to the general manager, Francisco Mascarenhas:

"Among the customers overdue by the time of the balance, I have sent statements to some of them requiring the payment of the following amounts: (...)"¹⁷⁷

Each mill manager was also responsible for the management of his workforce. Francisco Mascarenhas directly recruited and hired workers while he was at the Cachoeira mill. In June 1884, Francisco wrote to his brother Bernardo, saying that he could not find anybody who could write well and correctly and who could count regularly. Thus, he decided to look elsewhere¹⁷⁸. In the same year, he wrote again to Bernardo complaining that it was hard to obtain workers, since it was the time of clearing the land¹⁷⁹. In another occasion, Francisco explained to his brother his industrial relations policy:

"It does not matter how hard you try, the result will always be the same: more people will not come. The better way to hold people was studied by me and applied since the beginning - if one works from 30 to 40 days, he will earn 660, from 50 to 60 days, 680, and from 85 to 90 days, 700. The rewards will be paid for the day worked, when the job is finished. In this way, I have managed to hold a great number of people whose interest in the rewards have kept them here until the end."¹⁸⁰

Furthermore, as shown in the following letter, Francisco Mascarenhas was also responsible for controlling the workforce:

"Do not settle up with Smith, because it is necessary to deduct the three days wages during which he was ill. I must pay for the days spent on the round trip, but illness, no.

I also include the receipt of the money he took here, which I charged to the headquarters."¹⁸¹

As already mentioned, each mill manager was responsible for the finance of his mill. Francisco Mascarenhas once again gives a good example of that. In January 1885, he wrote to Bernardo reporting that the balance sheet of the Cachoeira mill was ready showing a result of 68:757\$391 Contos¹⁸². In 1895, Dario Diniz Mascarenhas reported to Francisco Mascarenhas that:

"It seems that the balance sheet was done correctly, but as I cannot rely on my expertise

¹⁷⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.41", "Letter from Dario Diniz Mascarenhas to Francisco de Paula Mascarenhas, 7 February 1885".

¹⁷⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 16 June 1884".

¹⁷⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 15 September 1884".

¹⁸⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 13 June 1884".

¹⁸¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Theóphilo Marques Ferreira, 2 September 1884".

¹⁸² Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 14 January 1885".

on this matter, I ask you to take a look at it and make all the necessary corrections until the 1st of January to avoid further changes in the balance sheet."¹⁸³

Dario's letter also indicates lack of professional skills. In 1899, Caetano Mascarenhas, then the manager of the São Vicente mill, gave the following account of the finance of the mill:

"Today I have debited the headquarters 12:278\$880 Contos, the amount of 52 bundles of several different cloths, according to the invoice enclosed, (...)"¹⁸⁴

Mill managers were also deeply involved in minute and different aspects of the production. From raw material supply to sources of energy. On two different occasions in 1885, Francisco Mascarenhas wrote about the problem concerning the cotton supply of the Cachoeira mill. In February of that year, he complained about increasing raw cotton prices due to the activities of speculators. Two months later, he signed a contract to supply the mill¹⁸⁵. In 1900, Caetano Mascarenhas, then manager at São Vicente, also looked for a supply of raw cotton:

"The mill was brought to a halt due to the lack of cotton. Whenever you have information about any delivery would you please inform Mr. João N. de Moura and I as soon as possible."¹⁸⁶

The maintenance of the machinery was another concern of mill managers, as Dario Diniz Mascarenhas in 1904 informed Caetano Mascarenhas:

"New looms - at the beginning the machinery worked with locally manufactured belts, but these often broke. New belts were then ordered from England. These also broke but not so often, probably due to their greater width. Hence, I am now ordering wider English belts."¹⁸⁷

A recurrent problem throughout the nineteenth century was the question of power for the mills. The supply of water was very irregular and steam also had its own problems. Thus, managers were always busy trying to resolve the problem of energy, as Francisco Mascarenhas wrote in 1885:

"Thirty looms and two spinning machines are regularly driven by steam. The ginning machine is also steam powered. But in order to obtain a sufficient head of steam to drive

¹⁸³ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.41", "Letter from Dario Diniz Mascarenhas to Francisco de Paula Mascarenhas, 7 February 1895".

¹⁸⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas - No.149", "Letter from Caetano Mascarenhas to Aristides José Mascarenhas, 30 September 1899".

¹⁸⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.17", "Letters from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 24 February 1885 and 25 April 1885".

¹⁸⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from caetano Mascarenhas to José J. Fernandes Ramos, 23 March 1900".

¹⁸⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Dario Diniz Mascarenhas to Caetano Mascarenhas, 16 January 1904".

all machines it is necessary to stop the equipment three or four times a day."¹⁸⁸

Finally, mill managers also dealt with legal affairs whenever the situation required. In 1885, for example, Francisco asks Bernardo for a letter of attorney in order to:

"Defend the rights of the CCC in the civil and criminal court of justice in Curvello. People are destroying our woods and I can do nothing to prevent it."¹⁸⁹

This analysis of the administrative structure of the CCC shows that there was little trace of any sort of departmentalization or specialization, an organizational process already under way in firms in the most developed countries at that time. Mill managers performed a wide range of tasks, such as the management of marketing, industrial relations, finance, and production. In other words, management reflected the degree of development and complexity of the business context.

Nevertheless, as a result of the fact that the CCC was a multi-site company, an embryonic administrative structure can be identified with at least 2 layers of managers: the general manager and the managers of the mills. The latter reported to the general manager, who by his turn reported to the board of directors, although he usually was one of the members of the board. Furthermore, the general manager also served as the manager of the Cedro mill. Bernardo Mascarenhas was general manager of the company and manager of the Cedro mill from 1883 to 1887. Theóphilo Marques Ferreira succeeded Bernardo as both general manager and manager of the Cedro mill from 1887 to 1893. From 1893 to 1895, Francisco de Paula Mascarenhas succeeded Ferreira in both posts, as did Aristides José Mascarenhas from 1895 to 1901¹⁹⁰. Hence, this accumulation of posts is another clear indication that the business environment in the nineteenth century was not very complex even for one of the largest textile companies in Minas Gerais.

The CCM was also constituted as a joint stock company. The company was founded by João da Matta Teixeira, who subscribed 79% of the initial capital. João da Matta Teixeira was elected director of the company in 1886 and held the position until 1923, when he died. His son, Américo Teixeira Guimarães, was the only general manager of the company throughout the last century, following his election on 15 July 1887¹⁹¹. It was Américo Teixeira Guimarães who actually managed the company from its inception. He chose, ordered, and supervised the installation of machinery of the mill¹⁹². He managed every aspect of the life of the company. From the purchase of raw material:

"I have to inform you that I have decided to re-establish the price of cotton, due to the

¹⁸⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 13 June 1884".

¹⁸⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 14 April 1885".

¹⁹⁰ Mascarenhas, Centenário da Fábrica do Cedro, pp.245-7.

¹⁹¹ Companhia Cachoeira de Macacos, Evolução da Cia. Têxtil Cachoeira de Macacos, 1886-1967, mimeographed notes distributed by the company.

¹⁹² Freitas, op.cit., p.27.

necessity that this company has to make a larger provision for this year, (...)”¹⁹³

To the relation with other companies:

“I am aware that you have taken the general managership of the company, (...).

In what concerns the relation between our companies, I have to tell you that I will not spare any effort to the mutual progress, interest and assistance of both companies, (...)”¹⁹⁴

Table V.28 - Companhia de Tecidos Santanense: share participation of the founders and their relatives.

NAMES	NUMBER OF SHARES
Manoel José de Souza Moreira	600
Manoel Gonçalves de Souza Moreira	400
Augusto Gonçalves de Souza Moreira	150
Antônio Pereira de Matos	150
Members of the family Gonçalves de Souza Moreira*	515
Total number of shares	3,000

Source: M.A.G. Souza, *História de Itaúna*, (Belo Horizonte, 1986), I, pp.124-6.

* The identified relatives of the four founders of the company are: Orozimbo Gonçalves de Souza, 100 shares; Arthur Pereira de Matos, 20 shares; Vicente Gonçalves de Souza, 150 shares; Josias Gonçalves de Souza, 20 shares; Francisco Gonçalves de Souza Junior, 5 shares; Mardocheu Gonçalves de Souza, 5 shares; Virgílio Gonçalves de Souza Moreira, 10 shares; Francisco Gonçalves de Souza, 200 shares; and Jovino Gonçalves de Souza, 5 shares.

The Companhia de Tecidos Santanense (CTS) followed the same pattern of administrative structure observed in both the CCC and the CCM. The CTS was typically a family affair, although again established as a joint stock company. The company was founded on 23 October 1891 by members of the Souza Moreira family: Manoel José de Souza Moreira, his sons, Manoel Gonçalves de Souza Moreira and Augusto Gonçalves de Souza Moreira, and his son-in-law, Antônio Pereira de Mattos¹⁹⁵. Together they held 43% of the shares of the company. Furthermore, among the original shareholders, the relatives of the founders held another 17% of the shares, as shown in Table V.28.

Further evidence that the CTS was a family affair is provided by the fact that the company was not only owned but also administered by members of the Souza Moreira family. According to the statutes, the company was to be administered by the board of directors, whose members were elected every 4 years by the general meeting of the shareholders. Furthermore, each member of the board ought to hold at least 50 shares of the company¹⁹⁶. In practical terms, this meant that only a small group of people were eligible for the board. Among the 56 shareholders of the company in 1895, for example, only 15 held at least 50 shares.

¹⁹³ Companhia Cedro e Cachoeira, “Caixa de Correspondências Recebidas No.26”, “Letter from Américo Teixeira Guimarães to Theóphilo Marques Ferreira, 2 May 1889”.

¹⁹⁴ Companhia Cedro e Cachoeira, “Caixa de Correspondências Recebidas No.36”, “Letter from Américo Teixeira Guimarães to Francisco de Paula Mascarenhas, 27 August 1893”.

¹⁹⁵ M.A.G. Souza, *História de Itaúna*, (Belo Horizonte, 1986), I, p.124.

¹⁹⁶ Companhia de Tecidos Santanense, *Estatutos*, (1891).

Moreover, 10 of the 15 shareholders with at least 50 shares in 1895 belonged to the Souza Moreira family¹⁹⁷. Therefore, throughout the century, the posts in the board of directors were filled by members of the Souza Moreira family, as indicated in Table V.29.

Table V.29 - Members of the board of directors of the Companhia de Tecidos Santanense, 1891-1899.

YEAR (Month)	NAME	POST
1891 (Sept.)	Manoel José de Souza Moreira	Chairman
	Manoel Gonçalves de Souza Moreira	Treasurer
	Augusto Gonçalves de Souza Moreira	Secretary
	Antônio Pereira de Mattos	Manager
1891 (Dec.)	José Gonçalves de Souza	Chairman
	Manoel Gonçalves de Souza Moreira	Treasurer
1893	Manoel José de Souza Moreira	Chairman
	Manoel Gonçalves de Souza Moreira	Treasurer
1894	Augusto Gonçalves de Souza Moreira	Chairman
	Manoel José de Souza Moreira	Treasurer
1899	José Gonçalves de Souza Moreira	Chairman
	Manoel Gonçalves de Souza Moreira	Treasurer

Sources: Compiled from Souza, *op.cit.*, pp.124-6; Companhia de Tecidos Santanense, *Ata da Primeira Assembléia Geral Extraordinária dos Acionistas*, (Itaúna, 19 December 1891); Companhia de Tecidos Santanense, *Ata da Assembléia Ordinária dos Acionistas*, (1893, 1894, 1899).

Appointment of managers also reflected the control of the Souza Moreira family over the company. The first manager was Antônio Pereira de Mattos, one of the founders of the company, Manoel José de Souza Moreira's son-in-law, and member of the board of directors in 1891. He was succeeded by Manoel Gonçalves de Souza Moreira, Manoel José de Souza Moreira, and finally by João Cerqueira de Lima, who was also Manoel José de Souza Moreira's son-in-law¹⁹⁸ and shareholder of the company¹⁹⁹.

The CME, conceived and organized by Bernardo Mascarenhas, was also a family-owned and local affair. According to Mascarenhas, the CME was organized with a capital of 150:000\$000 Contos divided into 1,500 shares: 500 shares he kept for himself, 500 were offered to the inhabitants of Juiz de Fora and

¹⁹⁷ The 15 shareholders holding at least 50 shares on 31 December 1895 were: Manoel José de Souza Moreira (670), Manoel Gonçalves de Souza Moreira (385), José Gonçalves de Souza Moreira (240), Francisco Gonçalves de Souza (210), Augusto Gonçalves de Souza Moreira (150), Vicente Gonçalves de Souza (150), Antônio Pereira de Mattos (150), Francisco Baeta Coelho (100), Antônio Maximiano de Campos (50), José Gonçalves de Souza (50), João Gonçalves de Souza (50), Francisco Manoel Franco (50), Francisco Bahia da Rocha (50), Rogério Candido de Andrade (50), and Thomaz Antônio d'Andrade (50). Companhia de Tecidos Santanense, *Lista Nominativa dos Acionistas da Companhia*, (1895), reproduced in J.W.T. Mello, *Santanense: Revolução Filosófica e Industrial em Sanct'Anna do São João Acima*, (Belo Horizonte, 1991), pp.252-3.

¹⁹⁸ *Ibid.*, pp.228-9.

¹⁹⁹ Companhia de Tecidos Santanense, *Ata da Assembléia Geral Ordinária dos Acionistas*, (24 March 1899).

500 were distributed within his family²⁰⁰. Although the firm was founded on 7 January 1888 as a joint stock company, Mascarenhas and his family concentrated ownership of the company in their hands until 1911, when a group of capitalists bought the company²⁰¹. Among the 30 original shareholders, 12 belonged to the Mascarenhas family²⁰² and together they held 833 of the total 1,500 shares, or 56%. Bernardo Mascarenhas himself held nearly 27% of the shares of the company²⁰³.

Even though the company pioneered the production of hydroelectricity in South America and could be considered modern in some aspects, the structure of the top administration of the company followed the traditional pattern used in nineteenth-century Minas Gerais. The board of directors consisted of only 3 members: the chairman, the secretary, and the treasurer. Furthermore, throughout the last century, all these positions were filled by shareholders. The board elected in 1888 consisted of Bernardo Mascarenhas, as chairman, Francisco Baptista de Oliveira, as secretary, and Francisco Eugênio de Rezende, as treasurer²⁰⁴. Francisco Baptista de Oliveira and Francisco Eugênio de Rezende were both among the largest shareholders, holding 5% and 6% of the shares of the company respectively²⁰⁵. The only changes in the board during the last century occurred in 1897, when Francisco Baptista de Oliveira resigned, and in the following year, when Bernardo Mascarenhas died. Francisco Eugênio de Rezende covered the position previously held by Francisco Baptista de Oliveira until the next election for the board in 1900. Bernardo Mascarenhas was succeeded by Azarias Monteiro de Andrade, who was also one of the original shareholders and two years later became Mascarenhas' son-in-law²⁰⁶.

Furthermore, Bernardo Mascarenhas himself was involved in every aspect of the life of the company. He, for example, drew up the specifications for the equipment to be ordered²⁰⁷ and personally supervised the assembly of the plant, as shown in his letter to the WEC:

"You may have an idea of my anxiety and fear of disappointment. I do not think that Mr. Merriman [the technician sent by the WEC to install the equipment] has enough

²⁰⁰ Letter from Bernardo Mascarenhas reproduced in Mascarenhas, Bernardo Mascarenhas, p.118.

²⁰¹ Oliveira, Companhia Mineira de Eletricidade, p.48.

²⁰² The members of the Mascarenhas family and the number of shares that each one held were: Bernardo Mascarenhas (400), Policena da Silva Mascarenhas (100), Francisco Mascarenhas (78), Vitor Mascarenhas (50), Caetano Mascarenhas (50), Viriato Diniz Mascarenhas (35), Theóphilo Marques Ferreira (30), Elvira Diniz Mascarenhas (25), Pacífico Mascarenhas (20), Antônio Diniz Mascarenhas (20), Altivo Diniz Mascarenhas (15), and Antônio Augusto Mascarenhas (10). *Ibid.*, p.27.

²⁰³ *Ibid.*, p.27.

²⁰⁴ Companhia Mineira de Eletricidade, Estatutos, (1888), reproduced in O Pharol, (Juiz de Fora), 15 January 1888.

²⁰⁵ Oliveira, Companhia Mineira de Eletricidade, p.27.

²⁰⁶ *Ibid.*, p.41.

²⁰⁷ Mascarenhas, Bernardo Mascarenhas, p.134.

knowledge, and he himself told me that he did not have any practical experience in alternative installations, but only in Edison's system. Today we are going to restart our experiment but I do not have too much faith in it."²⁰⁸

Thus, during the nineteenth century, the CME was owned by a small number of people, mainly local and members of the Mascarenhas family. Furthermore, at least at the beginning, the main shareholders of the company were deeply involved in its day-to-day management. However, apart from the board of directors, there is no information about the administrative structure of the company.

Although there is no detailed information about the ownership of the CFLCL, there is evidence that the company was owned by a small number of people, who also controlled its administration. Although the CFLCL was established in the twentieth century, the structure of its top administration was similar to that of companies established in nineteenth-century Minas Gerais. The company was founded by José Monteiro Ribeiro Junqueira, Norberto Custódio Ferreira, and João Duarte Ferreira, who were also the directors of the company from its inception in 1905. José Monteiro Ribeiro Junqueira was the chairman, Norberto Custódio Ferreira the treasurer, and João Duarte Ferreira the secretary²⁰⁹. The latter was the main shareholder of the company²¹⁰, and in 1909 he resigned²¹¹ to dedicate to his political career²¹². Further evidence that ownership and control of the company continued firmly on the hands of the founders and their families, is the fact that in 1982 the chairman of the company was Ivan Botelho, José Monteiro Ribeiro Junqueira's grand-nephew²¹³.

The administrative structure of the CFLCL was composed of the headquarters, the power-station, 5 local offices, and the distribution department, as shown on Figure V.4. The headquarters was headed by a manager, who reported to the board of directors. In January 1910, for example, the board of directors determined:

"the manager [of the company] to make all the modifications in the public lighting of Cataguazes, according to the determinations of the president of the city council, Mr. João Duarte Ferreira, (...)"²¹⁴

Moreover, on 9 June 1910 the board of directors authorized the manager to increase the salaries of the employees in 10%²¹⁵. The manager was assisted by an engineer, a bookkeeper, and senior and junior

²⁰⁸ Letter from Bernardo Mascarenhas to the Westinghouse Electric M. Company, reproduced in *Ibid.*, p.141.

²⁰⁹ Companhia Força e Luz Cataguazes-Leopoldina, "Ata da 1a. Reunião da Diretoria", (1905).

²¹⁰ L.S. Costa, Cataguases Centenária: Dados para a sua História, (Cataguases, 1977), p.541.

²¹¹ Companhia Força e Luz Cataguazes-Leopoldina, "Ata da 25a. Reunião da Diretoria", (1909).

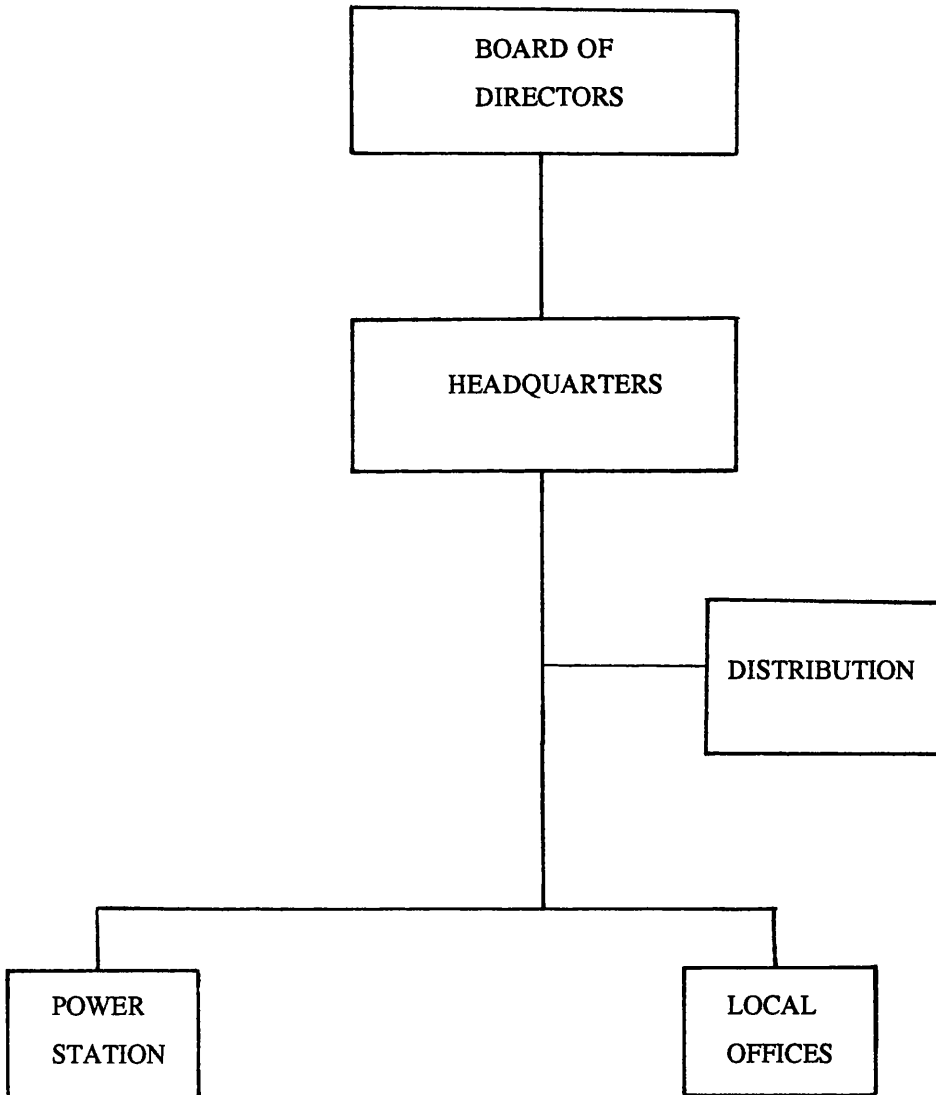
²¹² Costa, op.cit., p.542.

²¹³ Neto, op.cit.

²¹⁴ Companhia Força e Luz Cataguazes-Leopoldina, "Ata da 27a. Reunião da Diretoria", (1910).

²¹⁵ Companhia Força e Luz Cataguazes-Leopoldina, "Ata da 29a. Reunião da Diretoria", (1910).

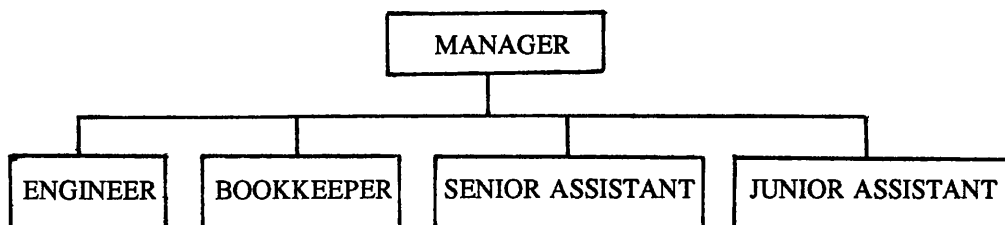
Figure V.4 - Companhia Força e Luz Cataguazes-Leopoldina: Administrative Structure.



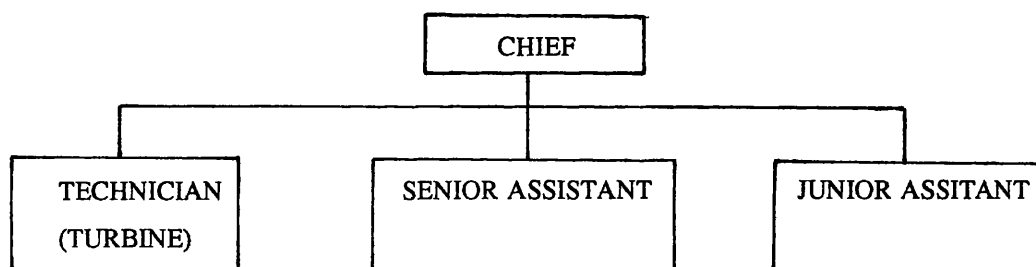
Source: Adapted from Companhia Força e Luz Cataguazes-Leopoldina, "Relatório do Gerente", (1910), p.9.

Figure V.5 - Companhia Força e Luz Cataguazes-Leopoldina: Administrative Structure of Headquarters, Power Station, and Local Offices.

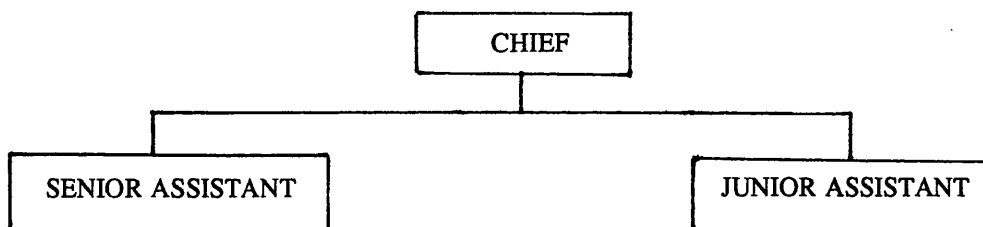
HEADQUARTERS



POWER STATION



LOCAL OFFICES



Source: Adapted from Companhia Força e Luz Cataguazes-Leopoldina, "Relatório do Gerente", (1910), p.9.

assistants, as shown on Figure V.5. The manager and the engineer earned 550\$000 Milreis per month, the bookkeeper 250\$000 Milreis, and the assistants 90\$000 and 40\$000 Milreis per month respectively. The power-station was headed by a manager, who earned 400\$000 Milreis per month, assisted by a technician in charge of the turbines, 3 senior and a junior assistants, who earned 150\$000, 90\$000, and 60\$000 Milreis per month respectively. The local offices in each one of the 5 towns supplied by the company in 1910 (Cataguazes, Leopoldina, São João Nepomuceno, Rio Novo, and Providencia) were headed by a manager who was aided by a senior and a junior assistant. The salaries of the managers of the local offices varied from 130\$000 to 150\$000 Milreis, and that of their assistants from 50\$000 to 110\$000 Milreis per month. Furthermore, there were 3 workers in charge of the cables of transmission, each earning 70\$000 Milreis per month²¹⁶.

The analysis of the CFLCL has revealed that the company was controlled by a small number of people. Although the structure of the top administration was similar to the pattern adopted by most mineiro firms in the nineteenth century, the company had a fairly developed administrative structure with at least 2 layers of managers. As in the case of the CUI, this seems to be related with the nature of the industry rather than with the complexity of the company per se.

Thus, in the last century the mineiro iron industry was owned by a small number of people, usually drawn from one family. Foundries were managed by their owners, irrespectively of their size, without the assistance of any kind of administrative staff. In addition, the foundries rarely constituted the sole occupation of owners and workers.

Although ownership of the CUI was not restricted to a small number of people, control over the company was in the hands of a small number of shareholders. Furthermore, the company employed a wide range of professionals and workers, organized in an extensive administrative structure. In such administrative structure it is possible to identify a layer of managers who operated the several stations along the turnpike and a technical body organized in a hierarchical basis. However, this somewhat more complex administrative structure is due to the nature of the business rather than to the peculiar complexity of the company itself. Because transport companies were physically different - with workers spread around several distinct locations - when compared, for example, with textile mills and iron foundries - which usually employed all workers on a single site -, a different and more complex structure had to be devised. Therefore, structural differences were industry specific and not due to different managerial approaches. This is evidenced by the structure of the top administration of the CUI, which was very similar to that of the textile mills.

The administrative structure of some of the largest textile firms shows that they were invariably family affairs, even though organized as joint stock companies. The board and managerial positions were filled by members of the controlling families in a clear indication that kinship was one of the basic requirements for appointment. The most extensive administrative structure consisted of no more than two layers of managers. Managers were responsible for a wide range of activities, from short to long-term

²¹⁶ Companhia Força e Luz Cataguazes-Leopoldina, "Relatório do Gerente", (1910), p.9.

decisions - further evidence of the lack of complexity of the business life.

Finally, the electricity generating companies were also owned by a small number of people, usually locals. Due to the nature of the industry, these companies had a more developed administrative structure of their technical bodies. Nevertheless, administrative personnel was very limited in number and the structure of the top administration, which did not differ from that of the other industries examined in this thesis, reflected the embryonic stage of their organizational structure.

Conclusion

This section examined the organization of mineiro firms in the nineteenth century by analysing the scope of their activities, measured in terms of the size of the firms and of the structure of their markets, and of their administrative organization. The analysis of the scope of the activities shows that, generally speaking, they were traditional business enterprises. They were small, single-unit firms, carrying on only one economic function, producing a limited range of products, and restricted to local markets. Furthermore, most of them applied traditional methods and sources of energy - such as wood, wind and water, man and beast - in the production and distribution of daily output.

The iron industry, in the first three-quarters of the last century, was dominated by a large number of small foundries employing a very simple and primitive technology which imposed a strict limit on the scale of production. In the latter part of the century, a few larger mills emerged employing a more complex technology, although the scale of production remained small. The size of the work-force was also small, with very few foundries employing more than 20 people in the first three-quarters of the nineteenth century. Furthermore, they operated on a regional basis supplying mining companies, farms, and local towns. The mineiro iron industry manufactured parts for mining machinery, agricultural tools, domestic appliances, and horseshoes. Nevertheless, individual firms produced only a narrow range of products. The distribution of the output was made by a large number of small generalist merchants spread across the province and by muletrains.

The CUI was certainly an exception in some respects. From the point of view of the length of the roads built and operated, the company was certainly a large business. The size of its work-force also points to a large enterprise. Nevertheless, in terms of the scale of the operation, measured in terms of freight and passenger transport, the company could hardly be considered large. Furthermore, the company operated on a local basis, being limited to the market consisted of the Paraíba Valley in the province of Rio de Janeiro and the Mata zone in Minas Gerais, and highly dependent on the transport of only one product - coffee.

The mineiro textile industry was made up of small and medium size firms, rarely operating more than one unit. Their scale of production was very limited compared with that of the largest Brazilian textile firms. In terms of the size of the work-force, although the mineiro firms proved to be much more labour-intensive than their Brazilian counterparts, their work-force tended to be smaller in absolute terms. They were restricted to local markets and to the less sophisticated niche of the market. Their output was distributed by muletrains and travelling salesmen, although in the last decade of the century the CCC resorted to the opening of warehouses across the province.

Finally, although the electricity generating companies established at turn of the century provided technologically advanced services (the generation of hydroelectricity and, in the case of the CME the provision of telephone services), they also could hardly be considered large firms. They fulfilled only one economic function, they were small both in terms of the scale of their operation and in terms of the size of their capital, and were restricted to small and local markets.

Furthermore, the analysis of the administrative structure of the mineiro firms has shown that, in this

respect, they were even more traditional and less complex than the analysis of the scope of their activities may have suggested. They were usually owned by a small number of people, managed by their owners, and very often they had no administrative structure whatsoever. Iron companies were rarely owned by more than a handful of people. They were managed by their owners, irrespectively of their size, without the assistance of any kind of administrative structure. Although the ownership of the CUI was not restricted to a small number of persons, control was in the hands of a small number of shareholders. The company's administrative structure consisted of a few layers of managers and a technical body organized in a hierarchical basis. Nevertheless, the top administration was very small, in a clear indication that the CUI was still in an embryonic stage of administrative development. Textile firms were invariably family affairs, even though organized as joint stock companies. The board of directors and the managerial positions were filled by the members of the controlling families in a clear indication that appointment was based on kinship rather than expertise. The most extensive administrative structure consisted of no more than two layers of managers. Managers responsibilities included a wide range activities, in a further evidence of no departmentalization or specialization of any sort. The electricity generating companies were also owned by a small number of people, mainly locals. Although these companies had a clear administrative structure of their technical bodies, organized on a hierarchical basis, with a few layers of managers, the main shareholders had a tight control of the daily life of these companies and the structure of the top administration once more revealed the embryonic stage of the organizational development of these firms.

Finally, the organizational analysis of mineiro firms reveals that towards the end of the century, firms tended to become more and more bureaucratic, as they grew in size or were replaced by larger firms. Nevertheless, the mineiro economy continued to be dominated by traditional firms which became more numerous and specialized towards the end of the century. This is the phenomena which preceded the emergence of the large and modern business enterprises and of the managerial capitalism in the USA, Great Britain, and Germany. Therefore, it is reasonable to conclude that, from the organizational point of view, the business environment in nineteenth-century Minas Gerais was characteristic of the first stage of the capitalist development - the traditional and personal capitalism.

PART III - TECHNOLOGY

Introduction

The prime influence behind the more or less rapid rates of economic growth of the Western European economies during the last two hundred years has been technological progress¹. Technological progress is a necessary element of economic development. Capital goods, the means of production in which much of technology has been embodied, have enormously increased productivity. In the absence of technological progress, the process of growth by capital accumulation and division of labour as proposed by Adam Smith would eventually encounter diminishing returns. The process of economic development is not only a matter of the increase of capital goods of the same type². As Schumpeter has pointed out, economic development consists primarily in the employment of different resources in a different way, in doing different things with them. Different methods of employment of economic resources, and not savings and the increase in the availability of labour, has changed the face of the world³.

Thus, the first chapter of this section reviews the literature on technological progress. It examines the nature of technical change and the importance of technological progress for the process of economic development of less developed countries such as Brazil. As production of technical knowledge has been mainly restricted to the so-called developed countries, less developed regions such as Brazil have depended heavily on borrowed technology to promote economic development. As the historical experience of less developed European countries has shown, the absence of a store of technical knowledge in backward countries was solved by its import from abroad. Developed countries served in this case as sources of technical assistance, skilled labour, and capital goods at the "disposal" of less developed countries⁴. Therefore, the second chapter of this section examines the process of the transfer of technology in nineteenth-century Minas Gerais. It discusses the dependence of various firms on foreign technical knowledge and the limits to the development of an indigenous technology during this period. It also discusses how mineiro entrepreneurs managed to absorb these technologies, from selection to operation, adaptation, and modification. The importance of this investigation for the study of the mineiro business environment arises from the fact that over the years one of the key indicators of the formation of a positive business environment is the capacity of an economy to absorb and refine imported technology.

¹ P. O'Brien, 'The Mainsprings of Technological Progress in Europe, 1750-1850', in Innovation and Technology in Europe: From the Eighteenth Century to the Present Day, eds. P. Mathias and J.A. Davis, (Oxford, 1991), p.6.

² J.L. Anderson, Explaining Long-Term Economic Change, (1991), p.41.

³ J.A. Schumpeter, A Teoria do Desenvolvimento Econômico, (São Paulo, 3rd.ed. 1988), p.50.

⁴ A. Gerschenkron, Economic Backwardness in Historical Perspective: A Book of Essays, (1962), pp.47, 127.

Chapter 6 - A BRIEF REVIEW OF THE TECHNOLOGICAL PROGRESS

LITERATURE

Technological progress may be defined as changes in the ways of doing things - of manufacturing goods, of organizing production and distribution, of transporting goods and people, and of providing services to consumers. It consists of the introduction of new machines, products and systems⁵. There are basically two views about the nature of technological progress. Rather than being contradictory, these views are complementary. The first, represented chiefly by Schumpeter, stresses discontinuity. Technological progress is seen as a series of major "breakthroughs" which have a great impact upon the pace and direction of economic development. The second view emphasizes the continuous, cumulative and piecemeal nature of technological progress. There are small sequential steps spread over long periods of time before full technological potential is achieved. The process is one of "learning by doing" and "learning by using"⁶.

Moreover, three different stages can be identified in the process of technological progress: invention, innovation, and diffusion or adoption. Invention may be defined as conceiving an idea for some change and demonstrating its feasibility. Innovation is the incorporation of an invention into the production process⁷. Innovation is closely linked to the inventive process and constitutes the beginning of the diffusion process. The diffusion process is dependent upon a series of improvements in the performance of an innovation, its progressive modification and adaptation to suit the requirements of various submarkets, and the availability and introduction of other complementary inputs which decisively widen the economic usefulness of an original innovation⁸. Thus, the diffusion process relates to the spread in the use of an already-established technological innovation⁹. It also includes the transfer of technology both from one industry to another and from one country to another¹⁰. Therefore, the processes of diffusion and technology transfer form a continuum with no clear dividing line¹¹.

Owing to the nature of this thesis and the degree of technological development of the mineiro economy during the last century, the transfer of technology is the stage of the process of technological progress which relates most directly to a study of the formation of the mineiro business environment. As most mineiro firms relied on foreign technology and as the process of technological generation was almost

⁵ P. Temin, Casual Factors in American Economic Growth in the Nineteenth Century, (1986), p.31.

⁶ N. Rosenberg, Inside the Black Box: Technology and Economics, (New York, 1990), pp.5-6; and O'Brien, op.cit., pp.7-9.

⁷ Anderson, op.cit., p.44.

⁸ N. Rosenberg, Perspectives on Technology, (New York, 1976), pp.75-6.

⁹ C.T. Stewart and Y. Nihei, Technology Transfer and Human Factors, (Lexington, 1987), p.2.

¹⁰ A.C. Samli, "Introduction", in Technology Transfer: Geographic, Economic, Cultural, and Technical Dimensions, ed. A.C. Samli (Westport, 1985), pp.xv-xvii.

¹¹ Stewart and Nihei, op.cit., p.2.

non-existent in Brazil, the international transfer of technology will be analysed in detail.

International technology transfer may be defined as the process by which a technology is transplanted or diffused from one country to another¹². As a concept it includes an aspect of absorption of the technology on the part of the recipient country. The international transfer of technology only takes place when there is some degree of assimilation of the technology under consideration by recipients, assimilation means the recipient's capacity to utilize the technology in its own right for its own purposes¹³.

Technology is a method for doing something and its use requires three elements: information about it, the means for carrying it out, and some understanding of it. Of these three elements, only information - usually embodied in blueprints, manuals, and technical books - and means - such as capital goods - can be transferred. Understanding can only be acquired by study and experience. Both information and physical means are worthless if the recipient does not know how to use them, which involves the knowledge of the potential of a technology and, mainly, some experience in the use of it. The ability of the recipient to use technology effectively comes from his understanding, and the degree of understanding required is related to the objective sought in employing the technology. Moreover, every technology is part of a larger system, and the presence or absence of other technologies has a major impact on what has to be acquired to accomplish the objective sought. Information, means, and understanding can be obtained basically by three ways. First, it can be provided by foreigners who retain the ownership. Second, it can be purchased from foreigners. Third, it can be acquired through indigenous efforts to translate foreign technical knowledge into specific methods. In addition, technology can be transferred with varying degrees of human capital accumulation and institutional development. At one extreme, technology is transferred with indigenous involvement limited to an unskilled labour force - as in direct foreign investment. At the other extreme, the knowledge is assimilated and then used to create the necessary elements. Knowledge can be acquired through education, experience, experimentation, research, or purchase¹⁴.

Furthermore, regarding what is acquired through technology transfer, it is possible to identify three broad types of capability. The first is the production capability which is required to operate a technology. Production capability is not achieved by passively importing technology. It requires local participation and considerable indigenous effort to master the use of a technology. The accumulation of local production experience is important to provide the understanding necessary to carry out some of the tasks involved in the other two capabilities. The second type is the investment capability which is required to expand and/or create new productive capacity. The third type is the innovation capability which is required to develop new

¹² R.C. Barquin, "Some Introductory Notes on the Transfer of Technology", in Industrial Development and Technology Transfer, D. Soen ed., (1981), p.103.

¹³ Stewart and Nihei, op.cit., pp.2-4.

¹⁴ C. Dahlman and L. Westphal, "The Transfer of Technology: Factors in the Acquisition of Technology", in Finance & Development, December 1983, pp.6-7.

methods of doing things¹⁵. Each one of these capabilities require different types and levels of skill and different supporting institutions. Only after all three types of capabilities have been transferred has the receiving country acquired permanently the mastery of any technology¹⁶. The transfer of technology to nineteenth-century Minas Gerais was restricted mainly to the level of the production capability. The investment capability was only incipient during the period studied and the innovative capability was virtually non-existent.

The international transfer of technology is widely recognised as the principal means for relieving world poverty, technology being crucial not only for growth, but also for the capacity to grow. However, a technology which works in one situation does not necessarily work in another. The international transfer of technology is thus a complex process encompassing different dimensions: economic, cultural and technical. In some respects, technology transfer is governed by economic forces, as for example: expectations of profit, levels of capital formation, market size and structure, relative factor (land, labour, capital) prices, the extent of entrepreneurial opportunities, and the availability of financial institutions. However, the transfer of technology is also influenced by cultural arrangements such as values, organizational forms, and material expressions of social groups. The rate of diffusion within the receptor economy/society is explained by cultural forces, combined with economic ones. Furthermore, imported technology selection is often shaped by cultural features themselves. Then there is the technology itself. The timing of transfer and adoption is clearly influenced by the appropriateness of a technology for a recipient economy/society. Furthermore, diffusion is likely to be a gradual process depending on the pace at which secondary improvements perfect the original innovation, and the level of human skills (especially machine-making skills) in the recipient economy is also critical. Moreover, bottlenecks in related production activities need to be removed before an innovation can spread. Finally, the nature and level of technical knowledge - which manifests itself in the form of technical vocabularies, technical measuring systems, patents, technical handbooks, etc. - in both the originating and receptor economies/societies is also an aspect which can present obstacles to the international transfer of technology¹⁷.

Although the international transfer of technology has been going on for a long time, its scale and impact has vastly accelerated since the Industrial Revolution, when the introduction of a number of new technologies brought immense improvements to productivity. Although the Industrial Revolution began in England, new technologies spread and were adopted elsewhere when circumstances and conditions were propitious. British technologies provided the basis for industrial development in several Western European countries, the USA and other countries where conditions were positive. Countries receiving foreign

¹⁵ Ibid., p.7.

¹⁶ Stewart and Nihei, *op.cit.*, pp.2-4.

¹⁷ D.J. Jeremy, "Introduction: Some of the Larger Issues posed by Technology Transfer", in International Technology Transfer: Europe, Japan and the USA, 1700-1914, ed. D.J. Jeremy (Aldershot, 1991), pp.1-3.

technology were in a favourable position. They could industrialize through the mere transfer of existing technologies without having to reinvent them¹⁸. The classic example in the nineteenth century was the USA¹⁹ and in the twentieth century Japan²⁰. Furthermore, as Gerschenkron has correctly pointed out, the opportunities for rapid industrialization through technology borrowing was one of the few advantages of backward countries. Their prospects of industrialization was more promising the greater the accumulation of technological innovations at their "disposal" in the more advanced countries. Borrowed technology was one of the primary factors assuring a rapid development in a backward country²¹. However, the importance of this advantage should not be exaggerated. The successful transfer of technology is not just a matter of transporting a piece of hardware from one geographical location to another. The transfer of technology and its diffusion through the recipient economy has never been a simple, easy, or effortless task. To begin with, the import of foreign technologies requires some minimum level of technological skills, not only to modify and adapt the foreign technology, but also to provide the basis for an intelligent selection among the wide range of potential foreign suppliers. The nineteenth-century experiences suggest that the successful transfer of technology depends greatly upon the specific domestic circumstances in the recipient country²².

Technological change in Latin American countries has relied mainly on foreign sources of technical knowledge and information, as the case of nineteenth-century Minas Gerais illustrates very well. Although foreign technological knowledge has often come embodied in imported machinery and equipment, it has also come in the form of blueprints, patents, instruction manuals, and other technical documents. However, rather than being exogenously given and freely and instantaneously accessible to everybody, technical knowledge and information has to be sought systematically. This obviously implies time and cost. Firms seeking new technologies need to engage in various tasks. Furthermore, a package of technical information is almost never absolutely precise, rarely perfectly understood or easily replicable.

An important aspect of the transfer of technology to less developed countries is the structural differences between them and the developed countries. Less developed countries such as Brazil are characterized by smaller domestic markets, higher degrees of tariff protection, shortage of skills, acute market imperfections, distortions in technical information, a higher business concentration, a weaker competitive atmosphere, a lack of basic infrastructure, etc. The size of the domestic market is one of the most important differences between developed and less developed countries, and it is certainly one which greatly influences technology choice. With very few exceptions, industrial firms operating in less developed

¹⁸ Rosenberg, Inside the Black Box, pp.246-7.

¹⁹ See N. Rosenberg, Technology and American Economic Growth, (New York, 1972), pp.59-86.

²⁰ C. Freeman, "Japan: A New National System of Innovation?", in Technical Change and Economic Theory, ed. G. Dosi, C. Freeman, R. Nelson, G. Silverberg, and L. Soete (1988), pp.330-46.

²¹ Gerschenkron, op.cit., p.8.

²² Rosenberg, Inside the Black Box, pp.247-9.

countries are much smaller than their counterparts in developed nations. These differences in size influence the selection of (appropriate) technology. Thus, manufacturing firms established in less developed countries usually settle for a technology involving a method of production of a more discontinuous nature and for a much lower degree of automation. This has a major impact upon plant "lay-out", type and cost of equipment and machinery, the overall organization of production (degree and patterns of subcontracting, etc.), the number of workers, etc. Such choices will also affect the size of the economies of scale which can eventually be captured by the firm.

The technology originally chosen by manufacturing firms in less developed countries also differs from that employed by industrial enterprises in developed nations in terms of the degree of vertical integration. Manufacturing firms in less developed countries usually make much less use of subcontracting than do their contemporary counterparts in developed countries, as the study of mineiro firms shows clearly. The degree of subcontracting may increase over time but not at a very rapid rate. The slow rate at which the division of labour and the development of a sufficiently vast network of subcontractors seem to proceed in less developed countries has at least two different explanations: the size of the market and the shortage of skills. Size of the market affects the likelihood of attaining economies of scale and specialization, and therefore the relative cost of external as opposed to internal production. Availability of technical skills and entrepreneurship is associated with quality standards and reliability and are certainly two major aspects taken into account by firms considering subcontracting decisions. A high degree of vertical integration usually means "in-house" provision of goods and services which are technologically dissimilar to the company's major activity, as in the case of the Companhia União e Indústria (CUI) for example. A high degree of technological dissimilarity necessarily means lower technical specialization, under-utilization of equipment and many difficulties concerning production planning and industrial organization.

Furthermore, various substitution effects play an active role inducing firms in less developed countries to adopt technologies different from those employed by comparable firms in more developed countries. Substitution effects can be of two different types: policy-induced and autonomous. Policy-induced substitution effects include all those forms of substitution between different types of machinery and/or raw materials, etc., and resulting from tariffs on imported goods, quotas, distorted exchange rates, outright prohibition of certain inputs, etc. Autonomous substitution effects derive from differences in resource endowments or other such "natural" phenomena. They are concerned with important technological differences between firms in less developed and developed countries and are induced by relative price differentials as between capital and labour. A much lower degree of automation - implying more universal machines or manual process-control, a less sophisticated maintenance technology, a more labour intensive transport system within the plant, etc. - are all standard features of Latin American manufacturing firms. This is particularly relevant in relation to the original choice of technology. In other words, most Latin American companies start to operate technological packages with a rather high ratio of labour to capital²³.

²³ J.M. Katz, "Domestic Technology Generation in LDCs: A Review of Research Findings", in Technology Generation in Latin American Manufacturing Industries, ed. J.M. Katz (1987), pp.13-55.

As the following chapter will show in detail, the above mentioned peculiarities of the transfer and absorption of borrowed technology to Latin American countries were, to different degrees, present in the mineiro experience of the nineteenth century. Structural differences between nineteenth-century Minas Gerais and the more advanced economies of that time were certainly large and had an immense impact on the whole of process of technology absorption.

Chapter 7 - THE PROCESS OF THE TRANSFER OF TECHNOLOGY

This chapter examines the transfer of technology in nineteenth-century Minas Gerais. As local production of technical knowledge was virtually non-existent, most industries relied on foreign technology. Thus, the first part of this chapter examines the limits on the development of indigenous technology and the reliance of most mineiro industries on foreign technologies. Of the industries investigated here only the iron foundries established in the first three-quarters of the last century employed indigenous technology. The other three, textile, electricity generating, and transport and road-construction, relied exclusively on foreign technology. The second part of this chapter investigates several stages in the process of handling a technology, from equipment selection to its adaptation to the local environment. However, technologies of different natures presented distinct problems. The selection of a intangible technology, for example, was primarily determined by the availability of skilled workers, whereas in the case of tangible technologies, price and technicalities were more relevant. Thus, the industries investigated are divided into two groups, according to the nature of the technology adopted by them. The first group is constituted by those industries which employed a highly intangible technology and where production or operation relied heavily on the technical expertise of workers and managers/entrepreneurs. These were the iron and transport industries. The second group is composed of those industries which employed a technology much more "embodied" in machinery and equipment, that is the textile and electricity generating industries. Production in these cases required comparatively less skill from the work-force, where the pace of work was primarily determined by the machinery/equipment itself.

7.1 - Reliance on Foreign Technologies and the Limits of Indigenous Technology:

The experience of successfully industrialized countries in the nineteenth century indicates that the existence of a capital goods industry was of critical importance for the development of indigenous technology. The crucial learning process involved in machinery production was a vital source of technological dynamism, flexibility, and vitality. Reliance on foreign technology perpetuates a posture of dependency, depriving a country of the development of a domestic capital goods industry properly adapted to its own needs¹. Thus, firms established in countries deprived of a capital goods industry are forced to resort to foreign technologies and face all the problems that this dependence involved. The case of nineteenth-century mineiro business enterprises are in this sense very illustrative.

This part of the chapter examines the main sources of technology of mineiro firms during the last century and the nature of the technological dependence of each industry investigated in this thesis. As mentioned above, among the industries investigated three, the textile, electricity generating, and transport industries, relied exclusively on foreign technology. Consequently, they also relied upon foreign sources for the supply of materials, components, parts, equipment, and machinery. The only industry in nineteenth-century Minas Gerais to employ an indigenous technology was the iron industry, although a few foundries

¹ N. Rosenberg, Perspectives on Technology, (New York, 1976), pp.154-68.

employed foreign methods of iron production. Therefore, iron foundries relied even less upon foreign suppliers. Nevertheless, their development was limited by the deficiencies of such indigenous technology and by the limited ability of the local business environment to develop technical knowledge.

The terms of the dependence of each industry upon foreign suppliers depended on the nature of the technology employed by them. Industries employing a more tangible technology used more specialized equipment and machinery which were usually supplied by more specialized suppliers. Therefore, the dependence of such industries on their suppliers was more critical. Industries employing a more intangible technology used more universal equipment, which tended to be more easily replicated locally and manufactured by more generalist suppliers. Thus, among the industries examined in this thesis the dependence on foreign suppliers was much greater for the textile and electricity generating industries, due to the nature, complexity, and age of the technologies employed by them. The technologies employed by these industries were more tangible, embodied in complex machinery and equipment, which could not be found locally. Furthermore, these technologies were recent developments when compared with those employed by the transport and the mineiro iron industries. The technologies employed in road construction and in the transport of goods and passengers were of a more intangible nature, technical knowledge being carried by experts. Therefore reliance was upon people rather than upon equipment. Moreover, the technologies for road-construction and the building of wheeled-vehicles drawn by animals were century-old and well established by the middle of the nineteenth century. Nevertheless, although several components and materials employed in the construction and operation of roads were not produced internally and mineiro road-building and transport companies had to resort to foreign suppliers, equipment and operational methods were soon replicated locally. Finally, the technology employed by the iron industry was also of a more intangible nature and the reliance was also upon people rather than upon equipment. Furthermore, methods of iron production employed by the mineiro foundries in the first three-quarters of the nineteenth century were also century-old and well established technologies by the middle of the last century. On the other hand, although only a small number of foundries employed foreign technology and the equipment used in iron production was of a more universal nature, a few foundries very occasionally imported part of the equipment which was not possible to be produced on the site. Nevertheless, the iron industry was the least dependent on foreign suppliers.

The textile industry was not only the first industrial sector to emerge in Brazil, but also the most important until the late 1930s. In the second half of the last century, several textile mills were established in the country, being favoured by a number of factors: the availability of raw material, the increasing domestic demand for textiles, the availability of cheap labour, and protection against foreign competition². As shown in Table VII.1, the number of textile mills established in 1866 was 9: 5 in Bahia, 2 in Rio de Janeiro, 1 in Alagoas, and 1 in Minas Gerais. The mill established in Minas Gerais was probably the Cana

² W. Suzigan, Indústria Brasileira: Origem e Desenvolvimento, (São Paulo, 1986), pp.122-3.

do Reino mill, a short-lived and unsuccessful enterprise³. In 1875, there were 30 textile mills in Brazil: 11 in Bahia; 6 in São Paulo; 5 in Rio de Janeiro; 5 in Minas Gerais; and 1 each in Maranhão, Pernambuco and Alagoas. Ten years later, the estimated number in the whole country amounted to 48: 13 in Minas Gerais; 12 in Bahia; 11 in Rio de Janeiro; 9 in São Paulo; and 1 each in Maranhão, Pernambuco and Alagoas. Yet, no indigenous textile technology emerged in Brazil during this period and textile entrepreneurs had to look for machinery and equipment abroad.

Table VII.1 - Estimated Geographic Distribution of the Brazilian Textile Mills, 1866, 1875, 1885.

PROVINCES	1866	1875	1885
Maranhão		1	1
Pernambuco		1	1
Alagoas	1	1	1
Bahia	5	11	12
Rio de Janeiro*	2	5	11
São Paulo		6	9
Minas Gerais	1	5	13
Total	9	30	48

Source: S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), p.36.

* The city and the province of Rio de Janeiro.

The most obvious sources of textile machinery and equipment during the last century were Great Britain and the USA. The textile industry was at the heart of the Industrial Revolution in late eighteenth-century England. Until the beginning of the twentieth century, the British textile industry was the most important in the world and British equipment was the most modern available⁴. Furthermore, technological transfer between Great Britain and the USA in the early part of the last century was relatively quick and effective. Both countries were closely related culturally. They shared a common language, legal and economic systems, and enjoyed a common technical heritage. The technological synergy between the two countries meant that by the end of the eighteenth century machinists building all kinds of textile machines could be found in the USA. British immigrant machine-makers played a major role in the diffusion of new textile technology in the USA and as early as the beginning of the last century the USA was already an important producer of textile equipment⁵. Moreover, at the beginning of the twentieth century the US textile industry was the second largest in the world⁶ and the leadership in output and invention was passing to the

³ For a short account of the story of the Cana do Reino mill see D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX, (São Paulo, 1988), pp.218-225.

⁴ D.S. Landes, The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present, (Cambridge, 1969), pp.41, 211-15.

⁵ D.J. Jeremy and D.H. Stapleton, "Transfers between Culturally-Related Nations: The Movement of Textile and Railroad Technologies between Britain and The United States, 1780-1840", in International Technology Transfer: Europe, Japan and the USA, 1700-1914, ed. D.J. Jeremy, (Aldershot, 1991), pp.31-9.

⁶ Landes, op.cit., pp.211-15.

USA⁷. Rapid textile technology transfer between Britain and the USA also demonstrates the mobility and adaptability of the textile technology "package" (that is, equipment and personnel).

Thus, for obvious reasons, mineiro mill owners relied mainly on British and US suppliers of technology. When the Cedro mill was established in the early 1870s, the mill machinery was bought from Guilherme Van Vlick Lidgerwood, a representative in Rio de Janeiro of the US manufacturer, Author Danfort Paterson of New Jersey⁸. Nearly a decade later, and with 48 mills already established in Brazil, the Cedro mill continued to rely exclusively on foreign suppliers, especially British and US, a clear evidence of the inability of Brazilians to replicate internally textile technology. Replying to an inquiry from the president of the Sete Lagoas City Council in Minas Gerais in 1882, the proprietors of the Cedro mill stated that the machinery employed in the mill was partly US and partly English⁹.

The original machinery of the Cachoeira mill was also acquired in Britain and the USA. As Bernardo Mascarenhas had already had the experience of setting up a mill (the Cedro), he was appointed by his family to organize the establishment of the Cachoeira factory. As shown in his correspondence, to select and purchase machinery Bernardo decided to go to the USA and Europe. In April 1874, he wrote from Manchester that he had visited the main English manufacturers, including Platt Brothers & Company, and that he was about to leave for New York to inspect US machines¹⁰. In December of the same year, he wrote to his brothers from New York:

"I have been here for nine days, arriving from Liverpool, which I left on the 26th of last month. During this time, I have visited two US machine manufacturers, one from Dampoth, in Baltimore, and the other from Badsbure, in Philadelphia, besides other textile mills. As the English machines are cheaper than the US ones I have decided to return to England (...). Nevertheless, I will buy here three Tenk spinning machines, which are much better than the English ones (...)." ¹¹

It is interesting to point out the comparison made by Bernardo between British and US machinery. Apparently the British machinery was cheaper than its US counterpart, but not necessarily of better quality, an opinion at variance with the view of subsequent historical work. It is also important to point out that Bernardo decided to buy machines of different origins, a decision which had long-run consequences, as will be discussed in greater detail below.

⁷ T.K. Derry and T.I. Williams, A Short History of Technology: From The Earliest Times To A.D. 1900, (Oxford, 1960), p.582.

⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.2", "Contra de Guilherme Van Vlick Lidgerwood and Mascarenhas & Irmãos, 27 September 1870".

⁹ Companhia Cedro e Cachoeira, "Copiador de Cartas de 1881 - Mascarenhas Irmãos", "Letter from Mascarenhas Irmãos to the president of the Sete Lagoas City Council, 13 March 1882".

¹⁰ Letter from Bernardo Mascarenhas on 13 April 1874 from Manchester, reproduced in G.M. Mascarenhas, Centenário da Fábrica do Cedro, 1872-1972, (Belo Horizonte, 1972), pp.97-8.

¹¹ Letter from Bernardo Mascarenhas on 18 December 1874 from New York, reproduced in *Ibid.*, pp.99-100.

In 1883, after the constitution of the Companhia Cedro e Cachoeira (CCC), the company decided to expand productive capacity. Hence, during this year another 50 new looms for the Cachoeira mill and 16 for the Cedro mill were ordered in England as existing capacity was considered inadequate¹². Further evidence that the CCC continued to be supplied by British and US manufacturers throughout the nineteenth century can be found in the extensive correspondence of the company with its suppliers and agents. In 1884, a year after the merger of the Cedro and the Cachoeira mills into the CCC, Max Nothmann, an agent in Rio de Janeiro, stated that:

"With the last steamship I received news from New York saying that the turbine would be dispatched in the next one. As another steamship is expected in the next few days, I hope to dispatch the turbine to you soon with the respective invoice."¹³

In 1887, the CCC ordered machine parts from the USA through the same agent¹⁴. Four years later, Robert L. Kerr, an engineer and machinery agent from Manchester, wrote informing the company that the English manufacturers of hydro-extractors wanted to supply the machine assembled and not in parts¹⁵. In 1893, the same agent wrote saying that he expected to deliver as soon as possible a steam engine and a boiler ordered by the company¹⁶. In 1895, James Leffel & Co., manufacturers of steam engines and steel boilers based in New York, wrote saying that they had received an order and specifications for the construction of a turbine¹⁷. In 1899, the company ordered machinery from England for both the Cedro and the Cachoeira mills¹⁸. Finally, in 1901, Kerr stated in his letter of 27 November that he was sending the estimate and specifications of a spinning machine, as had been requested¹⁹.

As this correspondence indicates, the CCC's reliance on foreign suppliers was not restricted to textile machinery. The company purchased capital equipment such as turbines, boilers and steam engines and inputs such as lubricants, yarns, dyes, chemicals, etc. In 1899, Victor Uslander, an agent in Rio de

¹² Companhia Cedro e Cachoeira, "Relatório da Diretoria", (1883), p.2.

¹³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Max Nothmann, 1 July 1884".

¹⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.21", "Letter from Max Nothmann, 21 May 1887".

¹⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.30", "Letter from Robert L. Kerr to Theóphilo Marques Ferreira, 6 August 1891".

¹⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.36", "Letter from Robert L. Kerr to Francisco de Paula Mascarenhas, 29 September 1893".

¹⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.41", "Letter from James Leffel & Co. to Francisco de Paula Mascarenhas, 19 January 1895".

¹⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.50", "Letter from Robert L. Kerr to Aristides Mascarenhas, 23 February 1899".

¹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.58", "Letter from Robert L. Kerr to Caetano Mascarenhas, 27 November 1901".

Janeiro, informed the CCC that the shipment of oil (apparently bought in England) to him was larger than he had expected and consequently he was dispatching two barrels of oil instead of the ordered by the company²⁰. In 1883, Max Nothmann wrote that he had already send the company's order for yarn to England²¹. On yet another occasion, Blum & Company (another agent in Rio de Janeiro) wrote charging the company for part of the dye and chemicals shipment cleared from customs and already dispatched²².

There is no reason to believe that other textile mills in nineteenth-century Minas Gerais were not equally reliant on foreign suppliers. On the contrary, evidence from other mineiro mills suggests that the entire industry not only relied on foreign suppliers, but that it was also mainly supplied by British and US manufacturers. The Tecelagem Mascarenhas was equipped with machinery supplied by Hogson and Robert Hall & Sons of Manchester, England²³. The machinery of the Companhia Cachoeira de Macacos (CCM) was purchased in England²⁴ as was that of the Companhia de Tecidos Santanense (CTS), with the exception of the turbine and the ginning machine which was purchased in New York, USA²⁵. The machinery of the Sociedade Anônima Industrial Machadense (SAIM) - a textile mill established in Machado, southern Minas Gerais, in 1872 - seems to have been purchased from a firm named "Lidgerwood". This was the name reported as being on the machinery. Coincidentally, as mentioned above, the machinery of the Cedro mill was purchased from a representative, called Guilherme Van Vlick "Lidgerwood" from Rio de Janeiro²⁶. Moreover, a local almanac of 1874 reported that the machinery of the SAIM had come from England:

"If several parts of the machinery of the mill, which was ordered from England again, had not disappeared the mill could already be working."²⁷

Further evidence indicates that some of the machinery was English and some US²⁸, a pattern already observed in the case of the CCC. The União Itabirana also bought its machinery from both the USA and

²⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.50", "Letter from Victor Uslander, 27 January 1899".

²¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.14", "Letter from Max Nothmann, 19 November 1883".

²² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.57", "Letter from Blum & Company, 24 July 1901".

²³ N.L. Mascarenhas, Bernardo Mascarenhas: O Surto Industrial de Minas Gerais, (Rio de Janeiro, 1954), p.125.

²⁴ N.A.M. Freitas, "Cia. Têxtil Cachoeira de Macacos: Empresa que deu Origem a uma Cidade", Fundação Mineira de Arte Aleijadinho/Escola Superior de Artes Plásticas, Mimeo., Belo Horizonte, 1990, p.27.

²⁵ M.A.G. Souza, História de Itaúna, (Belo Horizonte, 1986), I, p.126.

²⁶ M.L.P. Costa, A Fábrica de Tecidos de Machado, (Belo Horizonte, 1989), p.35.

²⁷ B.S. Veiga, Almanack Sul Mineiro, (Campanha, 1874), p.148.

²⁸ Costa, op.cit., p.35.

England. In 1883, the company observed:

"Some of our machines are English, manufactured by Platts, and some are US. All are very good and well-built. The English machines are more solid whereas the US ones are more convenient, since they are simpler, require fewer operatives, are cheaper, and produce as efficiently as the English ones."²⁹

These observations contradict the above mentioned remarks of Bernardo Mascarenhas about the difference in price between the English and US textile machinery. In 1874, Mascarenhas decided to purchase English machinery because it was cheaper than the US. It is possible that competition between manufacturers from England and the USA during these 9 years might have changed the previous balance between the prices of English and US machinery. Furthermore, it is interesting to note that the heterogeneity of the origin of the machinery (the result of the lack of a native capital-goods industry) employed by the mineiro textile mills must have created and aggravated a number of problems. It most probably complicated the servicing and the operation of different machinery, created incompatibilities in the production line, and increased the costs of procuring replacement parts.

Thus, as the evidence presented above suggests, the mineiro industry relied on foreign suppliers for parts, machinery, equipment, components, and all sorts of material, such as lubricants, dyes, and yarn. This was the result not only of the absence of an indigenous capital-goods industry, but also of the total absence of a domestic network of suppliers of any kind. As Katz has suggested, the absence of a network of independent and domestic suppliers in Latin America is due to the limited size of the markets, shortage of skills and entrepreneurship³⁰. Although there was a sufficient supply of entrepreneurship for the emergence of new industrial sectors, the mineiro business environment was not conducive to the generation of the whole range of enterprises required by a complex and advanced economy. Furthermore, in several cases, the same mill was supplied by both British and US manufacturers, adding to the already long list of problems (caused by cultural and economic differences and by the geographic distance between users and suppliers; see Part 7.2.2) mineiro textile entrepreneurs had to face in relying on foreign technology.

Reliance on foreign technology was not restricted to the textile industry. Any industrial sector which employed more sophisticated and mechanized equipment depended heavily on foreign technology, as was the case of the mineiro electricity generating industry. However, due to the difference in the nature of electricity and textile technologies (the former was a "breakthrough" scientific development and the latter a piecemeal development of traditional crafts), the terms of the dependence of the electricity generating industry were somewhat different from that of the textile industry. Owing to its scientific complexity, electricity technology was under the firm control of a few specialized firms in the world and was less feasible to be replicated locally with less opportunities for adaptations. Furthermore, as electrical equipment

²⁹ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1950), p.51.

³⁰ J.M. Katz, "Domestic Technology Generation in LDCs: A Review of Research Findings", in Technology Generation in Latin American Manufacturing Industries, ed. J.M. Katz (1987), pp.28-30.

was even more specialized than textile machinery, there was less opportunities for the use of equipment of different manufacturers without major consequences.

Electricity in the last century was a new technology even in the most advanced countries. Its first practical use was telegraphy, invented in the USA and Britain during the 1840s. After the 1880s, telephone and electrical power were developed in both the USA and Germany. As the progress of electrical technology in the USA and Germany was particularly rapid with the introduction of successive innovations (a classic example of a schumpeterian major technological "breakthrough"), the transfer of electrical technology was by no means easier than that of older technologies such as steam engines, mechanical spinning and iron smelting with coke. Electricity was development of nineteenth-century physical science, in contrast to the mechanical and metallurgical technologies of the eighteenth century, which were developed from the empirical skill in traditional crafts. Thus, the transfer of electrical technology at the end of the nineteenth century assumed an unusual character.

Since there were essential differences between the utilization of electricity and the manufacture of equipment, the spread of electrical utilities (including communication and power supply) within less developed countries was only possible when machinery was imported. As a public utility, the electricity generating industry supplied a service which was instantly consumed. Most firms were located close to their markets and given the nature of the "commodity" were immune from foreign competition, unlike textile firms. Indeed like all public utilities, the electricity supply industry enjoyed a natural monopoly, capital start-up costs precluded the entry of new firms into the industry once a successful operator had been established. Moreover, machinery embodied the most up-to-date advances in electrical technology - as it was also the case of textile machinery -, so any country could make use of these innovations and the utility industries could emulate progress in power and communication technologies in the advanced countries³¹. This was a classic example of backward countries taking advantage of technological innovations available in more advanced countries, as pointed out by Gerschenkron³².

In contrast, electrical equipment was hardware which could be transported long distances and preserved over time. Furthermore, electrical machinery was an international good and their consumers (utilization industries) had the choice of buying either domestic or imported equipment, as it was also the case of textile equipment. Nevertheless, most electric machinery was made in Britain, Germany or the USA, and in particular by the big five manufacturers: Western Electric, General Electric and Westinghouse Electric Company (WEC) of the USA, and Siemens and AEG of Germany. These firms were not only the world's largest producers of electric machinery, but also the main innovators in electrical technology³³. At the

³¹ H. Uchida, "The Transfer of Electrical Technologies from the United States and Europe to Japan, 1869-1914", in International Technology Transfer: Europe, Japan and the USA, 1700-1914, ed. D.J. Jeremy (Aldershot, 1991), pp.219-30.

³² A. Gerschenkron, Economic Backwardness in Historical Perspective: A Book of Essays, (1962), p.8.

³³ Uchida, op.cit., pp.219-30.

beginning, there were favourable conditions for entry into the heavy electrical industry. In the 1880s, electrical equipment was still in its infancy and could easily be copied by domestic mechanics with poor tools and little skill, as the case of Japan illustrates very well. However, by the end of the century, the products of the big US and German firms were improved in capacity as well as in quality, embodying the most recent achievements in electrical technology. Thus, the technological gap in the production of electrical equipment became so great that technology transfer could never be realized without the will of the big US and European electrical manufacturers³⁴.

Therefore, electricity generating companies established in Minas Gerais at the turn of the century had to rely on foreign suppliers of electrical equipment and most of them relied on US suppliers. A month after the foundation of the Companhia Mineira de Eletricidade (CME) in 1888, Bernardo Mascarenhas ordered power station equipment through a representative in Rio de Janeiro, Max Nothman & Cia. The order was then passed to the WEC which supplied equipment for the transmission of electricity³⁵. In 1889, the Marmelos-0 - the first large-scale hydro-electric power station established in Brazil - started operation³⁶. For the remainder of the century, the CME continued to be supplied by WEC. In 1891, the company ordered new machines as the old ones had been damaged and the lighting service had been suspended³⁷. In 1896, the new plant, the Marmelos-1, was also equipped with machinery supplied by the WEC³⁸. The equipment employed by the Companhia Força e Luz Cataguazes-Leopoldina (CFLCL) was acquired in the USA and Europe. The turbine of the Maurício power plant, inaugurated in 1908³⁹, was purchased from Escher Wyss, a Swiss manufacturer, whereas the rest of its equipment was acquired from WEC⁴⁰.

As indicated, the mineiro electricity generating industry relied heavily on foreign suppliers of equipment, following the same pattern as the textile industry. However, in the specific case of the electricity generating industry, the reliance upon foreign suppliers was probably aggravated by the peculiar characteristics of electrical technology. Since electricity outgrew of the physical science, there were less opportunities for adaptation and the transfer of the technology for the manufacturing of electric equipment involved the creation of a much more complex system of innovation and network of suppliers than the one required by textile machinery. Furthermore, electric technical knowledge was controlled by a few large US

³⁴ Ibid., pp.219-30.

³⁵ P. Oliveira, Companhia Mineira de Eletricidade: pioneira da iluminação hidrelétrica na América do Sul, (Juiz de Fora, 1969), pp. 29-31.

³⁶ Panorama do Setor de Energia Elétrica no Brasil, ed. R.F. Dias, L.M.M. Cabral, P.B.B. Cachapuz, and S.T.N. Lamarrão, (Rio de Janeiro, 1988), p.32.

³⁷ Companhia Mineira de Eletricidade, O Pharol, (Juiz de Fora), 27 March 1891.

³⁸ Companhia Mineira de Eletricidade, O Pharol, (Juiz de Fora), 8 August 1896.

³⁹ Panorama do Setor de Energia Elétrica no Brasil, p.32.

⁴⁰ Suplemento Minas Gerais, Companhia Força e Luz Cataguazes-Leopoldina, (Cataguazes, 1913).

and German corporations. Therefore, suppliers of electrical equipment could only be found abroad. Yet, although textile technology was simpler and less lumpy (and there was a dramatic growth in the number of firms), there was little difference in the textile and electricity generating industries in terms of technology absorption leading to backward linkages - i.e. the development of heavy industries.

The CUI also employed foreign technology, although its reliance upon foreign suppliers was very limited when compared to that of the textile and electricity generating industries. The reason seems to have been due to the nature of the technologies employed in the construction of roads and in the transport of goods and people at this period. The technology employed in the construction of roads was more intangible. In other words, road-building in the nineteenth century relied mostly on the technical knowledge carried by experts: the equipment used was of a very simple nature and universally available as reproducible. Furthermore, by the middle of the nineteenth century, the prevailing technology was a century-old and accessible. The transport of goods and people employed a technology which was embodied in wheeled-vehicles drawn by animals. The technology to build carts, waggons, and coaches, dated to the ancient times and it was not very complex. This meant that local production of these vehicles was feasible. The most modern methods of road-construction in the nineteenth century evolved from the French methods of construction developed in the preceding century. From the beginning of the eighteenth century, the French roads were admired, and to some extent imitated, by the rest of Europe. Around the 1750s, P.M.J. Trésaguet developed a new three-tier system of road-construction. His system was more economical in terms of materials when compared with the standard stone causeway preceding it and had the advantage of avoiding excessive camber, which was often dangerous. This new method was adopted throughout France and by about 1775 had spread to central Europe, Switzerland, and even Sweden⁴¹.

In Britain, Turnpike Trusts operating their own toll-gate-enclosed sections of roads created a better road-system and became the characteristic English highway by the middle of the nineteenth century⁴². They made regular coach services possible. Furthermore, they had better road-surfaces which were created by road engineers like Telford and McAdam. The Telford and McAdam technology reduced the camber of road surfaces, thereby improving drainage, safety and speed. By 1834, for example, while English coaches were driven at an average of 9-10 miles an hour, the French *malle-poste* averaged 6 miles an hour⁴³.

Telford, originally a journeyman stonemason with a wide experience of road-construction, developed a method of construction very similar to that of Trésaguet. He differed from the French road engineer in making the road-bed level and in forming the crown of the road with stone itself, rather than making the finished surfaced parallel to the base. Telford's methods were expensive for many of the turnpike trusts, who preferred to adopt the construction of John Loudon McAdam. McAdam's method, which

⁴¹ Derry and Williams, *op.cit.*, pp.429-30.

⁴² *Ibid.*, p.431.

⁴³ R.J. Forbes, "Roads to c 1900", in *A History of Technology*, ed. C. Singer, E.J. Holmyard, A.R. Hall, and T.I. Williams (Oxford, 1958), IV, p.531.

combined proper drainage with low cost by putting broken stone upon a road so as to form a solid hard surface, the size of the stones being closely controlled and the highway being drained by side ditches⁴⁴.

John L. McAdam wrote several books about road building which were translated into various languages, thus popularizing the McAdam system abroad. In the course of the nineteenth century, "metalled" and "macadamized" (roads using broken stones in their construction) became almost synonymous in descriptions of roads. McAdam's system had such an impact in Europe that by the end of the last century some 90% of the main highways were macadamized. Slowly the macadam road penetrated beyond Europe. US road engineers studied his method of road-construction and in 1832 the first US national road east of the Ohio river was given a macadamized surface⁴⁵. In Minas Gerais, the first macadamized road was built in the late 1850s. The União e Indústria turnpike was 144 kilometres long, linking Juiz de Fora in the Mata zone to Petrópolis in the province of Rio de Janeiro⁴⁶.

Furthermore, until the beginning of the nineteenth century, the equipment used in the building of roads consisted of simple tools such as hammers, sieves, spades, wheelbarrows, rammers, and pickaxes. Machines for compaction, such as rollers, had been used by the ancients. However, it was only in the 1830s that horse-drawn rollers were gradually introduced in Europe. The first steam-driven roller was invented in 1859, but despite its manifest advantages it gained ground only gradually. Moreover, in McAdam's days stones were broken by hand and continued to be so until as late as 1900, although the first stone-crusher was invented in 1858⁴⁷. Thus, until the late nineteenth century, road building preserved its craft nature, involving very little sophisticated equipment. The basic requirement was technical knowledge carried by craftsmen and trained road engineers.

The construction of the União e Indústria turnpike, for example, involved the work of several experts. The construction of the road began in 1856 under the supervision of foreign engineers and architects with a large experience of road-construction in Europe. The company also employed European surveyors and a number of foreign craftsmen, such as bricklayers, blacksmiths, locksmiths, painters, carpenters, belt makers, etc⁴⁸.

In the case of the road system, the technology employed in the manufacture of wheeled vehicles required little equipment and was largely embodied in skilled personnel. Light wheeled chariots were used even before the ancient Greeks and the Romans, who used two and four wheeled chariots for the transport of goods more than passengers. In Britain, the use of wheeled vehicles declined with the decline of the state

⁴⁴ I. McNeil, "Roads, Bridges and Vehicles", in An Encyclopaedia of the History of Technology, ed. I. McNeil (1990), pp.433-6.

⁴⁵ Derry and Williams, op.cit., p.433.

⁴⁶ W.L. Bastos, Mariano Procópio Ferreira Lage: Sua Vida, Sua Obra, Descendência, Genealogia, (Juiz de Fora, 1991), pp.23-9.

⁴⁷ Forbes, op.cit., pp.536-7.

⁴⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), pp.21-3.

of roads after the departure of the Romans. This situation persisted until the middle of sixteenth century when carriages and coaches began to be imported from the Continent. Soon, British manufacturers started to make copies, marking the beginning of an indigenous coach- and carriage-building trade. From the seventeenth century onwards, several developments in coach design and building were introduced such as sprang suspension, dished wheels, one-piece iron tyres, and better brake systems. Individually these developments amounted to little but collectively they transformed the primitive vehicle - which was little more than a box on wheels - into comparatively speedy and luxurious coaches. From the 1780s onwards, goods vehicles changed little, but many new and improved passenger vehicles of an European origin appeared⁴⁹.

Thus, the technology for the building of wheeled vehicles drawn by animals was basically the same for nearly a century, when the CUI started the construction and operation of its turnpike in the late 1850s. Therefore, the company was able to build the vehicles used in the transport of goods and passengers locally. Evidence of this fact is the existence of several workshops established at the Juiz de Fora station. Among them was the carpenters' workshops for the construction of all kinds of vehicles (carts, coaches, and carriages)⁵⁰. Furthermore, a Parliamentary Decree of 7 August 1852, mentioned in the company report of 1856, exempted the company from customs duties for 12 years on purchases of machines, instruments and any other objects destined for the construction of roads and vehicles of the company.

Nevertheless, due to the lack of a domestic network of suppliers, the CUI also had to rely on foreign suppliers and manufacturers for a wide range of materials. In 1856, for example, based on the Parliamentary Decree of 7 August 1852 mentioned above, the company purchased several commodities in Europe (from stationery to screws for bridges, carts, and carriages)⁵¹.

To sum up, the technologies employed by the CUI in the construction of the turnpike and in the transport of goods and people were also foreign. However, they were century-old technologies, of more or less common knowledge. Even so, owing to the total absence of a network of suppliers of any kind, the company had to rely on foreign suppliers for the supply of various components and material. However, the CUI's reliance was much smaller when compared to that of both the electricity generating and the textile industries. Materials, components and equipment used by the CUI were relatively simple and were soon replicated locally. The simplicity and universal nature of the technology employed by the CUI meant that backward linkages were more easily created, as the workshops of the company indicate.

In contrast with the textile, the electricity generating and the transport industries, the mineiro iron industry established during the first three-quarters of the last century was the only industry to employ an indigenous technology. However, a few foundries did rely on foreign technologies which were primitive when compared with that being employed at the same time in more developed countries. Although a few

⁴⁹ McNeil, op.cit., pp.438-9.

⁵⁰ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.23.

⁵¹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.22.

foundries resorted to foreign suppliers of equipment on a few occasions, the intangible nature of iron technology means that the industry relied much more upon the technical expertise of people rather than upon equipment. Furthermore, due to the universal nature of the equipment used in iron production they were also more easily reproduced locally.

The production of iron in Minas Gerais was introduced by African slaves at the beginning of the last century⁵². Initially, foundries were essential components of agricultural enterprises, with scores of slaves specialized in the domestic production of iron for farm use. Gradually iron-making emerged as the main activity of some estates⁵³. Until the first decade of the nineteenth century, several farmers and blacksmiths produced iron solely for their own consumption, not only because until the arrival of the Portuguese Royal family in 1808 the commercial production of iron was prohibited, but also because they did not have the technical knowledge for large-scale production⁵⁴. Later, Eschwege, the founder of the *Patriótica* mill - the first foundry to produce iron on an industrial scale in Minas Gerais⁵⁵ - and other foreign technicians introduced modifications to this local process, resulting in what became known as the *cadinho* method. These modifications were based on the Swedish method of production called *stückofen*. As indicated in Figure VII.1, the name *cadinho* derived from the shape of the cavities in the wall of the furnace. The shape of these cavities facilitated the introduction of ore and charcoal as well as the withdrawal of pig iron. There was also a small opening for the introduction of air by hydraulical bellows. The pig iron was taken to the hydraulical hammermill, where the slag was separated. When the separation was completed the pig iron was resmelted for transformation into cast iron. The *cadinho* method was very simple, requiring neither complex facilities nor skilled workers. It required only proximity to stands of timber and deposits of iron ore, and an abundance of water. Due to its simplicity, this method of iron-making was widely used in Minas Gerais in the first three-quarters of the nineteenth century⁵⁶. However, output was very limited compared with that of the two foreign methods employed by some of the *mineiro* foundries during this period, namely the Italian and the Catalan methods⁵⁷.

Among the four largest foundries established in Minas Gerais in the first three quarters of the nineteenth century, three (the *Patriótica*, *Morro do Pilar*⁵⁸, and *Girau*⁵⁹) employed the *cadinho* technology.

⁵² W.L. von Eschwege, *Pluto Brasiliensis*, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979), II, p.203.

⁵³ Libby, *op.cit.*, p.152.

⁵⁴ Eschwege, *op.cit.*, p.203.

⁵⁵ *Ibid.*, p.205.

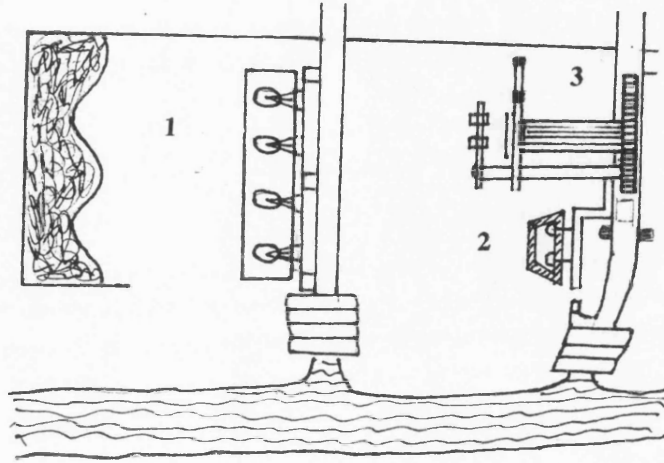
⁵⁶ Libby, *op.cit.*, pp.147-8.

⁵⁷ J.A. Paula, "Dois Ensaios sobre a Gênese da Industrialização em Minas Gerais: a Siderurgia e a Indústria Têxtil", in *Anais do II Seminário sobre a Economia Mineira*, (Belo Horizonte, 1983), p.34.

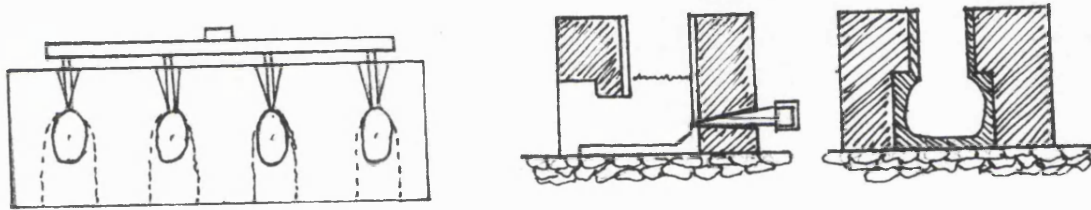
⁵⁸ Eschwege, *op.cit.*, pp.207-214, 247-54.

Figure VII.1 - The Cadinho Foundry

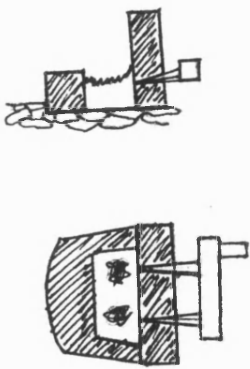
Plan of the Foundry



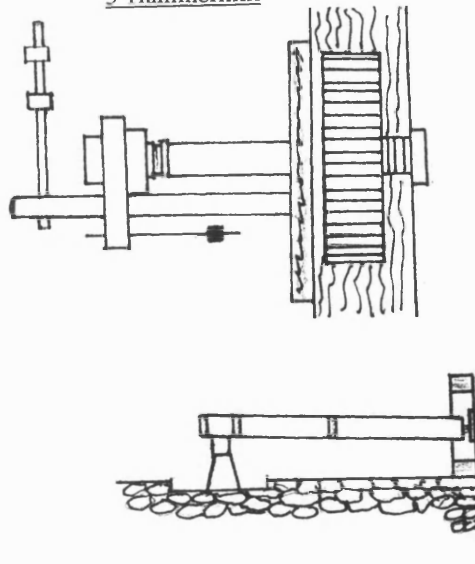
1. Blast Furnace



2. Resmelting Furnace



3 Hammermill



Source: P.Ferrand, "A Indústria de Ferro no Brasil (Provincia de Minas Geraes)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.167-88.

Furthermore, in his survey of the foundries located in the Metalúrgica zone, Costa Sena found 17 foundries employing the cadinho technology⁶⁰, clear evidence of the widespread employment of the cadinho method in Minas Gerais. However, there were a few occasions in which even the foundries employing the cadinho technology had to resort to foreign manufacturers for the supply of materials and equipment, because of the total lack of conditions to produce them on site. When Eschwege set-up his foundry in 1811, he imported the hammermills from England because it was very difficult to find someone who could produce them manually in Brazil⁶¹. In 1815, Schoenewolf informed Eschwege that Câmara requested from the government refractory material from England⁶². These two cases suggest that, at least in the first decades of the nineteenth century, the local conditions for the manufacture of any kind of equipment were inadequate despite the existence of an indigenous technology.

Hence, for the first three-quarters of the nineteenth century the large majority of the mineiro iron foundries relied on the cadinho method, an indigenous method of iron production. The employment of cadinho technology, however, did not mean that iron-masters did not resort to foreign suppliers, although their dependence was most probably much less intense than that observed for the textile, electricity generating, and transport industries. On the other hand, the employment of cadinho method imposed strict limits to the development of the iron industry. The demise of small foundries in the last quarter of the century is undisputable evidence of this fact. Once the natural barriers against foreign competition were lifted, the limits of the indigenous technology employed by the large majority of the mineiro iron-masters became evident⁶³. As an engineer of the Mining School of Ouro Preto observed:

"In the period between 1881 and 1888, the iron industry began to realize that it was not possible to develop against foreign competition brought with the arrival of the railway in the hinterland of Minas Gerais. The national industry was not prepared to compete against foreign products, since it did not apply scientific industrial techniques."⁶⁴

Despite the simplicity and popularity of the cadinho technology, a few mineiro foundries established in the first three quarters of the last century employed foreign methods of iron production, namely the Italian and the Catalan. However, like the cadinho technology, the Italian and the Catalan methods produced iron through the so-called direct process⁶⁵, i.e. the process in which wrought iron is produced directly from the

⁵⁹ J.C. Costa Sena, "Viagem de Estudos Metallurgicos no Centro da Provincia de Minas", in Annaes da Escola de Minas, (Ouro Preto, 1881), No.1, pp.134-5.

⁶⁰ *Ibid.*, pp.117-41.

⁶¹ F.A.M. Gomes, História da Siderurgia no Brasil, (Belo Horizonte, 1983), p.84.

⁶² Eschwege, op.cit., p.211.

⁶³ Libby, op.cit., pp.159-60.

⁶⁴ C.A. Oliveira, "A Metallurgia de Ferro em Minas", in Annaes da Escola de Minas, (Ouro Preto, 1902), No.5, p.79.

⁶⁵ *Ibid.*, p.76.

ore. Nevertheless, from the 1750s onwards this process was gradually eliminated by the indirect process, which was more productive and rapidly superseded the direct process as the major producing system in Great Britain⁶⁶. Hence, the Italian and the Catalan technologies were obsolete when compared with those being employed at the same time in more developed countries such as Britain⁶⁷.

From the middle of the eighteenth century to the First World War, Great Britain led the world in developing new technologies for the production of pig and wrought iron, and steel. In 1709, Abraham Darby successfully used coke instead of charcoal in blast furnaces to produce pig iron. By the end of the eighteenth century coke had displaced charcoal in smelting. In the early 1740s, Benjamin Huntsman developed the crucible process for making high-quality steel, which remained the dominant technique worldwide for more than a century. From the 1760s onwards, British ironmasters developed new technologies to replace charcoal with coke in the production of wrought iron. In 1784, Henry Cort developed the "puddling and rolling process", a method of making wrought iron from cast iron with mineral fuel which freed ironmakers from their last dependence on charcoal. By the end of the Napoleonic Wars Cort's techniques had come to dominate the refining stage of production. In the 1850s, Henry Bessemer introduced a new revolutionary process for manufacturing steel. Shortly after, William Siemens, a German who spent most of his life in Britain, together with two Frenchmen, Pierre and Emile Martin, developed the Siemens-Martin process, an open-hearth method for making steel. Until the First World War British industry continued to lead world steel industry in the introduction of technological improvements⁶⁸. By the middle of the last century, although Britain was the world's leading producer of iron and in many respects was almost alone, other countries also developed important iron and steel industries. Based on the English model, there were important ironworks in Belgium and France. Germany had some works of note and US ironmaking was growing as well. The Swedish iron industry was in a special position, since the country's very pure iron ore enabled its industry to produce iron of very high quality⁶⁹.

However, metallurgical processes of production differ from more purely mechanical technologies in some important respects and the international transfer of such technologies require further consideration. Metallurgical processes are intimately related to the qualities of the natural resource inputs. For example, the successful introduction of mineral fuel into the blast furnace in the last century depended upon the use of coal which had a chemical composition appropriate for smelting. However, until the latter part of the

⁶⁶ J.R. Harris, The British Iron Industry, 1700-1850, (1988), pp.12-3.

⁶⁷ For a detailed account of the history of the technological development of the British iron industry in the nineteenth century see M. Atkinson and C. Barber, The Growth and Decline of the South Wales Iron Industry, 1760-1880, (Cardiff, 1987) chapter 3, and Harris, op.cit.

⁶⁸ C.K. Hyde, "Iron and Steel Technologies moving between Europe and the United States, before 1914", in International Technology Transfer: Europe, Japan and the USA, 1700-1914, ed. D.J. Jeremy (Aldershot, 1991), pp.51-2; and W.K.V. Gale, "Ferrous Metals", in An Encyclopaedia of the History of Technology, ed. I. McNeil (1990), pp.153-76.

⁶⁹ Gale, op.cit., p.167.

nineteenth century, such relations between particular processes and the qualities of natural resources were not understood in any serious scientific sense. Hence, metallurgy during this period was essentially an empirical activity and variations in resource inputs affected the success of the productive process in ways which could not be understood or predicted⁷⁰.

Thus, the transfer of technology for the production of iron was a most complex process - sometimes even impossible -, and mineiro foundries which employed foreign technology were restricted to the use of more backward processes such as the Italian and the Catalan. As shown in Figure VII.2, the Italian method was constituted by a furnace, bellows, and hammermill. It employed blast furnaces which varied from between 3 to 2 feet deep, 5 to 3 feet long, and 3 to 2 feet wide, and required more care in the regulation of air for the maintenance of the temperature of the fire than the cadinho technology⁷¹. Moreover, this process required a regular series of successive heating and hammering operations. The Italian method was more productive and economical than the cadinho, and the quality of the final product was higher. However, this method was a simplified version of the Catalan process (shown in Figure VII.3), the most productive and economical method used in Minas Gerais during the first three-quarters of the nineteenth century. The Catalan process was a complex method of production, requiring even more skill from the workers for measuring the quantity of ore and charcoal as well as for making a perfect linkage of the heating and hammering operations. Furthermore, local experience indicated that the use of this process of production was only feasible if supervised by someone with a good knowledge of metallurgy⁷².

Among the four largest foundries established in Minas Gerais in the first three quarters of the nineteenth century, only the São Miguel de Piracicaba foundry employed the Catalan method of production. Even so, in the early 1870s, at the time of the death of its owner and founder, Monlevade, the ironwork was transformed into a Italian foundry⁷³. Furthermore, among the 24 foundries surveyed by Costa Sena in the Metalúrgica zone, 7 employed the Italian method of production, including the São Miguel de Piracicaba⁷⁴. However, due to the empirical and intangible nature of metallurgical technology, and confirming what has already been said about the technology employed by the road-construction and transport industry, foundries which employed a foreign technology did not relied heavily upon foreign suppliers. The only known case of the import of equipment is that of the São Miguel de Piracicaba foundry. When Monlevade established the foundry he imported more than 7 tons of equipment from England⁷⁵.

⁷⁰ N. Rosenberg, Technology and American Economic Growth, (New York, 1972), pp.77-8.

⁷¹ F.P. Oliveira, "Estudos Siderúrgicos na Provincia de Minas", in Annaes da Escola de Minas de Ouro Preto, (Ouro Preto, 1884), No.3, pp.108-9.

⁷² Libby, op.cit., pp.148-9.

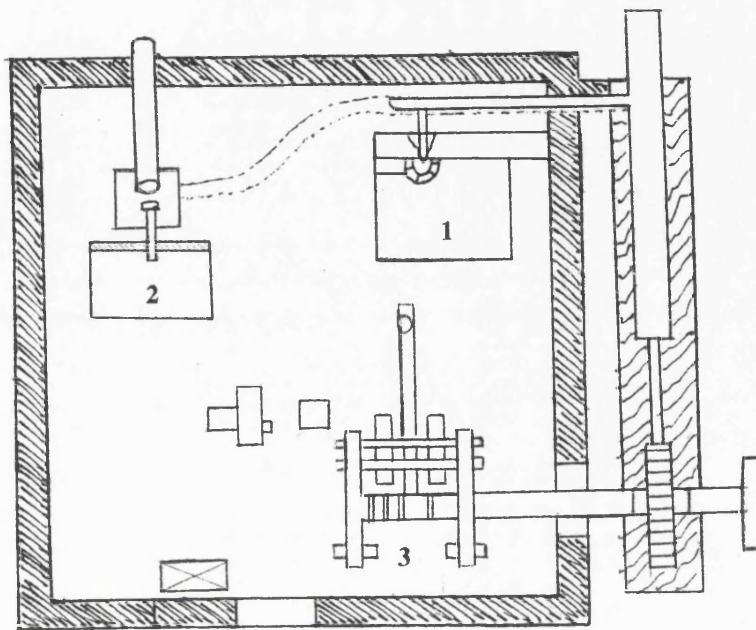
⁷³ Gomes, op.cit., p.112.

⁷⁴ Costa Sena, op.cit., pp.117-41.

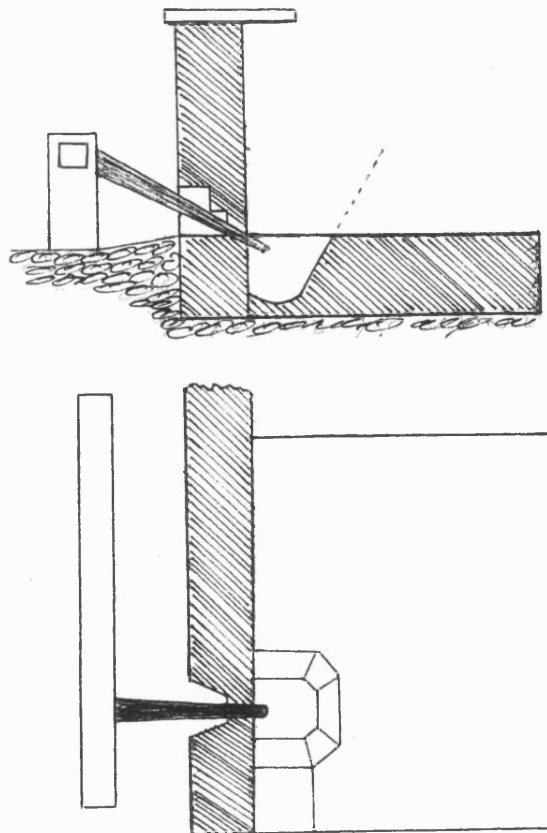
⁷⁵ Gomes, op.cit., p.110.

Figure VII.2 - The Italian Foundry

Plan of the Foundry



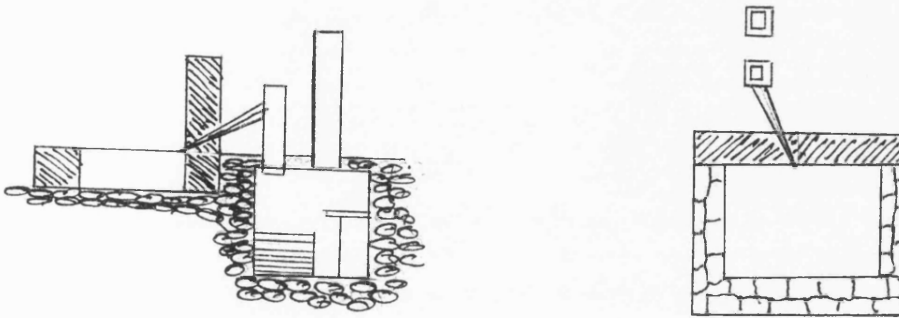
1. Blast Furnace



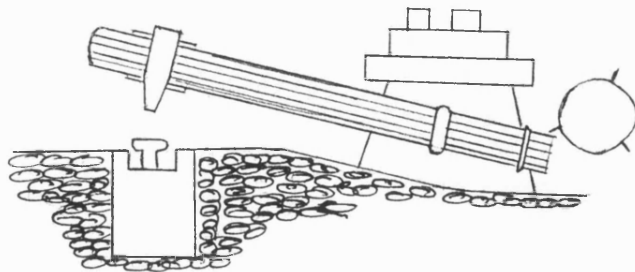
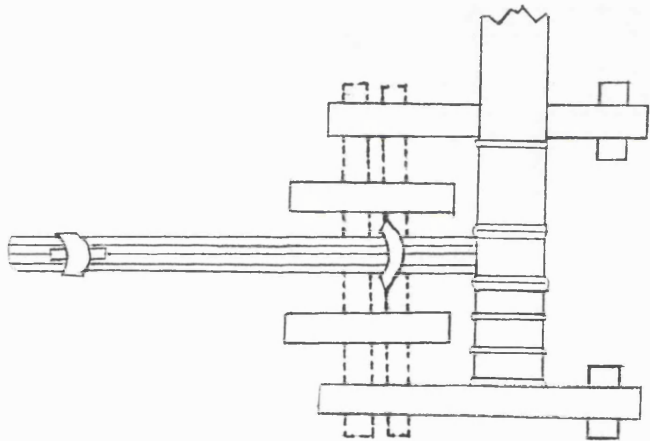
Source: P. Ferrand, "A Indústria de Ferro no Brasil (Provincia de Minas Geraes)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.167-88.

Figure VII.2 - The Italian Foundry

2. Resmelting Furnace



3. Hammermill

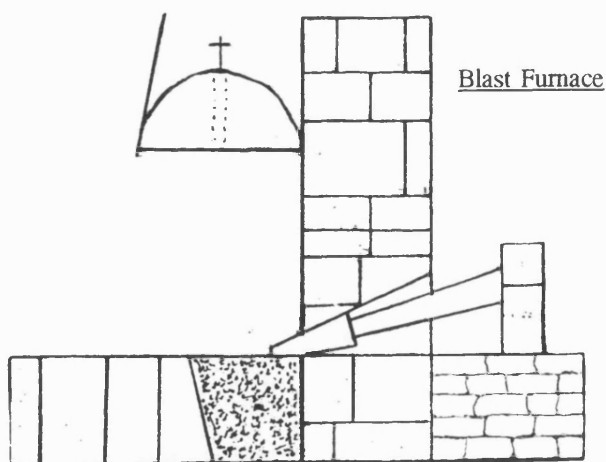
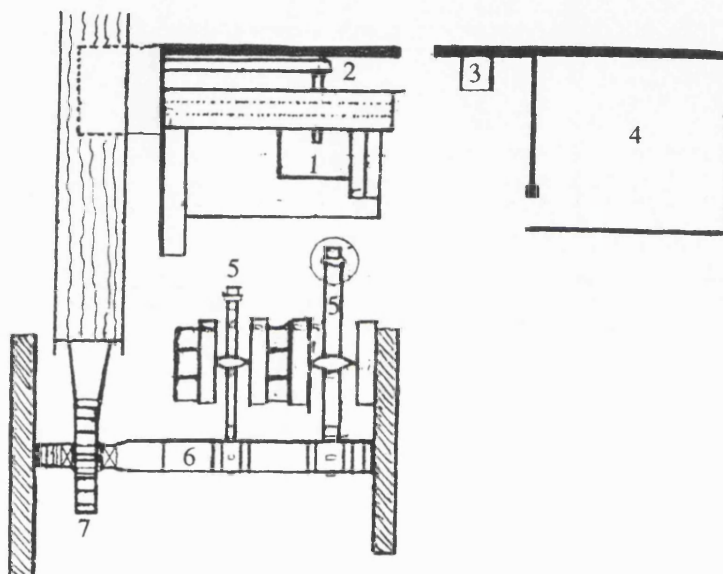


Source: P. Ferrand, "A Indústria de Ferro no Brasil (Provincia de Minas Geraes)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.167-88.

Figure VII.3 - The Catalan Foundry

Plan of the Foundry

- 1. Blast furnace
- 2. Bellows
- 3. Blacksmith's forge
- 4. Charcoal deposit
- 5. Hammermill
- 6. Axle
- 7. Wheel



Source:P.Ferrand, "A Indústria de Ferro no Brasil (Provincia de Minas Geraes)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.167-88.

Hence, for the first three-quarters of the nineteenth century only a small number of the mineiro foundries employed foreign technologies, which were outdated when compared with the technology employed in the more developed countries. The large majority of the iron foundries in Minas Gerais relied on the cadinho method. This indigenous method of production freed iron-masters from the dependence on foreign sources of supply of equipment experimented by the textile, electricity generating and, to a lesser extent, the transport industries. However, the widespread employment of this indigenous technology imposed strict limits to the development of the iron industry. Without access - and, most important, without the economic and technical conditions to have access - to the more modern foreign technology the mineiro industry was doomed to lag and perish. In the late nineteenth century, a few larger iron works emerged employing the - more modern and productive - indirect method of production. Nevertheless, until the end of the 1930s the Brazilian iron industry was mostly made up of small-scale industries still using charcoal. A large-scale iron and steel industry would only emerge as a result of the intervention of the federal government in the 1940s with the establishment of the CSN (Volta Redonda) in the state of Rio de Janeiro⁷⁶. Minas Gerais had to wait until the late 1950s for the emergence of its first integrated iron and steel industry based on coal and on Japanese technology, the USIMINAS⁷⁷.

To conclude, since the Industrial Revolution the international transfer of technology has become crucial to latecomer economies, not only for initial growth, but also for their capacity to sustain development. Most nineteenth-century mineiro industries relied on foreign technology and foreign manufacturers of equipment, machinery, parts, components, and materials. During this period, apart from the most elementary tools, sophisticated equipment could only be found abroad, mainly in Britain and the USA. However, such dependence differed according to the nature of the technology employed. Industries employing more tangible technology and specialized equipment depended more intensely on foreign sources than those employing more intangible technology and universal equipment and machinery. The mineiro textile industry imported from machinery to yarn and dyes and the electricity generating industry also relied heavily on foreign equipment, material and components. Although the CUI also relied on foreign technologies, it did not rely on foreign plants, because the equipment used in road-construction and in the transport of goods and passengers was simple, more universal and could be produced locally. Furthermore, as the technologies used by the company were of a more intangible nature the company relied more on the expertise of people than on equipment. Nevertheless, the company relied on foreign manufacturers to supply components and material of every sort. This reflects the absence not only of a domestic capital goods industry, but also the absence of a domestic network of suppliers of any kind. The only industry in nineteenth-century Minas Gerais to employ an indigenous technology was the iron industry, although a few foundries also employed outdated foreign technologies. Most of the foundries established in the first three-quarters of the last century employed the cadinho technology, an indigenous method of production. However,

⁷⁶ Suzigan, op.cit., pp.277-8.

⁷⁷ Gomes, op.cit., pp.303-50.

this method was very simple and the results were poor. Consequently, the domestic industry perished when it had to face foreign competition.

7.2 - The Handling of the Technologies:

The handling of any technology is a process which begins with the selection of a equipment or process, and involves a range of services which are essential to the continued operation of the technology. These include the ability to diagnose correctly the causes of mechanical breakdown or other sources of poor equipment performance, the availability of facilities and skilled labour to perform repair work and provide routine maintenance, and the provision of spare parts⁷⁸. However, when technologies are carried to points remote and culturally different from where they emerged, they need to be adapted to the local conditions. Therefore, the handling of foreign technology poses special problems which require particular attention. Furthermore, the handling of technologies of different nature require different approaches for each stage. The selection of tangible technologies, for example, depends less on the availability of experts whereas this is a much more critical factor in the selection of an intangible technology, and so on. Consequently, this part of the chapter investigates several of the stages of the handling process of the technologies employed in nineteenth-century Minas Gerais. It examines the process of selection of different technologies, the relationship between users and foreign suppliers, and the adaptation and eventual modification of the technologies adopted.

7.2.1 - The process of selection:

Technologies are generally selected on the basis of highly imperfect information. First of all, in most sectors the degree of choice is often so overwhelming that no single businessman can be aware of the full range of feasible alternatives. Although in most cases decision-makers could benefit from a much greater flow of information, this may be expensive and require considerable time for the accumulation of knowledge. Furthermore, businessmen with a wide range of responsibilities do not generally know where suitable information is to be found. Thus, entrepreneurs rely on a range of imperfect mechanisms for identifying the most suitable sources of supply and/or the most suitable sets of equipment, for example, word-of-mouth recommendations, well-known brand-names, occasional advertisements, firms with whom they have dealt in the past. These criteria for choice are not likely to lead to a reliable determination of technological choice, as the experience of many firms in industrially advanced and developing countries alike have shown. The costs of this form of ignorance can indeed be very large⁷⁹.

In nineteenth-century Minas Gerais, the criteria for the selection of equipment were not very reliable. Entrepreneurs resorted mainly to acquaintances, imported books and specialized magazines, foreigners living in the country, and even business trips abroad. However, different technologies required

⁷⁸ Rosenberg, Perspectives on Technology, pp.154-68.

⁷⁹ R. Kaplinsky, "Technology Transfer, Adaptation and Generation: A Framework for Evaluation", in Technology Transfer in the Developing Countries, ed. M. Chatterji (1990), pp.19-20.

distinct evaluation criteria. Because intangible technologies are carried by people - and not by machinery which perform most of the whole process of production with minimum human intervention - their selection are highly dependent on the availability of those experts. In this sense, metallurgy and road-building during the last century are illustrative.

Metallurgy, for most of the nineteenth century, was still essentially an empirical activity. Thus, the selection of a method of production of iron depended largely on the technical knowledge of workers and/or entrepreneurs/managers. Success in the productive process was affected by variations in resource inputs in ways that could not be predicted or understood and the best mix of resource inputs was found by trial and error⁸⁰. Therefore, not surprisingly, the most successful mineiro foundries in the first three-quarters of the century were set-up by foreigners with extensive knowledge of metallurgy.

Eschwege, for example, had a wide knowledge of natural sciences and wrote extensively on the subject. Furthermore, he came to Brazil after having worked in the Figueiró dos Vinhos foundry in Portugal⁸¹. However, one reason why he used the cadinho method at his foundry was his lack of knowledge of a more complex method of production:

"At that time, I still did not know how to work with the bellows, and I also did not have practical knowledge of the production of iron in the so-called Swedish furnaces."⁸²

Monlevade, founder of the São Miguel de Piracicaba foundry, had an extensive knowledge of metallurgy. Between 1809 and 1812 he studied mining engineering in the Polytechnic of Paris⁸³. His foundry was the only one to employ the Catalan method in Minas Gerais during this period. For more than forty years the foundry obtained good results because of Monlevade's technical knowledge:

"As a mining engineer, he [Monlevade] had a profound knowledge of the process which he employed and as he was continuously present in the foundry, he could overcome his employees' indifference and obtain from them the necessary care."⁸⁴

Nevertheless, when Monlevade died in 1872, his family had to hire an Italian master, who switched from the Catalan the Italian method, because they could not find anyone who could operate the Catalan system⁸⁵. This shows clearly that intangible technologies were selected on the basis of the availability of skilled labour. Once Monlevade was dead, the choice of a method of production was determined by the availability of people able to operate the plant, even if this meant going back to a simpler and less productive process.

Further evidence of the crucial role played by the technical competence of entrepreneurs in the

⁸⁰ Rosenberg, Technology and American Economic Growth, p.77.

⁸¹ Gomes, op.cit., pp.79-85.

⁸² Eschwege, op.cit., p.250.

⁸³ Gomes, op.cit., p.109.

⁸⁴ Ibid., p.109.

⁸⁵ Ibid., pp.109-13.

successful selection of a method of production of iron is provided by the appalling results of the Morro do Pilar foundry. The foundry failed mainly because of poorly conceived plans and the incompetence of its manager⁸⁶. According to Eschwege, Manuel Ferreira da Câmara, founder of the ironwork, made several mistakes in the establishment of the Morro do Pilar foundry. To begin with, insufficient wood was available at the site for the three blast furnaces planned:

"Any practical metallurgist who examines the region will soon be convinced that they [the woods] are not sufficient for even one blast furnace."⁸⁷

Câmara made so many mistakes in the construction of the buildings and the furnaces that he started production only in 1814, two years later than initially planned:

"In 1812, he [Câmara] had hoped to smelt some iron. Nevertheless, he was not successful until 1814, not only because the machinery did not correspond to the end for which it was designed - and consequently had to be modified - but also because he could not make iron without the help of an experienced foundry master."⁸⁸

After trying unsuccessfully for some time to produce iron, Câmara finally hired a German foundry master, who spent six months demolishing and reconstructing all the installations of the foundry:

"Nothing that had been made could be utilized. I demolished everything, including the bellows with their innovations. I reconstructed it and now I am making a hammermill like the one you [Eschwege] have in your own mill."⁸⁹

The history of the *Patriótica*, São Miguel de Piracicaba, and Morro do Pilar foundries illustrate well three different degrees of success in the selection of an intangible technology, such as metallurgy. They also illustrate the importance of technical competence of entrepreneurs. Eschwege's choice of a method of iron production was determined by his own technical knowledge rather than abstract appraisals of available technology. For this reason the *Patriótica* was the first successful foundry in Minas Gerais. Monlevade got the best results for more than forty years due to his technical competence on the chosen method of production. Nevertheless, as soon as he died his achievements in the São Miguel de Piracicaba foundry vanished owing to the lack of an expert to replace him. Câmara is the exemplar case of a complete failure for mistakes committed from the very beginning, i.e. the process of selection.

The case of the *União e Indústria* turnpike is also illustrative of the process of the selection of an intangible technology. It took Mariano Procópio Ferreira Lage several months after a trip to the USA and Europe, where he spent some time studying science and technology, to decide what type of road to build and which method of construction to employ⁹⁰. This was certainly a lengthy and expensive process of

⁸⁶ Libby, *op.cit.*, p.137.

⁸⁷ Eschwege, *op.cit.*, p.207.

⁸⁸ *Ibid.*, p.208.

⁸⁹ *Ibid.*, p.210.

⁹⁰ Bastos, *op.cit.*, pp.15-6.

selection, if one bears in mind that this happened in the first half of the last century - a time when a trip to Europe or the USA was very long and expensive - and that all the effort was only to enable him to choose the technology. In the construction work of the turnpike and the operation of the transport service, Lage employed a number of foreign engineers, architects, surveyors, drivers, craftsmen and so on⁹¹, who together carried the appropriate technologies for these activities. Thus, the analysis of the process of selection of intangible technologies, such as that employed by the iron and the transport industry in nineteenth-century Minas Gerais, has shown that the availability of skilled labour was a crucial factor.

The selection of technologies of a more tangible nature was much less dependent on the local availability of expertise, mainly because this kind of technical knowledge is found embodied in machinery and equipment. Moreover, usually there are a larger number of producers of capital goods competing against each other. Therefore, machine manufacturers ought to have a more aggressive marketing approach - producing catalogues, appointing representatives, etc. - which in the end facilitate the process of selection. Nevertheless, the selection of tangible technologies in the last century was also a lengthy and sometimes very expensive process. In order to acquire detailed practical knowledge of the capabilities and operating technique of machinery, early entrepreneurs resorted to different strategies. They sought to establish direct contacts with overseas producers of machinery or with their representatives in Brazil. They asked for the help of foreigners established in the province. They read technical literature and travelled abroad.

When the Cedro mill was founded and Bernardo Mascarenhas was appointed to select and purchase the machinery. He first went to Rio de Janeiro and São Paulo, where he visited the Santo Aleixo and the São Luís mills respectively. There, he obtained information about the construction of the buildings and the costs involved in the establishment of a textile mill⁹². He then went to the USA, where he stayed for a year and a half. During this period, he inspected various makes and types of machinery, and visited several textile mills in order to acquire knowledge about the technique of cloth production, the lay-out of the factory, and the performance of equipment⁹³.

Some years later, with the establishment of the Cachoeira mill, Bernardo Mascarenhas sent his brother Francisco to talk to J.N. Gordon, chairman of the St. John del Rey Mining Company (SJDRMC), a British gold-mining company which was exploiting the Morro Velho mine in Minas Gerais, in order to obtain information about English machinery. The information obtained from Gordon was not very precise nor helpful and Bernardo decided to select the machinery himself. He then went to the USA and Europe, as mentioned above, where he spent some time inspecting and comparing the various makes and types of machinery and learning how to assemble and operate them:

"I decided to buy the English machines, which are much better for the production of fine

⁹¹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.21.

⁹² A.M. Vaz, Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987, (Belo Horizonte, 1990), p.50.

⁹³ Mascarenhas, Bernardo Mascarenhas, p.37.

cloth. Furthermore, I have no reservation about them anymore, since I have seen them working satisfactorily in Macacos, Petrópolis and São Paulo. (...) I have bought several books and I have studied this subject a great deal. In Manchester I will go daily to the factories to see if I can learn how to assemble the machinery and teach a clever boy how to operate it (...).⁹⁴

Further evidence of the way in which mineiro entrepreneurs selected technology can be found in a letter from Kerr in 1884:

"Knowing that you are interested in bleaching and desirous of being made acquainted with all the latest improvements I have pleasure in handing you the enclosed slips which I have cut from one of today's newspapers."⁹⁵

Very often foreign technicians hired to work at the mills ordered parts, machines and equipment, and wrote the letters in English to overseas suppliers. In 1882, Bernardo Mascarenhas informed Kerr that George Jates, one of the two English technicians employed at the Cedro mill, would soon order the parts necessary for repairing damaged machines⁹⁶. Some years later, Theóphilo Marques Ferreira wrote:

"I soon hope to order the dyeing machinery, but it would be advisable to learn the opinion of the dyer, who is yet to be hired, on the machinery which he believes to be necessary."⁹⁷

Américo Teixeira Guimarães, who founded the CCM in 1886, spent several months learning English in order to consult catalogues to select machinery for his mill⁹⁸.

Towards the turn of the century, the process of selecting textile machinery became easier as foreign producers started to take the lead in approaching the Brazilian entrepreneurs and began to advertise in the local newspapers⁹⁹. Thus, capital goods produced abroad were becoming more easily available and entrepreneurs could select the equipment for their mills through Brazilian and foreign representatives of US and British manufacturers of machinery without having to go abroad, to resort to consulting foreigners, or to spend months studying English or other languages. This development points to the growing importance of the Brazilian market for textile equipment.

The process of selection of electrical equipment did not differ very much from that observed in the case of the textile technology. The main difficulty was that when Bernardo Mascarenhas decided to establish an electrical power company in Juiz de Fora in the 1880s the technology of electricity generation was new,

⁹⁴ Letter from Bernardo Mascarenhas on 18 December 1874 from New York, reproduced in *Ibid.*, pp.64-6.

⁹⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.15", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 17 April 1884".

⁹⁶ D.A. Giroletti, *Fábrica Convento Disciplina*, (Belo Horizonte, 1991), p.85.

⁹⁷ Letter from Theóphilo Marques Ferreira to Robert L. Kerr on 23 March 1889, reproduced in *Ibid.*, p.92.

⁹⁸ Freitas, *op.cit.*, p.27.

⁹⁹ Stein, *op.cit.*, p.50.

even in the most advanced countries, as mentioned above. Few cities in the world were lit by electricity, so there was less scope to observe plants in operation. The installation of the world's first central electric-light power plant, for example, occurred in New York in 1881-82¹⁰⁰. In Brazil, even the capital, Rio de Janeiro, was still lit by gas when Bernardo set-up his hydro-electric power plant¹⁰¹. However, even taking into account the fact that electricity was a science-based technology, the selection of electrical equipment was less dependent on the availability of skilled workers and/or managers than in the case of more intangible technologies.

In 1886, Bernardo Mascarenhas bought the concession to light Juiz de Fora and shortly afterwards he established the CME. The process of selection of the technology for his hydro-electric plant involved much study of electricity. In 1887, the local newspaper O Pharol gave the following account of Mascarenhas' dedication to the study of electricity:

"Mr. Mascarenhas, as an enthusiast for electricity, has been studying the matter for a long time in order to discover its mysteries."¹⁰²

Furthermore, Mascarenhas subscribed to specialized magazines, such as **Electrician** and **Electrical World**. Kerr, his friend and agent from Manchester, sent him prospectuses of various producers of electrical equipment: Zipernowski, Deri & Batty - producers of a new system of transformers -, Matern Platt, and Elwell Parke & Co. Mascarenhas also read several technical publications such as **The Electric Motor and its Application** and **A Practical Treatise on Electric Lighting**, by J.E. Gordon¹⁰³. In 1887, Mascarenhas wrote to Kerr, asking for more and recent publications on the matter:

"I have read with much interest the book on electricity you sent me, and I am delighted with the wonders of that science, mainly with the transmission of power, and light. The book you sent does not teach the wale and theories of the adopted measures - ohm, volts, watts, etc. I have seen in the Catalogue of the Brush Corporation, the advertsiment for General Rules and Tables, that I suppose to be a convenient one for learning the rules and units of measurement. Please send me one by mail."¹⁰⁴

During the same year, he asked the City Council of Juiz de Fora to postpone the inauguration of the lighting service for six months, because he needed to make further studies of the matter¹⁰⁵. At the beginning of 1888, he had finally made up his mind and had decided on the WEC alternating current system. He, thus, sent the

¹⁰⁰ The Longman Encyclopedia, p.328.

¹⁰¹ Mascarenhas, Bernardo Mascarenhas, p.89.

¹⁰² Companhia Mineira de Eletricidade, O Pharol, (Juiz de Fora), Vol.12, 12 November 1887.

¹⁰³ Mascarenhas, Bernardo Mascarenhas, pp.115-6.

¹⁰⁴ Letter from Bernardo Mascarenhas to Robert L. Kerr on 21 February 1887, reproduced in Ibid., p.93.

¹⁰⁵ Ibid., p.115.

order for the equipment together with a detailed plan of the plant¹⁰⁶.

To sum up, depending on the nature of the technology employed, mineiro entrepreneurs resorted to different criteria of selection. Technologies of a more intangible nature, such as metallurgy, road-construction, and transport service, were selected based mainly on the availability of skilled labour. The most successful and productive iron foundries established in the first three-quarters of the last century, for example, were set-up by entrepreneurs with extensive knowledge in metallurgy. The selection of technologies of a more tangible nature, such as that employed in the textile and electricity generating industries, depended on different criteria. As the technical knowledge could be found in the form of machinery and equipment, entrepreneurs engaged in visits to other textile mills, both in Brazil and abroad, established direct contacts with foreign producers of machinery or their representatives, made use of technical books, or even asked for the help of foreigners based in the province. Furthermore, foreign technicians employed by mineiro entrepreneurs themselves were asked to select the appropriate machinery and equipment. However, towards the turn of the century, the selection of machinery became easier and more systematic as foreign producers began to establish representatives in the main cities in Brazil and to advertise in the local newspapers.

7.2.2 - The user-supplier relationship:

Those industries which depended most upon foreign technology suffered an additional problem, namely the nature of their relationship with suppliers of machinery and equipment. Most problems were caused the geographic distance, and the cultural and economic differences between users and producers: machines were not supplied exactly as they were ordered, parts went missing on their long journey from manufacturers to would-be industrialists, machines did not perform as advertised, etc. Among the industries examined in this thesis, this was particularly true of the textile and electricity generating industries. Both the iron industry and the CUI depended more on technical knowledge of skilled labour than on the acquisition of machinery.

In the textile industry, the use of the services of representatives and agents of foreign suppliers of machinery, based in Brazil and abroad, did not always make far smoother the relationship between users and foreign suppliers. In 1872, for example, the Mascarenhas & Irmãos, owners of the Cedro mill, had several problems with the Rio de Janeiro representative, Guilherme Van Vlick Lidgerwood, of the US manufacturer, Author Danfort Paterson, who originally supplied the machinery for the mill. Lidgerwood blamed Mascarenhas for the difficulties with technician recruited to assemble the machinery. Mascarenhas & Irmãos replied that these difficulties were not their fault. The first technician never arrived, returning from Juiz de Fora as soon as he realized that he had to make the rest of the journey by horse. The man was ill and his illness had never allowed him to ride a horse. The second technician did not possess the qualifications for the job, besides being rude, arrogant and insolent. Even so, contrary to what had been alleged, he was paid in full. Furthermore, Mascarenhas & Irmãos contested the suggestion that missing parts

¹⁰⁶ Gomes, op.cit., pp.5-6.

ordered sometime previously, and allegedly sent by the above mentioned representatives, had been stolen on their way to the mill¹⁰⁷:

"Regarding the reels, (...) stolen on the way, as you suggest, but stolen for what purpose? Besides ours, is there any other textile mill in Minas? (...) The truth is that the reels have not arrived although we have already paid for them."¹⁰⁸

As the distance between users and foreign suppliers of machinery was very great, the chances of goods being lost on their long journey to the hinterland of Minas Gerais were greater than if they had been supplied locally. In 1884, for example, Kerr wrote informing Bernardo Mascarenhas that:

"As already advised I sent a short time ago a case containing the same quantity of pegs as was in case BM627 which was lost in transit."¹⁰⁹

In 1891, Kerr wrote to Theóphilo Marques Ferreira regretting the fact that boxes containing dyeing material and a hydro-extractor had been lost¹¹⁰. Part of the machinery of SAIM was also lost on its way to Machado, causing the postponement of the beginning of the production of the mill¹¹¹.

A further problem concerning foreign suppliers was the question of packing. As machinery had to travel long distances by sea, rail, and by muletrain, manufacturers needed to take extra care in packing. Of course, not every producer of machinery was sensitive to the problems of means of transport in a backward country on the other side of the ocean. In 1885, for example, Kerr wrote regretting the fact that much damage had been done to the machinery in transit and added that:

"Messrs. Hobson & Barlon are very careful in their packing. I wish all other makers were as careful, but I am sorry to say that some of them do not appear to be very anxious to improve."¹¹²

In 1893, the agent wrote again asking if the damage caused to the machinery dispatched was due to carelessness in packing¹¹³. During the same year, Francisco de Paula Mascarenhas informed Theóphilo Marques Ferreira, then general manager of the CCC, that most of the machinery recently received was

¹⁰⁷ Companhia Cedro e Cachoeira, "Copiador de Cartas da Fábrica do Cedro - 18/10/1872 a 10/04/1879", "Letter from Mascarenhas & Irmãos to Meilford de Lidgerwood, 18 February 1873".

¹⁰⁸ Companhia Cedro e Cachoeira, "Copiador de Cartas da Fábrica do Cedro - 18/10/1872 a 10/04/1879", "Letter from Mascarenhas & Irmãos to Meilford de Lidgerwood, 18 February 1873".

¹⁰⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.15", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 28 February 1884".

¹¹⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.29", "Letter from Robert L. Kerr to Theóphilo Marques Ferreira, 24 April 1891".

¹¹¹ Costa, *op.cit.*, pp.35-6.

¹¹² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 10 July 1885".

¹¹³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.35", "Letter from Robert L. Kerr to Theóphilo Marques Ferreira, 2 March 1893".

broken on detrainning in Lafaiete and unloading in Sabará¹¹⁴.

The supply of imported equipment was also very slow, sometimes taking months and creating embarrassing situations. In 1891, for example, the lighting service of Juiz de Fora was interrupted because of a breakdown of the generating machinery. The domestic lighting was only reestablished two months later when the new equipment ordered from the USA finally arrived¹¹⁵.

Mistakes in the supply of equipment were not uncommon and also required time to remedy. On 4 January 1884, Francisco de Paula Mascarenhas, manager of the Cachoeira mill, complained that he had opened a box of machinery from England, but the contents (wharves for spindles) were not the ones ordered¹¹⁶. On 24 March 1884, Kerr wrote to Bernardo Mascarenhas that he regretted the mistake made with the spindles wharves. He had already contacted the producers (Hobson & Barlon), who were going to examine the matter and would hopefully give a full explanation in the course of a few days¹¹⁷. On 4 April 1884, Kerr gave the following account about the problem:

"Referring to the spindles wharves which were sent by mistake I beg to say that Messrs. Hobson & Barlon now admit that they by some misunderstanding made the mistake but will supply the same quantity which you have recently ordered free of cost."¹¹⁸

It took three months from the day that the mistake was first noticed to the day that the supplier acknowledged it. The delay between the placing of the order and delivery of the correct material must have been much larger. If users and suppliers were closer to each other the solution would certainly take much less time. In 1885, Kerr again regretted that a wrong pair of hearts had been sent by mistake and, as a right one had already been dispatched, he expected it to be there in a fortnight's time¹¹⁹.

Sometimes machines did not perform as advertised. In 1889, Bernardo Mascarenhas advised Marques Ferreira, then general manager of the CCC, not to believe everything that the catalogues of the producers of machinery said, because they tended to exaggerate the performance of machines¹²⁰. Moreover, machines did not always perform as expected and procuring replacements was a complex and long operation.

¹¹⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.35", "Letter from Francisco de Paula Mascarenhas to Theóphilo Marques Ferreira, 13 January 1893".

¹¹⁵ Companhia Mineira de Eletricidade, O Pharol, (Juiz de Fora), 27 March 1891.

¹¹⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.15", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 4 January 1884".

¹¹⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.15", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 24 March 1884".

¹¹⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.15", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 4 April 1884".

¹¹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 18 September 1885".

¹²⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências - Bernardo Mascarenhas, 1883-1899 - No.148", "Letter from Bernardo Mascarenhas to Theóphilo Marques Ferreira, 20 April 1889".

In 1885, for example, Kerr wrote that he greatly regretted that the governors supplied with a turbine by Gunther had not worked satisfactorily. The poor performance could have been caused by the speed at which the governors were working:

"They [the governors] were running for several days before leaving the workshop and appeared to act very well and were very sensitive to any change in speed. It may be that they have not been working at the proper speed. I expect when you go to Cachoeira you will be able to find out why they do not work well."¹²¹

On other occasions, foreign suppliers failed to keep their word. In 1893, Henry Rogers Sons & Co., a representative from Rio de Janeiro, wrote that a supplier was refusing to exchange a part which did not fit the machinery of one of the mills of the CCC, although the supplier had promised to do so before he supplied it. The supplier argued that the part had signs of use and that a long time had passed since it had been sent to Brazil¹²².

On yet other occasions, machines were not always supplied according to the specifications stipulated. In 1885, Francisco de Paula Mascarenhas complained that looms received did not satisfy his specifications stipulated in the order:

"All of the looms were set on the right side whereas in the plan several of them should be set on the left side. This will bring lots of problems if there is no solution."¹²³

In 1899, Kerr informed Aristides Mascarenhas that the dyeing machine ordered for the Cachoeira mill had been made with only twelve divisions, instead of the fifteen originally ordered. The suppliers had never made such a large machine before and they had thought it would be unwise to do so¹²⁴. In 1901, Victor Uslaender & Co., an agent from Rio de Janeiro, wrote that the machine was supplied with a table of 36" x 20", instead of 30" X 20", as ordered. The manufacturer had decided to make the machine larger because he thought it would otherwise not leave enough space for the operative¹²⁵.

There were also times when a foreign supplier did not even guarantee that the equipment supplied would work at all. The first experiments with the equipment supplied by the WEC to the CME to generate electricity were unsuccessful. The supplier did not guarantee anything and expressed reservations about the chances of the equipment ever working. Moreover, the material was not supplied according to specifications

¹²¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 30 October 1885".

¹²² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.36", "Letter from Henry Rogers Sons & Co. to Francisco de Paula Mascarenhas, 5 August 1893".

¹²³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 22 April 1885".

¹²⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.51", "Letter from Robert L. Kerr to Aristides Mascarenhas, 15 June 1899".

¹²⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.58", "Letter from Victor Uslaender & Co., 11 December 1901".

originally drawn-up by Bernardo Mascarenhas. Also the quantity was insufficient¹²⁶.

Users of foreign technology were also more vulnerable to increases in the prices of materials and machinery because of the length of time between placing an order and delivery, and because any change in the exchange rates might represent an increase in their costs. Exchange variations posed a particular problem for Brazilian importers, especially during the late nineteenth century¹²⁷. In 1893, for example, the CME increased the price of domestic lighting by 50% because of the increase in the prices, among other things, of imported materials and machinery¹²⁸.

Finally, sometimes foreign suppliers were themselves victims of some of problems caused by geographic distance and cultural differences. In 1899, for example, the makers of a hardwaste breaking machine complained that the machine had been ready for a long time and that Kerr had done nothing towards having it collected:

"The machine has been in our way now so long and you do not give us any intimation when you will take it that we now give you formal notice that failing receipt from you within 14 days of the requested instructions, we shall dispose of the machine and sue you for Ten Pounds as our damage for breach of contract."¹²⁹

Distance and cultural and economic differences invariably caused problems of communication.

Geographical and cultural distance is a factor which may hinder the interaction between users and producers, and consequently jeopardize the absorption of a foreign technology¹³⁰. In the past, physical proximity between the producer and user of machinery was a significant factor promoting successful transfer of technology. Easy communication between the producer and user of machinery was important because it fostered and strengthened a complex network of contacts and communication. This promoted a convergence of interests between the user of a machine, who appreciates problems in connection with its use, and the producer of machinery, who is acquainted with the problems concerning machinery production¹³¹. However, as nineteenth century technologies were produced in places other than Portuguese-speaking countries and as most firms in Minas Gerais relied on foreign technology and were strongly depended on foreign skilled

¹²⁶ Mascarenhas, Bernardo Mascarenhas, p.140.

¹²⁷ For a more detailed account of exchange rate variations in nineteenth-century Brazil see E.A. Cardoso, "Exchange Rates in Nineteenth-Century Brazil: An Econometric Model", in The Journal of Development Studies, V.19 January 1983 No.2, pp.170-8.

¹²⁸ Companhia Mineira de Eletricidade, "Letter from Bernardo Mascarenhas to the president of the City Council of Juiz de Fora on 7 June 1893".

¹²⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.51", "Letter to Robert L. Kerr, 11 August 1899".

¹³⁰ B.A. Lundvall, "Innovation as an Interactive Process: From User-Producer Interaction to the National System of Innovation", in Technical Change and Economic Theory, ed. G. Dosi, C. Freeman, R. Nelson, G. Silverberg, and L. Soete (1988), pp.349-66.

¹³¹ Rosenberg, Perspectives on Technology, p.168.

labour, problems of communication were aggravated. Because of a scarcity of illustrative material for the other economic sectors, the case of the textile industry will be mainly used to demonstrate some of the problems of communication that businesses in Minas Gerais encountered during the last century.

Although there is no direct evidence for the iron industry and the CUI, it is possible to speculate about the extent that these sectors problems were caused by poor communications. As the technologies used by these industries relied heavily on the technical knowledge of personnel, and as there was a large number of foreign entrepreneurs, managers and technicians, employed in both the iron industry and the CUI, it is reasonable to believe that the question of communication was crucial for the operation of these technologies. The learning of a foreign language was a crucial requisite for both entrepreneurs and workers. Eschwege, founder of the Patriótica foundry, for example, was a German. However, when he came to Minas Gerais he probably could already speak Portuguese since had previously worked in Portugal¹³². Nevertheless, Monlevade, founder of the São Miguel de Piracicaba foundry, was a Frenchman who until the year when he came to Brazil lived in France. It is interesting to note that Monlevade's foundry was established only ten years after his arrival in Minas Gerais. He spent most of this time studying the deposits of minerals of Minas Gerais¹³³, and had probably to learn Portuguese before attempting to invest in any kind of business. Schoenewolf, a German foundry master, who worked in both the Patriótica and the Morro do Pilar foundries¹³⁴, had probably also to learn the language before he could effectively manage a foundry in Brazil. Mariano Procópio Ferreira Lage, founder of the CUI, spent some time in the USA and Europe¹³⁵ where he probably learned several languages. This proved important some years later when he organized the CUI, as most of the professionals and skilled workers employed by the company were foreigners¹³⁶.

Nevertheless, this is only speculation and direct evidence of the problem of communication can only be found for the textile industry. mineiro textile entrepreneurs had to learn a foreign language before they could even make the first contact with the producers of machinery. When the Cedro mill was established Bernardo Mascarenhas spent a year and a half in the USA learning English, while visiting several textile mills to get the know-how of the production of cloth¹³⁷. The learning of English would prove to be very important in his future entrepreneurial activities. By the time of the establishment of the Cachoeira mill, Bernardo spent eight months in England studying, working, and visiting factories. In Manchester, at Metropolitan Vickers, he met the engineer Robert L. Kerr who would become a close friend, his agent and

¹³² Gomes, op.cit., p.79.

¹³³ Ibid., p.109.

¹³⁴ Eschwege, op.cit., p.208.

¹³⁵ Bastos, op.cit., p.23.

¹³⁶ See Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), pp.13-4; (1857), p.21; and (1866), Annexe No.12.

¹³⁷ Mascarenhas, Bernardo Mascarenhas, p.37.

a very useful contact in England¹³⁸. Furthermore, Bernardo's command of English proved crucial by the time of the establishment of the CME, as seen above. Américo Teixeira Guimarães - founder of the CCM - had to learn English before sending the first letters to manufacturers of machinery in England. It took him several months of hard study before he could had a sufficient grasp of the language to carry out these transactions¹³⁹.

Furthermore, not only textile entrepreneurs had to learn a foreign language. Foreign workers employed by them also had to acquire language skills, as illustrated by the following letter sent to J.N. Gordon, chairman of the SJDRMC:

"I am returning Mr. Jorge Gregor as we do not need an interpreter anymore, since the Americans already understand Portuguese (...)." ¹⁴⁰

Communication problems should not be underestimated since most firms in Minas Gerais relied on foreign technology and depended strongly on foreign skilled workers.

Thus, there were many problems, old and new, in the user-supplier relationship which were created and aggravated by geographic distance and socio, cultural and economic differences. The most common of these problems were: delays in delivery, adulterated orders, inevitable misunderstandings, loss of goods, lack of sensitivity on the part of the suppliers to the specific circumstances of foreign users, vulnerability to changes in prices due to changes in the exchange rates, and unfulfilled promises. This was particularly true for those industries using embodied technologies, such as the textile and the power industries. The iron industry and the CUI depended more on the accumulated technical knowledge of skilled labour than on the acquisition of machinery. Another important problem in the relationship between users and producers who did not share common cultural features was the question of communication. Often mineiro entrepreneurs had to learn a foreign language before they could make the first contact with the suppliers of technology, while foreign workers sometimes had to rely on interpreters before they could understand Portuguese properly. Thus, the number of problems faced by the mineiro entrepreneurs in their relationship with foreign suppliers is undisputed and evidences the importance of physical proximity between users and suppliers for the successful absorption of technology. If the problems related to the distance and cultural differences between users and suppliers did not hinder the emergence of some of the industries examined in this work, they certainly delayed their development and increased their costs.

7.2.3 - Installation, maintenance, and adaptation:

Selecting and purchasing the right equipment or machinery was neither the hardest nor the least of the problems that mineiro entrepreneurs had to overcome in dealing with foreign suppliers and foreign technologies. After obtaining the appropriate equipment and before installing it, transporting it could prove

¹³⁸ Ibid., pp.63-4.

¹³⁹ Freitas, op.cit., p.27.

¹⁴⁰ Companhia Cedro e Cachoeira, "Copiador de Cartas da Fábrica do Cedro - 18/10/1872 a 10/04/1879", "Letter from Mascarenhas & Irmãos to J.N. Gordon, 6 November 1872".

a real handicap. The problems of transport of machinery in the nineteenth century, from their countries of origin to their final destination, cannot be neglected. Very often the lack of suitable means of transport in latecomer economies represented an enormous barrier.

Nevertheless, the problem posed by the lack of roads did not affect every industry in the same way. The transport of equipment did not represent a major problem for those industries which employed a more disembodied technology. As mentioned above, metallurgy and road-construction in the nineteenth century depended more on technical competence of skilled labour than on the acquisition of machinery. The basic machinery could be, and actually was, built on the site. Eschwege, for example, helped by a carpenter built most of his foundry's facilities, from the furnaces to the bellows¹⁴¹. The installations of the Morro do Pilar foundry were also built on site¹⁴². Furthermore, the commonest method of production employed by the iron industry in the first three-quarters of the last century - the cadinho method - was an indigenous and simple, and did not require complex facilities¹⁴³. The CUI also made most of its equipment on site, as the description of the workshops of the company suggests:

"There are established in Juiz de Fora workshops for a blacksmith, locksmith, carpenter of carriages, carts and coaches, carpenter of bridges and buildings, cabinet-maker, beltmaker and saddler, and painter."¹⁴⁴

The company also had a brickyard in the Juiz de Fora station which produce bricks and tiles¹⁴⁵.

Even so, foundries depended on some imported material, as the German foundry master Schoenewolf, who worked in the Morro do Pilar foundry for several years, showed clearly in his report to Eschwege about the planned changes in the facilities of the foundry:

"Everything will change now, including refractory material, which was ordered in England, because the existing ones were useless after few days."¹⁴⁶

The hammermills of Eschwege's foundry were also imported from England, since it was virtually impossible to produce them in Brazil¹⁴⁷. As already mentioned, the CUI depended on some imported material and components. At the time of the construction of the União e Indústria turnpike the company had repeated problems in transporting material bought abroad. In 1856, Mariano Procópio Ferreira Lage complained about the troubles caused by delays in clearing through customs imported material purchased in Europe. He illustrated very clearly the extent of such problems in the middle of the nineteenth century:

¹⁴¹ Eschwege, op.cit., p.248.

¹⁴² Ibid., p.208.

¹⁴³ Libby, op.cit., pp.147-8.

¹⁴⁴ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.23.

¹⁴⁵ Bastos, op.cit., pp.40-1.

¹⁴⁶ Eschwege, op.cit., p.210.

¹⁴⁷ Gomes, op.cit., p.84.

"One day of delay of any object in the customs in Rio de Janeiro may represent a delay of two or three months, if by any chance we miss a muletrain that could bring it."¹⁴⁸

Thus, although both the iron industry and the CUI were not totally free of the problems caused by the lack of suitable means of transport, which greatly disturbed other businesses, they were not unaffected.

The most affected industries were those that employed technologies embodied in the form of equipment and machinery. Due to the lack of roads, the transport of textile machinery from the port of Rio de Janeiro to the hinterlands of Minas Gerais was full of adventures and obstacles. Machines had to be carried on the back of beasts of burden. Roads were rough and sometimes bridges had to be built along the way.

Bernardo Mascarenhas, for example, arrived in Rio de Janeiro from the USA with 50 tons of machinery in 1871. From there, the machinery was transported to Entre Rios by rail, and from Entre Rios to Juiz de Fora in large carts by the CUI. From Juiz de Fora onwards, the machinery was transported in ox-carts. The trip took approximately two months to cover a distance of nearly 250 miles¹⁴⁹. An eye witness recalled the caravan passing by:

"A long time ago, when I was a child, I was woken up by the noise of the huge caravan of carts drawn by oxen passing, in the morning, through the small village of Santa Quitéria, (...) carrying the machinery for the Cedro textile mill (...). Even now I can recall the large number of men carrying hoes, pickaxes, and shovels, anticipating the caravan and crossing the village to fix and build bridges along the way where the heavy carts had to pass (...)."¹⁵⁰

Further evidence of the lack of basic infrastructure and the difficulties in transporting machinery is given by the proprietors of the Cedro mill in their reply to the inquiry of the president of the Sete Lagoas City Council:

"The only difficulty in the acquisition of machines is freight, which is expensive and very slow from Rio de Janeiro to the mill."¹⁵¹

Moreover, the lack of suitable means of transport imposed strict limits on the ability of the suppliers or agents to dispatch machinery, parts and materials. In 1884, Kerr informed Bernardo Mascarenhas that he had sent three cases exceeding the weight permissible for transport on the backs of mules because the suppliers could not make them any lighter¹⁵². Some days later, Kerr gave the following account of the problems that had to be overcome when supplying materials to the textile mills located in the hinterland of

¹⁴⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.22.

¹⁴⁹ Vaz, op.cit., p.50.

¹⁵⁰ Ibid., p.50.

¹⁵¹ Companhia Cedro e Cachoeira, "Copiador de Cartas de 1881 - Mascarenhas & Irmãos", "Letter from Mascarenhas Irmãos to the president of the Sete Lagoas District Council, 13 March 1882".

¹⁵² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 8 July 1884".

Minas Gerais:

"With respect to the sizes of cases ordered by you for the dyeing materials I found several of them would have been too heavy for being conveyed on the backs of mules, I therefore have supplied you with smaller cases, and making up the quantity to a certain extent by increasing the number of cases. The Brown Catechu is only supplied in solid blocks, and the smallest block I could buy weighed about 3 [?] (...), so that I was obliged to purchase the block and get it cut into 3 pieces to suit the weights allowed for the back of mules."¹⁵³

The opening of roads and the building of bridges on the way from Entre-Rios to Machado seems also to have been the destiny of Azarias de Sousa Dias, the founder of the SAIM. A slave who took part on the trip to bring the machinery to Machado, Antonio Moreira de Souza Guerra, better known as Chico Moreira, recalled that the oxen had to be constantly changed in order to continue the exhausting journey. Furthermore, as mentioned above, one of the explanations given for the postponement of the beginning of the production of the mill was that part of the machinery had been lost during the trip¹⁵⁴.

As had happened to Bernardo Mascarenhas and his brothers fifteen years before, Américo Teixeira Guimarães faced very similar problems when he transported machinery for his mill in Cachoeira dos Macacos, which was not very far from the Cedro mill. To reach Cachoeira dos Macacos, the machinery was transported on the backs of animals and in large carts drawn by oxen especially built for the carriage of machinery. The journey took more than two months from Juiz de Fora, the railhead¹⁵⁵.

Towards the end of the nineteenth century, the problem of transporting machinery became less acute, as the railway was penetrating farther and farther into the hinterlands of Minas Gerais. However, the problems of transport mentioned above did not disappear completely. In the early 1890s, machinery for the CTS was probably transported to either Divinópolis or Sabará, the closest railway stations at that time, some twenty five and fifty miles distance respectively, and from there to Sanct'Anna do São João Acima by ox-carts. This was indeed an improvement, though not the end of serious problems, as Zé Carreiro, who had participated in the journey as a driver, observed:

"Hard time. (...)

We left family and friends behind. We needed a couple of days to prepare. (...)

(...) it required skill to load the cart. If the load were not well positioned the cart would tilt forwards or backwards. Tilting forwards would hurt the back of the oxen; backwards would strangle them. (...)

(...) As a rule, we knew the road. We knew the pot-holes, the cliffs, the holes, (...), the right places to rest. It was possible to travel up to five leagues per day. (...) There were times of anguish. The pot-holes, for example, were as deep as they were wide and were impossible to cross. The carts and the oxen would sink. It would be a great disaster and the best thing to do was to avoid them, passing by their edges. Nevertheless, there were pot-holes that deceived the driver, even the most experienced. But the biggest danger were the cliffs. There were some of more than a hundred fathoms high, very steep. God help me! I do not like to recall it. When it was raining

¹⁵³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 31 July 1884".

¹⁵⁴ Costa, *op.cit.*, pp.35-6.

¹⁵⁵ Freitas, *op.cit.*, p.27.

the surface became very slippery. Saying it like that does not sound dangerous, but it really was. To pass along a road like that required experience. We were always afraid of losing the oxen, the cart or even the load. (...) ¹⁵⁶.

Zé Carreiro's description gives a good idea of the obstacles entrepreneurs had to overcome even before starting production. Furthermore, it graphically illustrates the lack of basic infrastructure in Minas Gerais, even at a time when the railway was starting to reach the hinterland of the province.

Although the mineiro electrical power companies also employed technologies embodied in equipment, the transport of this equipment did not represent a major obstacle for several reasons. The power companies were established mainly at the turn of the century, a time when the means of transport had improved considerably. The CME, for example, was established on 10 December 1887¹⁵⁷ and the CFLCL on 26 February 1905¹⁵⁸. More importantly, however, they were both located in the southern part of Minas Gerais, one of the first regions to be linked to Rio de Janeiro by good means of transport and where there was an extensive network of good roads. The CME was located in Juiz de Fora, which was served by the União e Indústria turnpike from the late 1850's¹⁵⁹ and by the D. Pedro II railway (EFDPII) a few years later¹⁶⁰. The CFLCL was located very near to Juiz de Fora, in the Mata zone.

Owing to the lack of suitable means of transport, the problems of shipping foreign machinery and equipment from their countries of origin to their final destination represented an enormous barrier, specially for the textile industry.

Once the first difficulties of selecting and purchasing a technology - and in the case of embodied technologies, of transporting it - had been overcome, it had to be installed and put into operation. When the transfer of technology involved countries geographically distant from one another, this implied that skilled labour had also to be procured overseas. Technology is not a set of techniques available independently of the human inputs who utilize it. The capacity to understand and apply technical knowledge is essential for the successful utilization information incorporated in any "technological package"¹⁶¹. In some countries skilled migrant labour played a critical role not only in setting up a technology but also on its daily operation. Most Paulista railways, for example, drew heavily on foreign labour for assembling imported material during construction phases and later in maintenance operations. At the outset, Paulista railways

¹⁵⁶ J.W.T. Mello, Santanense: Revolução Filosófica e Industrial em Sanct'Anna do São João Acima, (Belo Horizonte, 1991), p.142.

¹⁵⁷ Mascarenhas, Bernardo Mascarenhas, p.120.

¹⁵⁸ Companhia Força e Luz Cataguazes-Leopoldina, 80 Anos da Companhia Força e Luz Cataguazes-Leopoldina: Uma Luz sobre a História, (1985), p.1.

¹⁵⁹ Bastos, op.cit., p.30.

¹⁶⁰ F. Iglésias, Política Econômica do Governo Provincial Mineiro: 1835-1889, (Rio de Janeiro, 1958), p.165.

¹⁶¹ Rosenberg, Perspectives on Technology, pp.154-68.

depended entirely upon foreigners for both skilled and unskilled labour, as local supply was scarce. Foreigners, until the turn of the century, virtually monopolized skilled jobs¹⁶². Mineiro entrepreneurs very often also had to rely on foreign technicians to assemble, operate and maintain imported equipment. However, these foreign technicians were neither easy to find nor reliable. Furthermore, they were expensive and relationships with them usually proved difficult.

As in the case of the USA, where the transfer of iron and steel technologies took place via the migration of artisans or managers experienced in using the technology¹⁶³, foreign entrepreneurs and ironworkers were extremely important in the establishment of the mineiro iron industry. However, the search for these foreign ironworkers was an uncertain enterprise for Brazilian businessmen compared to their US counterparts. Besides demanding high salaries and, sometimes, not possessing the knowledge they claimed, these ironworkers rarely stayed in the same foundry for long. Thus, hiring a European technician was usually prohibitively expensive. This is one of the reasons why the çadinho method was so popular¹⁶⁴.

The largest foundries established in Minas Gerais in the earlier part of the nineteenth century were either owned by foreigners or relied upon foreign technicians. As mentioned above, two of the most successful foundries belonged to foreigners. The Patriótica was established, operated, and managed by Eschwege, a German engineer¹⁶⁵. Moreover, Eschwege counted on the help of a German foundry master, who was considered very competent¹⁶⁶. Also as indicated above, the São Miguel de Piracicaba foundry belonged to the French engineer Monlevade and was for more than forty years, under his management, obtaining the best results among all the foundries in Minas Gerais¹⁶⁷. Production at the Morro do Pilar foundry was only possible after Schoenewolf, the German foundry master who worked at the Patriótica foundry, was hired to supervise the work in 1814. His presence was absolutely vital to the successful production of the foundry¹⁶⁸.

Eschwege stressed the vital role played by foreign ironworkers in setting up an iron foundry in Brazil. They were essential not only for assembling the facilities but also for training the native workforce. However, these foreign technicians earned three times more than Brazilian masters and their travelling expenses were high. There were further problems:

"The foreign masters, who believe themselves to be indispensable, make several demands.

¹⁶² R.H. Mattoon, "Railroads, Coffee, and Big Business in São Paulo Brazil", in HAHR, May 1977, Vol. 57, No.2, pp.289-93.

¹⁶³ Hyde, op.cit., pp.52-70.

¹⁶⁴ Libby, op.cit., p.141.

¹⁶⁵ Eschewege, op.cit., pp.247-54.

¹⁶⁶ Gomes, op.cit., p.83.

¹⁶⁷ Libby, op.cit., p.149.

¹⁶⁸ Eschwege, op.cit., p.208.

Some become idle and others take to drink. As a consequence, they quarrel with their employers, who in the end dismiss them. The work is then done by Brazilians who have only learned a little from the foreign masters. Consequently, the products do not improve and production does not increase with change. Thus, the entrepreneurs are forced to close down their foundries."¹⁶⁹

The reliance upon foreigners in the construction and operation of the União e Indústria turnpike was also strong. As in the case of paulista railways established in the second half of the last century, at least at the beginning the CUI depended heavily on foreigners for skilled labour. The construction of the road was supervised by two French engineers, J.J. Regnier Vigouroux and Theodoro Flagolot, until 1856¹⁷⁰. In 1857, the French engineers were replaced by a German, Keller, and a Brazilian engineer, Bulhões. During the same year, the company also hired Keller's two sons to work as his assistants, who were probably not Brazilians¹⁷¹. For the architectural and surveying work, foreigners were also employed, namely Carlos Augusto Gambis and Miguel Lallemand, architects, and Adryano H. Mynssen, surveyor¹⁷². Moreover, in 1856, Mariano Procópio stated that the company had recruited 20 craftsmen in Hamburg for the workshops¹⁷³. According to the decree of 7 August 1852, which granted the company the concession for the construction of the turnpike, the company established a colony of immigrants in Juiz de Fora in 1858. Among the 667 adults, 389 men and 278 women, who lived in the colony in 1860, approximately 196 worked for the company: 48 in the brickyard, 85 in the workshops, 55 in the construction of the road, 5 in the warehouse and 3 as drivers¹⁷⁴.

The mineiro textile industry is full of examples of how crucial foreign technicians were, and how difficult relationships with them might become. The contract for the purchase of machinery for the Cedro mill, for example, included the provision of a technician to assemble and operate the machinery¹⁷⁵. However, after having reached its final destination after the long journey from the USA, where it has been made, to the hinterlands of Minas Gerais, where the Cedro mill was located, the machinery was left standing for months for a technician to assemble it. As already mentioned, the first technician who came from the USA in accordance with the contract never arrived. Then, two other technicians were hired, Barnes and Nicholson.

¹⁶⁹ Ibid., pp.257-8.

¹⁷⁰ A.O. Esteves, "Mariano Procópio: Trabalhos Originais", in Revista do Instituto Histórico e Geográfico Brasileiro, (Rio de Janeiro, 1856), Vol.230, pp.149-52.

¹⁷¹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.21.

¹⁷² D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980, p.27.

¹⁷³ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.13.

¹⁷⁴ Giroletti, A Companhia e a Rodovia União e Indústria, pp.31-7.

¹⁷⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.2", "Contract of purchase of machinery signed by Mascarenhas & Irmãos and Gme. Van Vlick Lidgerwood, 27 September 1870".

Barnes left the company five months after his arrival. He did not have the qualifications he claimed and his relationship with the Mascarenhas rapidly deteriorated:

"The story that Barnes is an experienced and excellent machinist is a great mistake. Barnes never was a machinist. He was a bad weaver in a factory, and finally worked as a taverner in New York, where he pretended to be a practical machinist, an occupation of which he is completely ignorant. This man, who cost us so much, has done nothing more than damage machines. Furthermore, he is rude, arrogant, and insolent. He broke off all his relationships, even with his countrymen, James and his wife. He himself decided to do us a favour and left."¹⁷⁶

Nicholson stayed longer in the company and his wife became responsible for the training of the weavers. Furthermore, at least in the first years, every master in the mill, apart from the blacksmith and carpenter masters, was hired abroad, preferably in the country where the machinery had been bought¹⁷⁷. In 1879, two Englishmen, George Jates and Nathan Holt, experts in weaving and spinning, were recruited by Kerr to work at the Cedro mill. Nathan Holt was dismissed in 1882 because of his rudeness and carelessness, which had caused considerable damage to the machinery. Obviously, there are two sides of the story and this is only the version of the employer. The worker's version, as usual, is not available. George Jates also left in 1882 and the company hired another foreign technician, John Smith, in the same year¹⁷⁸.

At the beginning, the Cachoeira mill also relied on foreign technicians to supervise work. In 1876, the Cachoeira mill hired an Englishman, William Hutchinson, for two years to set-up and operate the mill and train the workforce. In 1879, another two foreign machinists, John and William Lomas, and a foreign weaver, Andrew White, were hired to replace William Hutchinson, who had returned to England. The first machinist left the company to visit England in 1882 but would not promise to return. In the same year, William Lomas and Andrew White ran away during the night, but there is no information about the reasons which motivated them to do it. Nevertheless, based on the number of problems with foreign workers that employers reported, it is reasonable to believe that the attitude of mineiro employers towards their workforce was harsh. In 1883, James Winders, another Englishman, was hired to work at the mill¹⁷⁹.

The employment of, and the search for foreign technicians, as well as the problems of retaining foreign workers, continued throughout the century and remained at the beginning of this century. James Winders continued to be employed at the CCC, after the merger of the Cedro and the Cachoeira mills, until 1889 despite the numerous problems he caused. In 1888, Francisco de Paula Mascarenhas wrote to Bernardo Mascarenhas giving the following account of James Winders' misbehaviour:

"During my absence, while I was travelling to São Sebastião, several regrettable events occurred caused by James' drunkenness. (...) Last Saturday, with the excuse of a row

¹⁷⁶ Companhia Cedro e Cachoeira, "Copiador de Cartas da Fábrica do Cedro - 18/10/1872 a 10/04/1879", "Letter from Mascarenhas & Irmãos to Meilford de Lidgerwood, 18 February 1873".

¹⁷⁷ Vaz, op.cit., p.53.

¹⁷⁸ Giroletti, Fábrica Convento Disciplina, , pp.84-6.

¹⁷⁹ Ibid., pp.86-8.

between his wife and the Winders, James assaulted her, (...). On Sunday, James got drunk and assaulted his wife once again, causing a great scandal and too much screaming, and intended to shoot her with a gun and a rifle; meanwhile, an employee of the mill went there to save the poor woman and he was also assaulted by James. The insulted man grasped the Englishman and beat him badly, but not as much as he deserved."¹⁸⁰

However, there is no information about Winders' story. In 1884, Kerr wrote saying that he had made enquiries about an experienced and skilful dyer and that he had found that such workers expected to earn from £5 to £6 per week, plus free accommodation¹⁸¹. Although there is no information about the salary of a Brazilian machinist during this year, comparison between the salaries of James Nicholson and his wife in 1872, and that of a Brazilian machinist five years later is illustrative of the differences between the salaries paid to foreigners and Brazilians. In the first case, James Nicholson received 10\$000 Milreis per day, plus food and accommodation, and his wife 4\$000 Milreis. In the second case, a Brazilian machinist received in 1877 5\$000 Milreis, without food or accommodation¹⁸². In December 1886, Kerr gave the following account of the conditions to recruit a mechanic in England:

"With reference to looking out for another mechanic I presume I must not send any one until I hear from you again. I should like to know if you require a man who understand carding, spinning and weaving, and also the same man capable of erecting machinery and keeping the same in good order. It is rather difficult to find a man who is capable of doing all these things, but I would do my best for you."¹⁸³

Moreover, William Hutchinson's long story with the CCC illustrates well not only the difficulties of recruiting skilled foreign labour, but also the difficulty of retaining it. In 1883, William Hutchinson was invited to work for the company once again. Nevertheless, he decided not to go back to Brazil because his wife would not agree to accept the offer:

"In respect to our conversation respecting going to Brazil I have had very much conversation with my wife since I saw you at the mill, but she seems to take it very hard, (...), we are both very sorry that we cannot reply in your favour (...)."¹⁸⁴

In September 1886, Kerr wrote saying that he had spoken to William Hutchinson, who would consider the matter of rejoining the CCC and would reply in the course of a few days¹⁸⁵. Three months later, Kerr wrote

¹⁸⁰ Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas on 9 June 1888, reproduced in *Ibid.*, pp.89-90.

¹⁸¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 8 July 1884".

¹⁸² Vaz, *op.cit.*, p.201.

¹⁸³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 11 December 1886".

¹⁸⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.14", "Letter from William Hutchinson to Robert L. Kerr, 7 January 1883".

¹⁸⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 2 August 1886".

that Hutchinson was reluctant to travel to Brazil, unless the company was willing to offer him great inducements to leave home again¹⁸⁶. However, it seems that the CCC decided to pay the "great inducements" that Hutchinson was requesting, as in 1889 he rejoined the company for a two-year contract. In 1891, William Hutchinson returned to England and left his son, Hebert, in his place together with a relative, also William, who had come out with him two years previously. Both of them continued working for the company until 1894, when they returned for good to England. In 1892, William Hutchinson was once again recruited to set-up machinery recently acquired for the São Vicente mill. He stayed until October 1894¹⁸⁷. However, in the following year, William Hutchinson again refused to return to Brazil because his family opposed his leaving England¹⁸⁸. Kerr tried to recruit another machinist, whose services would cost £6 per week¹⁸⁹. Eventually, the company decided to hire John Lomas, who was employed at the São Sebastião mill. However, John Lomas left the company after a few months and the company failed to hire another foreign technician¹⁹⁰. Only in 1901 after the representatives in Brazil of Henry Rogers, Sons & Co., an English manufacturer of textile machinery, were informed that the CCC needed a technician and offered an operative from their own factory in England was the problem resolved:

"Our mutual friend, Mr. Viriato Mascarenhas, has been here and said that you need a master in spinning. We have one in our factory in England, Mr. James Hargreaves, who has already been at the Biribiry mill. We believe he is the person that you need (...)." ¹⁹¹

The employment of foreign technicians can also be noted in other textile mills in Minas Gerais. In 1893, Manoel José de Souza Moreira wrote to Aristides Mascarenhas, chairman of the CCC, requesting the help of a foreign technician for assembling machinery at the CTS:

"As I needed a mechanic to assemble four spinning and carding machines in the mill that I am setting up here, I wrote to Mr. John Lomas. Nevertheless, when he arrived here he informed me that it would be difficult for him to work here since he was still an employee of the Companhia do Cedro.

"(...).

"As the work of assembling the machines we have here will not take more than one or two months, I would like to ask if you could release Mr. Lomas to assemble our machines and put them

¹⁸⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 11 December 1886".

¹⁸⁷ Giroletti, Fábrica Convento Disciplina, pp.94-5.

¹⁸⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.41", "Letter from Robert L. Kerr to Francisco de Paula Mascarenhas, 23 May 1895".

¹⁸⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.42", "Letter from Robert L. Kerr to Francisco de Paula Mascarenhas, 8 August 1895".

¹⁹⁰ Giroletti, Fábrica Convento Disciplina, p.96.

¹⁹¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.56", "Letter from Henry Rogers, Sons & Co. of Brazil to Companhia Cedro e Cachoeira, 28 May 1901".

into operation."¹⁹²

At the CCM, an English technician was hired to install machinery. However, his relationship with the manager of the mill, Américo Teixeira Guimarães, soon deteriorated and the Englishman returned home early¹⁹³. In 1875, the Brazil Industrial, a textile mill established in Juiz de Fora, hired five technicians in England just to assemble the machinery¹⁹⁴.

Although Bernardo Mascarenhas had a good knowledge of electricity and was able to draw-up detailed plans for his electrical power plant, he also had to rely upon foreign technicians during installation. At the beginning of 1889, the equipment ordered from WEC began to arrive together with two North American technicians¹⁹⁵. However, they did not possess the necessary skills, as Bernardo stated in his letter to the agents of WEC:

"You may have some idea of my anxiety and great apprehension. I do not think that Mr. Merriman possess the necessary skill, and he himself has confessed that he does not possess any experience with alternating current, but only with Edison's system."¹⁹⁶

The CME continued to rely on foreign technicians throughout the century. In 1893, the company informed its customers that the increase in the price of the domestic lighting service was due, among other things, to the increase in the salaries of its foreign employees¹⁹⁷, probably due to exchange fluctuations.

Thus, mineiro business enterprises relied heavily on foreigners for setting-up and putting into operation foreign technologies. However, once installed, it was often necessary to adapt imported equipment or processes of production to local conditions. This was often necessary because of differences in physical or climate factors, in the inputs which were utilised¹⁹⁸, and in the availability of factors of production among different countries. Techniques which were efficient in one environment might not be so in another¹⁹⁹. The problem of adaptation did not apply only to the operation of equipment and machinery, but also with regard to managerial procedures. The problem of adaptation was often neither simple nor trivial. In some cases it

¹⁹² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.35", "Letter from Manoel José de Souza Moreira to Aristides Mascarenhas, 24 April 1893".

¹⁹³ Freitas, op.cit., p.27.

¹⁹⁴ Stein, op.cit., p.52.

¹⁹⁵ Oliveira, Companhia Mineira de Eletricidade, p.31.

¹⁹⁶ Letter from Bernardo Mascarenhas, reproduced in Mascarenhas, Bernardo Mascarenhas, p.141.

¹⁹⁷ Companhia Mineira de Eletricidade, "Declaração da Companhia Mineira de Eletricidade". "Letter issued by the Companhia Mineira de Eletricidade informing its customers the increase in the price of the domestic lighting service, 10 June 1893".

¹⁹⁸ Kaplinsky, op.cit., pp.19-26.

¹⁹⁹ Rosenberg, Technology and American Economic Growth, p.61.

might require relatively sophisticated inputs of skills or information, drawing on the experience of other local firms. It might also not be possible to undertake adaptation without the assistance either from governments, educational institutions or even specialised consultants. However, it was often one of the most important technological activities which a firm could implement. Indeed, empirical studies in Latin America have shown that the primary source of technological change within firms arose from an accretion of these relatively minor trouble-shooting efforts to adapt equipment and procedures to local conditions²⁰⁰.

During the nineteenth century, all of the mineiro firms examined in this thesis carried out a surprising amount of minor adaptations and modifications. The development of the cadinho method of production is clear evidence of this. The cadinho process derived from modifications applied by Eschwege and other foreign experts, based on the Swedish method of iron-making, to a more primitive technique first introduced into Brazil by African slaves. Eschwege's main contribution was the application of water to power the bellows and the hammermill²⁰¹. Nevertheless, the simplicity of the cadinho method meant that scope for further modification was very limited. Lack of skilled personnel rendered the cadinho foundry the only feasible method of in Minas Gerais. Attempts to employ more complex methods usually failed.

Manuel Ferreira da Câmara, for example, attempted to establish a foundry of large proportions in the first decade of the last century. He planned to build three blast furnaces, but in the end he built only one because there was not enough water power and wood available in the neighbourhood for the operation of more than one blast furnace, one forge, and one hammermill. Later, Câmara decided to build two small Swedish furnaces to replace the blast furnace. The original structure had been damaged as the result of early experimental firings. The inexperience of the work-force led to high temperatures, which destroyed the walls. Nevertheless, the Swedish furnaces could not operate effectively because of the scarcity of water power. In 1814, Schoenewolf, a German foundry-master who had work at the Morro do Pilar foundry for several years, described the failure of attempts to adapt and repair the bellows of the forge:

"When I arrived, the hammermill and the forge were already built, (...), as well as the two bellows made of leather, which were put into action by strings instead of chains.

Mr. Câmara assured me that the bellows produced enough air. However, the first experiment showed that the quantity of air was so irregular that it was not possible to refine (...).

Mr. Câmara tried to repair it, (...) lost his patience and transferred the managership to his brother, who had never seen an iron foundry before, (...).

The manager attempted several innovations (...) without changing the final result."

In the end, Schoenewolf changed the whole lay-out of the hammermill and reconstructed the bellows according to Eschwege's specifications. Furthermore, Câmara have decided not use a blast furnace before the arrival of the skilled personnel requested from the government. Altogether, he requested 14 people,

²⁰⁰ Kaplinsky, op.cit., pp.19-26.

²⁰¹ Libby, op.cit., pp.137-8.

among smelters, refiners, moulder-masters, etc²⁰². Further evidence of limits to the capacity of adaptation and modification is given by Eschwege. He had imported the hammermills of his foundry from England as it was nearly impossible to produce them locally²⁰³.

As shown above, although the CUI depended more on the technical knowledge of skilled labour than on the acquisition of machinery, the company also relied strongly on imported tools and materials for the construction of roads, carriages, and carts²⁰⁴. Nevertheless, the importation of these materials did not represent a reliance on any specific technology embodied in machines or equipment. The importation of these implements were due to the impossibility of obtaining them locally. But, apart from the imported materials and tools mentioned above, the company produced almost everything else it needed in workshops at Juiz de Fora. The facilities there included workshops of a smithy, carriage shop, harness and leather working depot, and a paintshop²⁰⁵. In the company report of 1856, Mariano Procópio Ferreira Lage pointed out the strategic importance of these workshops for the CUI:

"The work done in these workshops are already considerable. Without them the several activities of the company, especially that of transport services, would have necessarily suffered. The lack of local resources, the difficulty of obtaining them from where the central station is established [Juiz de Fora], and the necessity of the company not to depend on imports for everything it needs for its daily running, have led me to believe in the benefits and economy that result from the establishment of these workshops."²⁰⁶

Thus, the establishment of the various workshops in the Juiz de Fora station may be seen as part of the company's policy to create, in the long run, a local capacity of routine maintenance, repairs work, and the provision of spare parts.

Supply problems also encouraged textile entrepreneurs to invest in workshops, to provide maintenance and repair facilities and to manufacture locally some spare parts, and even to adapt and modify the imported machinery. At the CCC, for example, some form of equipment adaptation and modification was carried out. As the supply of imported parts could not be guaranteed the company employed several skilled craftsmen in its forges to replace broken parts. Manoel Peculista, a slave acquired by the Cedro mill, for example, was considered an excellent forger. He was probably employed to manufacture spare parts and tools²⁰⁷. Further evidence of the adaptation process is found in the correspondence of the company. In 1884, Francisco de Paula Mascarenhas, manager of the Cachoeira mill, wrote to Bernardo Mascarenhas saying that

²⁰² Eschwege, *op.cit.*, pp.208-11.

²⁰³ Gomes, *op.cit.*, p.84.

²⁰⁴ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1856), p.22.

²⁰⁵ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1857), p.23.

²⁰⁶ Companhia União e Indústria, *Relatório da Assembléia Geral dos Acionistas*, (1856), pp.15-6.

²⁰⁷ Giroletti, *Fábrica Convento Disciplina*, pp.61-2.

he had to halt spinning operations pending repairs²⁰⁸. In 1885, he wrote again saying that:

"I am returning the axles of the turbines, which have given me too many troubles, because the manufacturers did not calculate the brackets of the three large hangers in relation to the position of the pulleys of the turbines. They sent the brackets were too large, (...) Nevertheless, by moving the pulleys from one side to the other I managed to sort everything out."²⁰⁹

During the same year, Francisco reported that the new weaving machine lacked the rear card and that he was going to make a new one of wire or bamboo to replace it, until a new card was ordered from England²¹⁰. A month later, Francisco reported that they have worked until night-fall the preceding day trying to fix the turbines. They forged iron and put it on the edge of the axle to see if the turbines would work without the "thrust collars" which were badly damaged²¹¹. In the following year, Francisco wrote to Theóphilo Marques Ferreira saying that James could go as soon as he finished the parts of the looms which were going to be modified²¹². A month later, Francisco de Paula Mascarenhas reported that he had made some alterations in the spindles and that the alterations had yield an increase of 70% in production²¹³. This was not a simple adaptation and alteration, but an impressive improvement revealing a surprising ability to refine a foreign technology. In 1904, Dario Diniz Mascarenhas, manager of the Cachoeira mill, informed Caetano Mascarenhas that in the beginning the machinery had worked with national belts but they broke very often. Subsequently, new English belts were ordered. However, these continued to break though not as frequently as locally manufactured belts, probably because of their width. Hence, new modified belts would be required from England²¹⁴. This episode demonstrates how, by trial and error, mineiro businessmen both adapted imported technology to local needs and were able to devise more specific technical instructions for foreign suppliers. Indeed, companies, when possible ordered machinery according to their own specifications. However, this kind of adaptation and modification required a sophisticated degree of interaction between user and supplier. No doubt the availability of an English agent was important element

²⁰⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 2 June 1884".

²⁰⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 12 May 1885".

²¹⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 24 September 1885".

²¹¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 17 October 1885".

²¹² Companhia Cedro e Cachoeira, "Caixa de Correspondências No.19", "Letter from Francisco de Paula Mascarenhas to Theóphilo Marques Ferreira, 18 May 1886".

²¹³ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.19", "Letter from Francisco de Paula Mascarenhas to Theóphilo Marques Ferreira, 28 May 1886".

²¹⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Dario Diniz Mascarenhas to Caetano Mascarenhas, 16 January 1904".

in this interaction. In 1884, for example, Kerr wrote saying that he had dispatched the special looms and jacquards that the CCC had ordered²¹⁵. Nevertheless, these modifications were expensive, as Kerr observed:

"The special looms and jacquards that you ordered are now completed and despatched (...).

As the jacquards are very expensive I thought it would be more satisfactory to send a copy of Mr. Hodgson's invoice of these goods."²¹⁶

Ordering non-standard equipment was undoubtedly expensive but must have been considered worthwhile.

In 1885, Kerr wrote again informing Bernardo Mascarenhas that:

"I send you a new catalogue by Mr. Gunther, and on page 35 you will see the same kind of governors on the same principle but altered a little in the design and construction, since yours were made for Cachoeira."²¹⁷

In the following year, he reported that the modifications made on the bobbins for weft had been prompted by Bernardo's suggestions. Nevertheless:

"They have cost rather more in the making of them, but they will prove more satisfactory than the last."²¹⁸

Further evidence that modifications to standard equipment cost a company dear. Another point to be stressed is that these extra costs had to be covered at a time when the milréis was depreciating rapidly against foreign currencies. In these circumstances, special orders were doubly costly. Equipment would take longer to supply by which time prices would have risen²¹⁹. In the same year, James Leffel & Co. wrote saying that:

"We carefully note all the specifications, also the drawings which you send, and have forwarded the same to our shops to have suitable turbine constructed."²²⁰

Thus, the adaptations and modifications carried out by the CCC were not restricted to the company's workshops. In several occasions, the company ordered equipment according to its own specifications directly from the foreign manufacturer.

There is also evidence of adaptations and modifications of equipment and machinery carried out by the CME. The original plan drawn by Bernardo Mascarenhas and sent to WEC, gave detailed

²¹⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 18 July 1884".

²¹⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 18 July 1884".

²¹⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 30 October 1885".

²¹⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.19", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 16 July 1886".

²¹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.18", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 18 September 1885".

²²⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.41", "Letter from James Leffel & Co. to Francisco de Paula Mascarenhas, 19 January 1895".

specifications for the manufacturing of equipment for the electrical power plant. The plan specified that:

"The public electrical lighting for the city of Juiz de Fora, is going to be done by alternating current of 1,500 to 2,000 volts to light 40 lamps of 1,000 candle power (not nominal, but equivalent to 1,000 candles with a spermaceti of a diameter of 7 1/2 burning 120 grains per hour, which is the English standard).

(...)

The plant will be equipped with two excellent generators powered by two turbines of vertical or horizontal axles, arranged in a way that they can work separately or in combination. Each generator, however, has to have power enough to light 50 lamps of 1,000 candle power and 500 of 16 candle power, so that one generator is able to provide perfectly well the lighting service when the other is out of order.

The plant will be equipped with all the measuring and recording apparatuses necessary for the perfect regulation, voltmeters, ammeters, etc., in order to maintain a constant tension in the circuits. Perhaps, it would be more convenient manually operated equipment for the distribution of electricity through the generators."²²¹

Bernardo followed with a detailed description of the location and distance of the power plant in relation to the city of Juiz de Fora and how the electricity will be distributed in the different points of the city. Furthermore, he gave precise specifications for the manufacture of the lamps and bulbs, and the conductor cables which are going to be used in the distribution of the electricity²²². Bernardo's plans demonstrate the extent of his technical knowledge previous to the establishment of the CME.

Moreover, close to the day fixed by the contract between the company and the City Council of Juiz de Fora for the inauguration of the lighting service, the experiments carried on with the equipment did not yield positive results. As mentioned above, the supplier would not guarantee the equipment which in any case did not follow exactly the stipulated specifications. To overcome these difficulties Bernardo had to improvise an axle and to extend the generator pulleys. He finally succeeded and on the 5th of September 1889 the lighting service was inaugurated²²³. In this event, it is important to point out the importance of the existence of a local technical ability to deal with foreign, newly developed technology. Entrepreneurial skill and initiative enabled operating difficulties to be resolved by adapting equipment.

Thus, owing to poor communications the problems of transporting foreign machinery and equipment from their countries of origin to their final destination represented an enormous barrier, specially for the textile industry. Machinery and equipment had to be carried on the backs of beasts of burden and roads and bridges had to be built along the way. It required special attention from the part of the foreign supplier to the packing and assembling of equipment as shipment was long and difficult. However, these problems of transport became less acute with the arrival of the railway by the end of the nineteenth century. Even so, difficulties related to the transport of machinery and equipment continue to persist. Nevertheless, some sectors of the mineiro economy were not as badly affected as the textile industry. Most of the equipment, machinery and facilities used by the iron industry and the CUI were built on the site. The electricity

²²¹ Mascarenhas, Bernardo Mascarenhas, pp.131-2.

²²² *Ibid.*, pp.132-4.

²²³ *Ibid.*, pp.140-8.

generating companies, in their turn, were established mainly after the turn of the century, a time when the means of transport had improved considerably, in an area with an extensive network of good roads.

Further, mineiro business enterprises relied strongly on foreigners. They were vital not only for introducing new technology, but also for operating equipment. In the iron industry, foreign ironworkers and foreign entrepreneurs played a critical role during the earlier part of the nineteenth century. The reliance of the CUI upon foreigners for the construction and operation of the turnpike was also great. The company recruited engineers, architects and craftsmen abroad. Foreign technicians were not less crucial to the textile industry. They assembled the machinery, supervised production, and trained the workforce. Finally, the electricity generating industry was no exception and foreign personnel was also used in the CME. However, foreign skilled personnel were difficult to find and expensive, and personal relationships with them usually proved difficult.

In addition, the successful transfer of foreign technology requires a local capacity for adaptation and modification - adjusting technology to a new socioeconomic environment. This capacity of adaptation and modification can be observed in nineteenth-century Minas Gerais. In the iron industry, the development of the çadinho method points to the existence of a capacity of adaptation and modification. This native method of production was the result of modifications, based on the Swedish method of production, introduced by foreign technicians. Nevertheless, the simplicity of the çadinho method meant that the possibility of extensive refinement was limited, but the lack of skilled personnel made the çadinho foundry the only feasible means of production for the mineiro entrepreneur. Attempts to employ more complex methods of production usually failed, so Minas Gerais was compelled to use a "dead end" technology. Even though the CUI relied on imported tools and materials for the construction of roads, carriages, and carts, the company depended more on technical knowledge of trained personnel than on the acquisition of machinery and equipment. Thus, it seems inappropriate to speak of a process of adaptation of technology in a strict sense. mineiro textile entrepreneurs were prompted by problems in their relationship with foreign suppliers to invest in workshops thereby gaining the capability to repair, modify and even manufacture machinery. Finally, the adaptation and modification of equipment and machinery can also be observed at the CME which employed a newly developed technology with all the technical difficulties that this involves.

Conclusion

Most business enterprises in nineteenth-century Minas Gerais relied strongly on foreign technology and the main sources of technology were Great Britain and the USA. The only exception in the first three-quarters of the nineteenth century was the iron industry which employed an indigenous process of production. Nevertheless, this indigenous technology imposed strict limits on the development of the industry which virtually disappeared when it had to compete against foreign products at the end of the century. In terms of the process of selection of technology, mineiro entrepreneurs resorted to different strategies to acquire the minimum level of technological skill required. These included long periods of study abroad, visits to similar establishments in Brazil and overseas, direct and indirect contacts with foreign producers of machinery, the use of technical books, and even the help of foreigners residents in Minas Gerais. Furthermore, the geographic distance and cultural, socio and economic differences between users and foreign suppliers of technologies aggravated existing and created new problems in their relationship. The most common problems were, among others, delays in delivery, adulterated orders, inevitable misunderstandings, loss of goods, lack of sensitivity on the part of suppliers to the specific circumstances of foreign customers, unfulfilled promises, etc. Moreover, as a consequence of the dependence of most mineiro firms upon foreign technologies and foreign skilled personnel, communication problems were not a negligible difficulty. Entrepreneurs had to learn a foreign language before they could make the first contact with the producers of machinery, while foreign workers had to rely on interpreters before they could understand Portuguese properly. Very often, due to the lack of suitable means of transport, transporting foreign machinery to Minas Gerais proved to be a real hardship. Machines had to be carried on the backs of beasts of burden and roads and even bridges had to be built. The penetration of the railway into the hinterland of Minas Gerais at the end of the nineteenth century helped to ease this problem, although it was not completely resolved. Moreover, mineiro business enterprises relied heavily on foreign technicians not only to set-up equipment but also to operate it. Nevertheless, these foreign technicians were difficult to find. They were often unreliable, expensive, and relationships with them usually proved difficult. Finally, although some capacity of adaptation and modification can be observed in nineteenth-century Minas Gerais, this capacity had strict limits.

This examination of technology - availability and adaptation - reveals Minas Gerais to have been an inhospitable environment for the entrepreneur. Mineiro firms relied strongly on foreign technologies and skilled personnel. The process of adaptation and modification was too narrow to be characterized as a specific mineiro way of manufacturing. The existing informal and spontaneous technological innovative system was not developed enough to take the process of technological assimilation farther in the direction of a profound modification of existing foreign technologies or to the creation of a more complex indigenous technological alternative. The narrowness of the capacity of the nineteenth-century mineiro economy to absorb and refine imported technology was due to the lack of skills and entrepreneurship, which was confirmed by the failure to develop a capital goods industry.

PART IV - LABOUR

Introduction

Labour is one of the key factors in the study of any business environment and its provision was certainly one of the most acute problems faced by businessmen in nineteenth-century Brazil. A great deal of attention is paid to this question in the Brazilian economic historiography. During the nineteenth century, easing the scarcity of labour was one of the priorities of both businessmen and politicians. Labour was seen by many as the key factor in the economic development of the country¹. Slavery, the main source of labour until the last decade of the century, had long been doomed to disappear and nobody doubted it. Moreover, the legacy of slavery poisoned the relationship between non-slave workers and employers. Therefore, non-slave Brazilians were reluctant to replace slave hands because they assumed they would be treated as slaves. Employers, in their turn, saw non-slave Brazilians workers as unreliable, lacking discipline and habits of work. Several attempts were made to bring foreign workers, but only the coffee economy of Western São Paulo was successful in attracting a large number of foreigners. Hence, other regional economies of Brazil had to rely basically on non-slave Brazilians when slaves became scarce and expensive, and finally disappeared.

The objective of this section is to address the question of labour in nineteenth-century Minas Gerais. Any investigation of the problem of labour in Minas Gerais must take into account the process of the making of the Brazilian working-class. In other words, it must identify the forces behind the working-relations and the prevailing work-ethic. Local working-relations cannot be thoroughly understood outside their broader environment. Only inside this context can labour policies adopted by mineiro entrepreneurs be fully appreciated. Thus, the objective of the first chapter of this section is to identify the main forces in the shaping of the Brazilian labour market and the formation of the working class. The second chapter of this section examines the main sources of labour in nineteenth-century Minas Gerais. Its objective is to investigate the impact of the macro environment, examined in the first chapter, upon the micro environment within which business operated.

¹ See C. Furtado, Formação Econômica do Brasil, (São Paulo, 16th ed. 1979), p.120.

Chapter 8 - A BRIEF REVIEW OF THE LITERATURE ON THE MAKING OF THE WORKING-CLASS

This chapter identifies the main influences in the making of the Brazilian working-class by drawing parallels with the making of the English working-class. In both cases, a single major social influence - religion in England and slavery in Brazil - seems to have played a decisive role in shaping the prevailing work-ethic and labour market formation. Religion in England, for example, provided the moral energy for the new work-ethic which arose with the emergence of industrial capitalism. In Brazil slavery was the reference point for all the worker-employer relations during the last century. Thus, despite the obvious differences, the comparison between the two experiences will help to illustrate how these social processes taking place in the broader environment shaped the relationships between capital and labour.

8.1 - The Making of the English Working-Class:

Until the early nineteenth century the typical English working-man lived in the countryside working on the land together with his wife and children. Although industrial occupations existed, they accounted for only a minority of jobs when compared with agriculture². During the first half of the nineteenth century all this changed dramatically. The census taken in 1811, for example, unmistakably indicated a new pattern of employment in England with fewer families engaged in agriculture than in trade, manufacture, and handicrafts. On the whole, families engaged in agriculture constituted little more than one-third of all families, as indicated in Table VIII.1. By 1851, industrial workers constituted nearly a third of the entire British population³ and, although agriculture continued to be the largest single occupation, there were four times as many industrial workers as there were agricultural labourers, as shown in Table VIII.2. Britain had become an industrial nation and the lives of a large number of working people had changed extraordinarily. From their traditional life in the countryside, these people found themselves living in industrial towns and working in workshops, foundries, shipyards, brickworks, and textile factories⁴.

Table VIII.1 - Occupations in England in 1811.

Families employed chiefly in agriculture	697,353
Families employed chiefly in trade, manufacture, or handicrafts	923,588
All other families	391,450
Total	2,012,391

Source: E. Hopkins, *A Social History of the English Working Classes, 1815-1945*, (1979), p.2.

This rapid change in the pattern of employment of the English working class brought with it a new

² E. Hopkins, *A Social History of the English Working Classes, 1815-1945*, (1979), p.2.

³ Ibid., p.3.

⁴ Ibid., pp.3-4.

work-ethic in which religion, Methodism in particular, played an important role in its shaping. Although there has been an almost complete disagreement among historians about the role and significance of religion in English working-class life during the nineteenth century, they seem to agree about the influence of religion on working-class politics and on more general cultural changes, especially in the early years of the century. Christianity and Christian churches had a pervasive influence in nineteenth-century British society and nonconformity, in the period 1780-1840, spread rapidly within the English working class⁵.

Table VIII.2 - Principal Occupations in Britain in 1851.

Agriculture	1,790,000	Milliners	340,000
Domestic Service	1,039,000	Wool	284,000
Cotton	527,000	Shoemakers	274,000
Building	443,000	Coal Miners	219,000
Labourers	376,000	Tailors	153,000

Source : Ibid., p.3.

Research in church membership records reveals quite high percentages of working-class members in many congregations. Analysis of nonconformists registers of baptism and burials, mainly from the period 1800-37, suggests that artisans were the largest occupational group. Together with smaller numbers of labourers and miners, artisans made up about 75% of the Methodists, Baptists and Congregationalists whose occupations were recorded in the registers. Further evidence shows that the great expansion of English nonconformity in the period 1780-1840 was mainly due to recruitment among the working class and that it was only in the twentieth century that Methodism has become predominantly middle-class. Analysis of marriage and baptismal registers from Wesleyan, Primitive, Baptist and Congregationalist chapels in Lancashire cotton towns in the period 1830-70 reveals a preponderance of working-class occupations⁶.

The influence of nonconformity within the English working class may be explained by the fact that in the latter part of the eighteenth century the building of new places of worship by the Church of England failed to keep pace with the growth of the population. The institutional weakness of the Anglican Church left a religious vacuum which was partly filled by nonconformity, especially in the new industrial towns that sprang up in the late eighteenth and early nineteenth centuries⁷. Furthermore, for many working people the Church of England was very much the church of the employers. There, the workers' social inferiority would be emphasized by the charging of pew rents and the segregation of working-class worshippers into the few free pews at the back or sides. Although nonconformist chapels also levied pew rents, they were usually smaller than in the Church of England and the number of free seats greater. Moreover, the poorest of the working classes might not have decent clothes in which to attend church. For these reasons the Church of

⁵ H. Mcleod, Religion and the Working Class in Nineteenth-Century Britain, (1984), p.9.

⁶ Ibid., pp.14-5.

⁷ Ibid., pp.22-3.

England was not likely to appeal to the working classes in the early decades of the nineteenth century⁸.

However, the profound social influence of nonconformist belief over many working-class people is also explained by other factors. First, with its emphasis on hard work and personal accomplishment nonconformism - especially Methodism - provided a social discipline which encouraged the working-class people to go on working and doing their duty to God and fellow men, however harsh their environment⁹. Second, dissenting religion offered the uprooted and abandoned people of the Industrial Revolution a kind of community spirit to replace the older values which were being swept away¹⁰. Third, religious observance became a kind of consolation after the many political defeats suffered by the working classes during the counter-revolutionary movement of the 1790s and the following decades. As their leaders failed to gain political reform after 1815 working-class people turned in despair to nonconformity¹¹.

Although workers were more likely to worship at a nonconformist chapel than at an Anglican church, they were more likely to worship at a Methodist chapel than at the chapels of the Congregationalists, Baptists, or Unitarians. The latter ones were attended more by the middle classes than the working classes. Methodists had a powerful appeal to the working class due to the directness and simplicity of their teaching¹². Hence, Methodism increased remarkably within the new industrial areas during the Napoleonic War years, creating a deep-rooted allegiance to Methodist Church in many working-class communities¹³. Although the increase of Methodism is an indication of its influence on the new working class of the Industrial Revolution, this gives little indication of its inner impact on individual workers and how Methodism helped to shape the new work-ethic.

Methodism was of crucial importance in training the first and second generations of factory workers in habits of discipline, regularity, and obedience¹⁴. Employers in the "putting-out" industries in the seventeenth century experienced difficulties as a result of the irregular working habits (drunkenness, embezzlement and so on) of the workers. Similar difficulties were encountered by mill-owners and woollen and cotton manufacturers throughout the eighteenth century. During this period, most workers were happy to leave their jobs for the month of harvesting, had loose and vagrant habits, and seldom remained long in the same establishment. Peasants and rural labourers in unenclosed villages, as well as urban artisans, did not measure the return of their labour exclusively in terms of money. In his "traditional" way of life, a man

⁸ Hopkins, *op.cit.*, pp.80-2.

⁹ *Ibid.*, p.80.

¹⁰ Mcleod, *op.cit.*, pp.22-3.

¹¹ Hopkins, *op.cit.*, p.80.

¹² *Ibid.*, p.80.

¹³ E.P. Thompson, *The Making of the Working Class*, (1980), p.386.

¹⁴ Mcleod, *op.cit.*, pp.9-23.

did not by nature wish to earn more and more money, but simply to live as he was accustomed and to earn as much as was necessary for this purpose. The same type of mentality can be observed within the Brazilian working class of the earlier part of the nineteenth century.

Under these circumstances, the master-manufacturer of the Industrial Revolution, as the Brazilian entrepreneur, was obsessed with problems of discipline. From the employer's point of view, workers needed to be educated to pay attention to instructions, to develop "methodical" habits, to fulfil contracts on time, and to consider the embezzlement of materials as sinful. Furthermore, the factory system demanded a change in human nature, in order for the worker to become adapted to the discipline of machines. For children, the discipline of the overseer and of the machinery might have sufficed, but not for adults. Adults required an "inner compulsion", a new work-ethic, and Methodist theology was better suited than any other for this purpose. In Brazil, this was achieved first with the employment of African slaves, who were disciplined through physical violence.

According to the Methodist theology, grace and sin are universal and any man who is convicted of sin may receive grace and know himself to be redeemed by Christ's blood. But Christ's redemption is only provisional and forgiveness of sin lasts only so long as the penitent sinned no more. Those who were "saved" were in a state of conditional and provisional election. It was always possible to "backslide". Moreover, as salvation is the prerogative of God, all that a man can do is to prepare himself, by utter abasement, for redemption. However, once convinced of grace and thoroughly introduced to the Methodist brotherhood, "backsliding" became a complicated matter for a working man or woman. They would have been expelled from the only community-group which they knew in the industrial wilderness and they would have to live with the ever-present fear of an eternity of punishment to come. How, then, to remain in a state of grace?

Since this world is the ante-room to eternity, wealth and poverty matter very little. For the rich people, evidence of grace was given by serving the Church; most notably, by building chapels for their workers. The poor were more likely to remain in a state of grace, because they faced fewer temptations to backslide. Three obvious means of maintaining grace presented themselves. First, by serving the Church as a class leader, local preacher, or in more humble capacities. Second, by the cultivation of one's own soul, in religious exercises, tract-reading, but - above all - in attempts to reproduce the emotional convulsions of conversion, conviction of sin, penitence, and visitation by grace. Third, through a methodical discipline in every aspect of life, especially in labour itself, which is an evident sign of grace when undertaken for no other motive but as "a pure act of virtue". Moreover, as there was no assurance of salvation and temptations were everywhere, there was a constant inner pressure to "sober and industrious" behaviour - the visible sign of grace - at all times. The consequence of indiscipline at work might not only be the loss of employment but also punishment in the flames of hell. God was the most vigilant overseer of all. The Methodist was taught not only to accept poverty and humiliation, but also to be obedient. Work was seen as the salvation of the "transformed" industrial worker. Such a drastic redirection of impulses were only effected with a central disorganization of the human personality. As joy became associated with sin and guilt, and pain

(Christ's wounds) with goodness and love, so it became natural to suppose that man only found grace in God's eyes when performing painful, laborious or unpleasant jobs. "To labour and to sorrow was to find pleasure, and masochism was 'Love'"¹⁵.

Hence, Methodist theology - by virtue of its elevation of the values of discipline and of order, and of its moral rigidity - provided the ideological background and the moral energy for the new work-ethic which began to prevail with the emergence of industrial capitalism and the capitalist working-relations. In other words, Methodist ideas suited the necessities and circumstances of capitalism in England. They were used to soften the resistance of the working people and provide with a moral meaning the new pattern of discipline required by capitalist production. The Methodist indoctrination aimed at producing a docile, more easily managed, working class.

However, Methodist indoctrination was not only restricted to the working classes. Methodist ideas were shared by the employers as well. As Weber has pointed out, capitalism is in very great measure the product of a religious spirit such as Puritanism. The result of the convergence of religious and economic factors was the production of modern "rational" man; more specifically, the production of a social ethic which substantiated the capitalist culture. Capitalist entrepreneurs had an ascetic manner of living very well adapted to the peculiarities of the capitalism¹⁶. Furthermore, some of the English self-made men, who became employers themselves, were Methodists or Dissenters whose frugality had produced riches and who would tend to favour fellow-religionists, finding in them a guarantee for good conduct¹⁷. Therefore, Methodist ideas created a widespread view of work, its role and purpose in people's lives and how it should be carried out.

In this sense, slavery in Brazil had a similar role as that of Methodism in England. Slavery produced a work-ethic which was shared by workers and employers alike. More than providing actual hands for the economy, it provided a social meaning for work, a basis for the formation of the Brazilian working classes. Slavery became the reference-point for all the working-relations providing, like Methodism, the ideological background which regulated the way in which labour was paid, treated and controlled. The mentality created by slavery had a deep and long lasting effect in both workers and employers in Brazil, as it is going to be shown in the following part of this chapter.

8.2 - The Making of the Brazilian Working-Class:

The impact of slavery on working-relations in Brazil can be seen even several years after its abolition in 1888. However, to understand the making of the Brazilian working-class, it is necessary to go back in time and look at some social and economic patterns peculiar to slavery and to the colonial system. What is important in this examination is the basic characteristics and the legacy of both slavery and the

¹⁵ Thompson, *op.cit.*, p.391-409.

¹⁶ M. Weber, *The Protestant Ethic and the Spirit of Capitalism*, (20th. ed. 1989), pp.13-78.

¹⁷ Thompson, *op.cit.*, p.385.

colonial system; in other words, the deep roots which persisted during the nineteenth century and which had a great influence on the process of the formation of capitalism and of social classes in Brazil.

With the exception of the colonies of New England, the American colonial system was devised by metropolitan capital for the large-scale production of tropical products. Indeed, from the beginning, with the introduction of sugar cane and the development of tobacco in the sixteenth century, a permanent system of production was created which required a great amount of labour. This type of colonial exploitation necessitated a number of interrelated processes which had a wide impact on the social structure of the Americas. The first of these was the introduction of slave labour which, through extremely long working-hours and extremely low levels of subsistence, was more profitable than the attempt to submit the mass of the non-slave population to a harsh regime, given the great availability of land¹⁸. Brazil, for example, imported more African slaves than any other country in the American continent and Africans constituted the major source of labour for the main economic activities of the colonial period (1550-1822) - the sugar-mills in the Northeast in the sixteenth and seventeenth centuries, and gold panning and diamond mining in the eighteenth century¹⁹. However, the colonial system of production created not only African slavery, but also a social structure based on slaves and commanded by slave-owners²⁰.

After three centuries, the colonial system in Brazil had hindered internal ramifications capable of developing other economic activities. The concentration of resources in the production of tropical products, based on slave labour, weakened those activities which did not operate in close connection with the export sector. In this way, a stratified society was created down the centuries which led to the marginalization [desclassificação] of those who could not find a place in the rigid and dichotomized slave order. On the one hand, there was a mass of slaves engaged in the productive process. On the other hand, the landowners who - together with the civil and military bureaucracy - formed the narrow circle which imposed the forms of political dominion and surplus extraction²¹.

During the nineteenth century, the importance of the colonial legacy would lead the employment of slave labour to persist in coffee production - by then the dominant economic activity -, maintaining a number of economic and social conditions which would continue to exclude the non-slave work-force from the productive processes essential to society. The introduction and persistence of slave labour in coffee production was due to the impossibility faced by farmers of resorting to a sufficiently numerous and reliable stock of non-slave Brazilians. This situation would exist until very late in the nineteenth century and would bring profound consequences to the formation of the labour market in Brazil. Even when coffee capital

¹⁸ L. Kowarick, Trabalho e Vadiagem: a Origem do Trabalho Livre no Brasil, (São Paulo, 1987), pp.18-23.

¹⁹ P.C. Mello and R.W. Slenes, "Análise Econômica da Escravidão no Brasil", in Economia Brasileira: Uma Visão Histórica, ed. P. Neuhaus, (Rio de Janeiro, 1980), p.91.

²⁰ Kowarick, op.cit., p.23.

²¹ C. Prado Júnior, Formação do Brasil Contemporâneo, (São Paulo, 5th.ed. 1957), pp.279-80.

began to spread into other activities - such as railways, the coffee processing and packing industry, and banking -, slaves continued to be the main source of labour for a long period after 1850, when the Atlantic slave-trade was finally brought to an end²².

With the cessation of the transatlantic slave trade in the middle of the century, coffee growers started to buy slaves mainly in the Northeast, despite the fact that slaves became increasingly expensive. In addition to the high prices charged for slaves - due to the decrease in their number -, heavy taxes were levied on their transit from one province to the other²³. The evolution of the stock of slaves after 1850 is very illustrative of the interprovincial slave trade. In Brazil as a whole the number of slaves decreased rapidly: from 1,715,000 in 1864 to 1,540,829 in 1874, to 1,240,806 in 1884, and to 723,419 in 1887, as shown in Table VIII.3. During the same years, the decrease in the number of slaves was more marked in the Northeast: from 774,000 in 1864 to 435,687 in 1874, to 301,470 in 1884, and to 171,797 in 1887. However, the province of Rio de Janeiro maintained its stock of about 300,000 slaves between 1864 and 1874, the number decreasing to 258,238 in 1884, and to 162,421 in 1887. Thus, in this region a decrease began after 1874, whereas in Minas Gerais the slave population increased from 250,000 to 311,304, and in São Paulo from 80,000 to 174,622. In the following decade, whereas in all the other provinces the decrease in the number of slaves was substantial, in the latter two provinces the decrease was not significant: 10,000 in Minas Gerais and less than 8,000 in São Paulo. From then onwards, both provinces followed the general pattern of the years previous to the abolition of slavery: in 1887 there were 191,952 in Minas Gerais and 107,329 slaves in São Paulo, as indicated in Table VIII.3.

Table VIII.3 - Brazil, the Northeast, Rio de Janeiro, Minas Gerais, and São Paulo: the evolution of the stock of slaves, 1864-1887.

YEARS	BRAZIL	NORTHEAST	RIO DE JANEIRO	MINAS GERAIS	SAO PAULO
1864	1,715,000	774,000	300,000	250,000	80,000
1874	1,540,829	435,687	301,352	311,304	174,622
1884	1,240,806	301,470	258,238	301,125	167,493
1887	723,419	171,797	162,421	191,952	107,329

Source: Compiled from R. Conrad, The Destruction of Brazilian Slavery, 1850-1888, (1972), p.285.

With the development of coffee production and the huge slave imports of the 1830s and 1840s (see Chapter 1), slavery became generalized and was not confined solely to large-scale export production. The employment of slaves in activities not related to the growing of coffee was far from negligible. Slaves were

²² Kowarick, op.cit., pp.35-41.

²³ E. Viotti da Costa, "O Escravo na Grande Lavoura", in História Geral da Civilização Brasileira - II. O Brasil Monárquico, ed. S.B. Holanda (São Paulo, 1985), V, pp.155-7.

to be found throughout rural Brazil in the production of basic foodstuffs²⁴. They were also employed for the most diverse functions in the urban areas. They worked as factory hands, barbers, street porters, stevedores, domestic servants; they worked in craftshops and factories as skilled and unskilled labour, in transporting passengers and cargo, in the most varied urban services, etc. There were slaves living independently under the money-earning system [*escravos de ganho*], and there were slaves that could be found as prostitutes and beggars²⁵. This form of slavery differentiated itself from that which prevailed in the great export plantations in the sense that it enjoyed a relative degree of autonomy and the master-slave relationship was more direct and democratic. Nevertheless, these two forms of slavery exhibited similarities, mainly in regard to the need for violence in the social order²⁶. However, the form of slavery which dominated the great export plantations was the one which permeated the other sectors of the economy and was diffused into the general stream of social life²⁷, as did Protestant ethic - with its emphasis on responsibility, discipline, ascetism and individual liberty - in England.

The situation of non-slave Brazilians clearly illustrates the influence of slavery upon the work-ethic in Brazil before and after the abolition of slavery. At the end of the eighteenth century the Brazilian population was almost 3 million, of whom nearly half was made up of Brazilians and freed men: individuals of various social origins, whose common characteristic was their marginalization in relation to the necessities of the large properties producing for export. They were marginalized because the slave system, concentrating and monopolizing economic resources, especially land, hindered the emergence of alternatives which could productively settle this increasing mass of individuals, who had irregular occupations or even without any occupation at all. Such was the situation of freed negroes, whites, and Indians, as well as of those groups produced by the interbreeding of these three races: mulattos and mestizos. A large number of these people was employed in rudimentary activities of subsistence having virtually no contact with agro-production for export. Another segment of the non-slave population was made up of servants or dwellers on the land who performed jobs on the farms which were combined with their own subsistence activities. Their survival was intensely unstable and completely dependent on the large property, because access to a piece of land depended on the discretion of the landowner. In addition, there were beggars, vagabonds, homeless ones who, like the others, could not find a stable place in the rigid division of labour of the slave system. Like the others, they were individuals from several different races and social origins, who were also marginalized.

The established slave regime excluded those who, being free, were unable to be masters. Since colonial times, the agro-export system based on slave labour had hindered production for the internal market.

²⁴ L. Bethell and J.M. Carvalho, "1822-1850", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell (Cambridge, 1989), p.46.

²⁵ L.C. Soares, "Urban Slavery in Nineteenth-Century Rio de Janeiro", University of London, unpublished Ph.D. Thesis, 1988, pp.145-273.

²⁶ *Ibid.*, p.13.

²⁷ J. Gorender, O Escravismo Colonial, (São Paulo, 1978), pp.88-9.

Thus, for a large number of people the options for work were restricted to occasional jobs, subsistence activities or wandering through the country side and towns. Even with the end of the Colonial Pact, with Brazilian Independence, and with the emergence of the coffee economy, the Brazilian society of the nineteenth century would persist with slave labour as the basis of the productive process. A more dynamic and diversified economic system was slowly formed which, contrary to that of the previous period, kept increasing parts of the surplus in Brazil, but which would continue to be structured on the slave-master relationship. Thus, Brazilians and freed men would continue to be marginal to the essential productive processes of the Brazilian society²⁸.

In the coffee-growing areas, until the beginning of the great movement of immigrants - which coincided with the abolition of slavery -, poor non-slave Brazilians participated only on an occasional basis in the productive process²⁹. There were some options available for Brazilians as muleteers, coachmen, and grocers³⁰. When directly linked to large farms, some of them would work as private policemen or in some more specialized aspects of the organization of the productive process. When they lived on the farms they were completely dependent on the landowner³¹. As soon as the interests of the farmer required, servants and dwellers on the land were expelled from the farms³².

To sum up, nationals were very mobile, moving constantly, and occasionally rendering services to the large farms. As long as the production continued to be based on slave labour, the large and increasing contingent of poor non-slave Brazilians would continue to be excluded from the productive system, and would be seen by landowners and rulers as vagabonds. Therefore, they were considered unfit for regular and disciplined work. Marginal - productively speaking - and without social significance in a slave economy, poor non-slave Brazilians were employed by the masters in the service of defence, coercion, or murder. In other words, nationals were employed in every type of violence.

In the nineteenth century, the coffee economy still faced the contradiction inherited from the colonial times: to convince Brazilians to exchange the alternative of a marginal and vagrant life, although free, for the regular and disciplined work of the plantations, would be necessary to offer them great material gains. However, these economic circumstances explain only partially the persistence of slave labour in the coffee economy. Another factor of crucial importance was the influence of slavery on working-relations since the beginning of the colonization, engendering a historical situation which persisted throughout the centuries. Indeed, poor non-slave Brazilians were seen by masters and employers as a segment which could

²⁸ Kowarick, *op.cit.*, pp.28-31.

²⁹ Lamounier, "Between Slavery and Free Labour: Experiments with Free Labour and Patterns of Slave Emancipation in Brazil and Cuba c.1830-1888", University of London, unpublished Ph.D. Thesis, 1993, p.185.

³⁰ See M.S.C. Franco, *Homens Livres na Ordem Escravocrata*, (São Paulo, 1969), pp.61-80.

³¹ Lamounier, *op.cit.*, pp.184-5.

³² Kowarick, *op.cit.*, pp.31-2.

be treated in a way similar to that which characterized the condition of the slave. The way that masters treated slaves - susceptible of being exploited to the limits of their survival - influenced both the perception that non-slave Brazilians had of regular and disciplined work, and the employers' perception of the possible ways of employing non-slave Brazilians. Brazilians, as long as slavery was the reference point of the productive process, could only regard organized work as the most degrading form of existence. Furthermore, as long as it was possible to produce their own subsistence they would not have any reason to submit to the strictness of the productive organization based on slave labour. In its turn, as the masters' and employers' reference point was work based on slave labour, which non-slave Brazilians tried to avoid in every possible way, the perception of Brazilians as vagabonds and unfit to work crystallized out³³.

Slavery, insofar as it degraded work to an extreme degree, it did not stimulate the emergence of abilities and skills. It inhibited any type of manufacturing, and became an obstacle to the development of craft production, consequently skills did not develop, knowledge was not transferred, and personal abilities were not stimulated, because manual work was a slave's job, degrading and repulsive to Brazilians³⁴. The exploitation of slave labour, on the one hand, and the marginalized mass of Brazilians, on the other, were the result of the colonial-slave enterprise which would reproduce itself until very late in the nineteenth century. The so-called Brazilian - white, black, mulattos, and mestizos -, freed or born free, was the least desired to be employed on the coffee plantations. In the Northeast, after 1850, as the slave regime began to lose its hegemony within the sugar economy, with the internal migration of slaves, Brazilians were increasingly hired. In the coffee regions, especially in São Paulo, Brazilians only began to be employed after the abolition of slavery, even so on a casual basis. Together with Brazilians and ex-slaves successive batches of immigrants would be employed in the new dynamic zones of Western São Paulo, whereas Brazilians were employed in the stagnated areas where the immigrant did not go³⁵.

Nevertheless, the mass employment of immigrants on coffee farms began only in the last decades of the nineteenth century, when a large number of Italians, Spanish and Portuguese workers began to migrate to Brazil subsidized by state and federal governments³⁶. The incorporation of new areas into coffee plantations, made possible by the expansion of the railway system, always created the necessity of more and more workers at a time when the Brazilian worker available in the region was difficult to recruit, and there was also a strong prejudice against him. The only alternative left was the transference of Brazilians from other places in Brazil, mainly from the Northeast where pressure for land and several successive droughts had created a population transformable into cheap labour. Nevertheless, at this time this alternative proved to be impracticable because of the high costs of transport between the two regions and, most of all, because

³³ Ibid., pp.45-48.

³⁴ S.B. Holanda, Raízes do Brasil, (Rio de Janeiro, 21st.ed. 1982), pp.26-8.

³⁵ Kowarick, op.cit., pp.64, 68-9.

³⁶ W. Dean, "Economy", in Brazil: Empire and Republic, 1822-1930, ed. L. Bethell (Cambridge, 1989), pp.235-6.

of the difficulty of recruitment. The local oligarchy strongly opposed a larger migration southwards, because such transference would have not only represented a loss of political power but would also have brought problems of labour to the rubber plantations in the North. The considerable internal migration of Brazilians in the last decades of the nineteenth century and in the first ones of the twentieth century was not mainly directed to the province of São Paulo. There were Brazilians who went to São Paulo, but in the period between the years previous to the abolition of slavery and the first decades of this century the internal flux of Brazilians was of small significance in comparison with the number of foreigners who went to this state after 1888³⁷.

The demise of slavery imposed a solution which could only be based on the employment of free labour. Rather than employing Brazilian labour - considered unfit for the regular and disciplined work of the farms - coffee planters opted for the employment of immigrant workers. In this sense, it must be emphasized that the economic crisis in Italy from the 1870 onwards presented as an ideal opportunity of recruitment of cheap labour in large numbers³⁸. A large part of the successive batches of immigrants was employed in the production of coffee, because this was one of the clauses of the system of recruitment to which they were, at least temporarily, submitted³⁹. Thus, there was created a continuous flux of workers who supplied the farms with cheap labour. The immigrant worker who left the farms was, for several decades, replaced by his fellow countryman who arrived creating a vicious circle of replacement of the work-force⁴⁰.

However, it is important to point out that the type of labour which replaced slave labour cannot be characterized as free labour, which it is often stated to have been. The starting point is that the crisis of slavery brought with it free labour. However, contrary to what several authors believe, this process of replacement of slave labour by free labour was not an easy and simple one. Although the presumed slave mentality of the farmer may have created difficulties in the relationship with the immigrant, the truth is that the objective conditions for the replacement of the negro by the white did suffer very few modifications in relation to the prevailing conditions under slavery. As slavery was not a mere institution - but was a real relationship based on well defined historical conditions -, its legal suppression, or the mere incorporation of non-slaves into the productive process, was not sufficient to change the nature of the relationship between the farmer and the worker. Therefore, the mentality of the farmer had well defined social roots.

In the crisis of conversion from slave labour, free labour had a particular meaning to the farmer, which in any way was totally or mainly expressed in its legal form. To the farmer, free labour was the work actually free from the burden of the trafficker's charges. It was labour completely free of any extra charges.

³⁷ Kowarick, *op.cit.*, pp.78-80.

³⁸ S. Silva, *Expansão Cafeeira e Origens da Indústria no Brasil*, (São Paulo, 1976), p.44.

³⁹ B. Fausto, "Society and Politics", in *Brazil: Empire and Republic, 1822-1930*, ed. L. Bethell, (Cambridge, 1989), p.258.

⁴⁰ Dean, *op.cit.*, pp.236-7.

In this respect, the white immigrant was not necessarily free of any charge, although he was legally free⁴¹. Until the 1880s when provincial and Imperial governments began to subsidize European immigration, the farmer paid for the transport and supplies required by the immigrant and his family until the immigrant was able to provide for himself. Before this the immigrant had to pay the farmer back these expenses and any other advance payment⁴². Indeed, this was a new way of creating a new type of personal dependence. As the immigrant was indebted to the farmer, he was restricted to the farm without freedom to leave it unless he had the permission from the farmer himself. There was a contradiction in this situation. At the economic level, farmers behaved according to liberal principles. They considered the immigrants free to buy (goods and services) and sell (labour). Actually, however, at the social relations level, they tended to treat immigrants like they had treated slaves. Farmers believed that by economically maintaining the immigrants they had actually bought in advance the immigrants' labour, as had happened in the slave regime. The only way that the farmers could be certain of the return of their investment was to keep the immigrant in a kind of bondage. This at least was what the farmers believed⁴³.

Only with the intervention of the State was it possible to break the circle of captive labour, thus creating the conditions for the establishment of free labour and of the labour market. Through the intervention of the State the farmers became free from the costs of transporting the immigrants from their countries of origin to the farms⁴⁴. Hence, the fate of immigrant workers in the coffee-growing areas shows clearly the long-standing impact of slavery on the working-relations in Brazil.

However, the influence of slavery on working-relations was not restricted to the agricultural sector. It also influenced working-relations in the emerging Brazilian industry. This can be observed in the way that owners of textile mills treated their employees:

"In the nineteenth century, the mill owners treated their journeymen in the same way coffee farmers or sugar-mill owners [senhores de engenho] treated their slaves or their few non-slave workers (...)"⁴⁵

Marginalized since the colonial times, poor non-slave Brazilians and freed men tended not to pass through "the school of work". They were seen as vagabonds who turned rather to vice or crime than to disciplined work. What is important in this process of rejection caused by the slave regime is that any manual work was considered a slave's work and, therefore, degrading and repulsive. It could not be otherwise in a situation in which individuals who performed productive tasks were treated as things, without volition, without any chance to decide where to live or when or how much to work, and who - suffering every sort of violence -

⁴¹ J. Souza Martins, O Cativo da Terra, (São Paulo, 1979), pp.9-62.

⁴² Lamounier, op.cit., pp.157-62.

⁴³ Souza Martins, op.cit., p.123.

⁴⁴ Ibid., p.66, 125-6.

⁴⁵ S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850/1950, (Rio de Janeiro, 1979), p.63.

would die in captivity.

For those who were not masters, work would not lead anywhere and the effort of working, instead of dignifying the worker, tended to bring him close to the rules of dominion and submission existing in slavery. That is why short, and sometimes forced, periods of work were followed by long periods of rest. He who was not forced to work would only do it when it was absolutely necessary. In the social context in which the non-slave and poor worker does not accumulate anything, necessities are reduced to a minimum and are based for most of the time on a subsistence economy.

In this situation in which all activities were based on slave labour, in which servants were often treated in the same way as slaves, and in which dwellers on the land were summarily dispossessed or expelled, there were few alternatives left for the increasing contingent of poor non-slave Brazilians and freed men who historically swelled at the margin of a dichotomized society. Even the emerging Brazilian industry hardly constituted an alternative for this mass of people⁴⁶. In 1869, for example, the Minister of Agricultura, Commercio e Obras Publicas complained about the lack of chances of employment for non-slave Brazilians in the industrial sector in Rio de Janeiro. Among the 1,009 people employed in the industries in the district of Santa Rita, 76 were slaves, 248 were Brazilians, and 685 were foreigners. Furthermore, the Minister made the following comments about the disproportion in the number of Brazilians and foreigners employed:

"These figures reveal the bias of our internal economic organization (...), which place so many difficulties in the employment of Brazilians in our factories.

If the commercial and industrial establishments are not an alternative of work, what will be left for him [the Brazilian worker]? (...)"⁴⁷

Wherever there was a large influx of immigrants they tended to fill the places in the productive activities and reduced substantially the employment of non-slave Brazilians. In São Paulo, for example, immigrants were largely employed in the several sectors of the urban economy, particularly in industrial activities, where the employment of Brazilians was small. As happened in the prosperous coffee regions, the Brazilian worker was only occasionally employed in the Paulista industry. The number of immigrants was sufficient to supply the Paulista industry and create an abundant reserve of cheap workers. Thus, the emerging industry of São Paulo did not need to resort to the Brazilian work-force. The Brazilian worker was largely marginalized from the industrial activities, a situation more common among negroes and mulattos who suffered from the prejudice of colour so strongly implanted by slavery⁴⁸.

However, where there was no influx of immigrants Brazilian workers were employed. The employment of Brazilians - white, negro or mulatto - distinguished the economy of São Paulo, where at the beginning of the twentieth century there was a total of 529,000 immigrants representing 23.19% of the whole population, from other regional economies. In Pernambuco, for example, in 1900 there were only 11,000

⁴⁶ Kowarick, *op.cit.*, pp.65-8.

⁴⁷ Ministerio da Agricultura, Commercio e Obras Publicas, Relatorio da Repartição dos Negocios da Agricultura, Commercio e Obras Publicas, (Rio de Janeiro, 1869), p.23.

⁴⁸ Kowarick, *op.cit.*, pp.101-6.

immigrants, representing only 1% of total population of this state⁴⁹. In several northeastern provinces, the number of Brazilian non-slave workers employed in sugar production increased⁵⁰. Where slavery declined after the end of the transatlantic slave trade, and where the immigrant did not go, Brazilians were employed either in the countryside or in the cities.

Towards the end of the nineteenth century, there was a change of attitudes about the nature of the labourer. This change in attitudes was coincident with the abolition of slavery and the massive European immigration⁵¹. From then onwards, other factors began to have a major influence on the making of the Brazilian working class - namely the labour movement of mainly anarchist inspiration. The years before the World War I constitute the formative period for organized labour. During that period, the first labour organizations were formed and the movement acquired the basic characteristics that shaped its later course.

Beginning in the 1840s, a variety of organizations turned their attention to working-class problems, and a modern labour movement gradually emerged. At first, mutual-aid societies, liberal political movements, and utopian experiments were the principal forms of organization. Towards the end of the nineteenth century, faced with the failure to improve their lot and under the influence of European working-class philosophies, workers moved towards more militant expressions of their goals and sought more adequate forms through which to achieve their aims. By World War I, unions, federations, and confederations constituted the predominant working-class organizational vehicles. In addition, political parties, representing worker's interests, were formed.

During the 1870s and 1880s, a growing acceptance of new and more militant ideologies led to the emergence of a modern labour movement. These doctrines, adopted from Europe but at times moulded to local circumstances, served as guides for workers seeking to improve their lives. Several circumstances aided the spread of ideas. Foreign immigrants played a major role in the process. In all, just under 10 million persons emigrated to Latin America before World War I; almost 8 million of them went to Argentina and Brazil. They generally settled in urban zones, although many farmed or worked on the land. By far the largest number of immigrants came from Italy and Spain, and anarchism's strong roots in both those countries partly account for its strength throughout Latin America⁵². Thus, from the beginning of the twentieth century onwards, under the increasing influence of political ideas brought from Europe, the work-ethic and the working-relations in Brazil became more closer to that prevailing in the industrial European nations.

To sum up, there were similarities in the problems faced by the English employers in the

⁴⁹ *Ibid.*, p.116.

⁵⁰ Lamounier, *op.cit.*, pp.339-40.

⁵¹ *Ibid.*, p.349.

⁵² H.A. Spalding, Organized Labor in Latin America: Historical Studies of Urban Workers in Dependent Societies, (New York, 1977), pp.1-8.

seventeenth and eighteenth centuries, and his Brazilian counterparts in the nineteenth century. Like Methodism in England, slavery was a major influence in the making of the Brazilian working-class during the last century. Methodism provided the moral energy for the new work-ethic emerging from the capitalist working-relations. Slavery was the point of reference for all the working-relations in Brazil. Its impact was felt even several years after the abolition of slavery at the end of the 1880s. Towards the end of the century, a large number of foreigners entered the country, going mainly to the coffee farms in São Paulo. Foreigners also went to the city of São Paulo where they were employed in large numbers in the emerging Brazilian industry. Nevertheless, in other provinces foreigners were not as numerically important as they were in São Paulo. In these provinces, Brazilians were more widely employed. As will be discussed later, this seems to have been the case in Minas Gerais, where foreigners constituted a small proportion of the whole population and thus a relatively less important source of labour.

Chapter 9 - NINETEENTH-CENTURY MINEIRO LABOUR MARKET

Bearing in mind the major impact of slavery on the making of the Brazilian working class until late nineteenth century, it is important to examine the sources of labour available to nineteenth-century mineiro entrepreneur. As indicated above, in some parts of Brazil, like in the Northeast, non-slave Brazilians became the major source of labour available from the end of the transatlantic slave trade due to the exodus of slaves and the scarcity of foreigners. In other parts, like São Paulo, slaves first and foreigners later represented the main sources of labour. In Minas Gerais, slaves were undoubtedly an important source of labour for almost the entire century. They were employed in a wide variety of occupations in both the agricultural and non-agricultural sectors. Non-slave Brazilians, however, had a larger participation in the work-force. They constituted the majority of the population and some sectors of the mineiro economy relied almost exclusively on their labour. Even foreigners, numerically not as representative as in São Paulo and Rio de Janeiro, had a distinguished participation within the mineiro labour force as a source of skilled labour.

This chapter is divided into two parts. The first part discusses briefly some of the main demographic characteristics of the mineiro population. It analyses the occupational structure of the mineiro population and the participation of different populational groups within it. The aim is to draw a broad picture of the labour market and the possible sources of labour in Minas Gerais during the last century. The second part examines the main sources of labour - both skilled and unskilled - used by the firms surveyed in this thesis. It also examines - in those cases where information is available - the forms of recruitment used by mineiro firms.

9.1 - The Mineiro Population:

With one of the largest populations in Brazil during the nineteenth century¹, Minas Gerais had also one of the largest slave populations in absolute terms. As shown in Table IX.1, the province had the second largest slave population in 1823. During that year, only the province of Bahia had a larger number of slaves (237,458). In 1872², Minas Gerais had the largest slave population, as shown in Table IX.2. Towards the

¹ Although nineteenth-century population data may be unreliable (sometimes the several estimates are contradictory and often they were not rigorously collected) most estimates and the 1872 census point to the same conclusion: Minas Gerais had one of the largest populations in Brazil during the nineteenth century. In the first decade of the last century the mineiro population amounted to 350,000, making Minas the most populous province. In the 1820s, the population was estimated at around 600,000, increasing to more than 900,000 in the 1830s and to around 1,500,000 in the middle of the century. An estimate of 1870 calculated the population of the province in only 631,885 people, nearly a third of the estimate for 1867 (1,600,000) and 1869 (1,600,000). Nevertheless, even this low estimate confirmed the primacy of Minas as Brazil's most populated province. The census of 1872, found that Minas Gerais was the most populous province with 2,039,735 people, a dominance confirmed by the censuses of 1890 and 1900. See Ministerio da Agricultura, Industria e Commercio, Directoria Geral de Estatistica, Recenseamento do Brazil realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, pp.403-23.

² The census of 1872 also was not exempt of problems. Collection of data did not begin in the same day throughout the country. In the provinces of Minas Gerais, São Paulo and Mato Grosso it began only later. Furthermore, census was not carried out in 25 parishes: 1 in Maranhão, 2 in Piauí, 3 in Rio de Janeiro,

Table IX.1 - Brazilian population in 1823 per province and divided by nationals and slaves.

PROVINCES	POPULATION				
	NON-SLAVES	%	SLAVES	%	TOTAL
Alagoas	90,000	69	40,000	31	130,000
Bahia	434,464	65	237,458	35	671,922
Ceará	180,000	90	20,000	10	200,000
Rio de Janeiro*	301,099	67	150,549	33	451,648
Espirito Santo	60,000	50	60,000	50	120,000
Goiás	37,000	61	24,000	39	61,000
Maranhão	67,704	41	97,132	59	164,836
Mato Grosso	24,000	80	6,000	20	30,000
Minas Gerais	425,000	66	215,000	34	640,000
Pará	88,000	69	40,000	31	128,000
Paraíba	102,407	84	20,000	16	122,407
Pernambuco	330,000	69	150,000	31	480,000
Piauí	80,000	89	10,000	11	90,000
Rio G. do Norte	56,677	80	14,376	20	71,053
Rio G. do Sul	142,500	95	7,500	5	150,000
Santa Catarina	47,500	95	2,500	5	50,000
São Paulo	259,000	92	21,000	8	280,000
Sergipe	88,000	73	32,000	27	120,000
Brazil	2,813,351	71	1,147,515	29	3,960,866

Source: Adapted from Ministério da Agricultura, Indústria e Commercio, Recenseamento do Brazil Realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, p.404. * Including the province of Rio de Janeiro and the city of Rio de Janeiro.

3 in Rio Grande do Sul, 5 in Sergipe, and 11 in Minas Gerais. See Directoria Geral de Estatistica, Relatorio Anexo ao do Ministerio dos Negocios do Imperio de 1876, (Rio de Janeiro, 1877), pp.5-8.

Table IX.2 - Brazilian population in 1872 per province and divided by non-slaves and slaves.

PROVINCES	POPULATION				
	NON-SLAVES	%	SLAVES	%	TOTAL
Alagoas	312,268	90	35,741	10	348,009
Amazonas	56,631	98	979	2	57,610
Bahia	1,211,792	88	167,824	12	1,379,616
Ceará	689,773	96	31,913	4	721,686
Corte*	226,033	82	48,939	18	274,972
Espirito Santo	59,478	72	22,659	28	82,137
Goiás	149,743	93	10,652	7	160,395
Maranhão	284,101	79	74,939	21	359,040
Mato Grosso	53,750	89	6,667	11	60,417
Minas Gerais	1,669,276	82	370,459	18	2,039,735
Pará	247,779	90	27,458	10	275,237
Parafba	354,700	94	21,526	6	376,226
Paraná	116,162	92	10,560	8	126,722
Pernambuco	752,511	89	89,028	11	841,539
Piauí	178,427	88	23,795	12	202,222
Rio de Janeiro	490,087	63	292,637	37	782,724
Rio G. do Norte	220,959	94	13,020	6	233,979
Rio G. do Sul	367,022	84	67,791	16	434,813
Santa Catarina	144,818	91	14,984	9	159,802
São Paulo	680,742	81	156,612	19	837,354
Sergipe	153,620	87	22,623	13	176,243
Brazil	8,419,672	85	1,510,806	15	9,930,478

Source: Adapted from Ministério da Agricultura, Indústria e Comercio, Recenseamento do Brazil Realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, p.414.

* The city of Rio de Janeiro.

1880s, although the number of slaves decreased in the country as whole, Minas Gerais continued to have the largest slave population. In 1875, for example, there were 1,419,966 slaves in Brazil, 298,496 (21%) in Minas Gerais. Ten years later, there were 1,133,228 slaves in the whole country and 276,275 (24%) in Minas Gerais³. Finally, by the time of the abolition of slavery, the Brazilian slave population was estimated in 800,000, of whom 230,000 (29%) resided in Minas Gerais⁴.

Table IX.3 - Minas Gerais: non-slave and slave population, and their percentage participation in the total population in 1819, 1823, 1830-1, 1854-7, 1869, and 1872.

YEARS	NON-SLAVES (%)	SLAVES (%)	TOTAL
1823	425,000 (66)	215,000 (34)	640,000
1830-31	- (69)	- (31)	-
1854-57	- (75)	- (25)	-
1869	1,200,000 (80)	300,000 (20)	1,500,000
1872	1,669,276 (82)	370,459 (18)	2,039,735

Sources: Compiled from Ministerio da Agricultura, Industria e Commercio, Directoria Geral de Estatistica, Recenseamento do Brazil realizado em 1 de Setembro de 1920: Resumo Historico dos Inqueritos Censitarios Realizados no Brazil, (Rio de Janeiro, 1922), I, pp.403-23; and D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX (São Paulo, 1988), p.47.

Slaves constituted a large proportion of the mineiro population. During the first half of the nineteenth century slaves represented about 30% of the population of the province, as indicated in Table IX.3. This proportion was not much different from that for Brazil (29%) in 1823, as shown in Table IX.1. During this year, only four other provinces had a larger proportion of slaves: Maranhão (59%); Espírito Santo (50%); Goiás (39%); and Bahia (35%). From the middle of the century onwards, slave participation in the mineiro population decreased to 25% in the 1850s and to about 20% in the late 1860s and early 1870s. In 1872, the proportion of slaves in the mineiro population (18%) was once more very similar to that for Brazil (15%), as shown above in Table IX.2. During this year, only the provinces of Rio de Janeiro (37%), Espírito Santo (28%), Maranhão (21%), and São Paulo (19%) had a larger proportion of slaves within their population. Hence, it is reasonable to conclude that the mineiro slave population was large both in absolute and relative terms.

If the size of the slave population in itself is an indication of the importance of slaves as a source of labour during the last century, this becomes even clearer when the figures for slave participation in the work-force are taken. As shown in Table IX.4, during the period 1831-40 slaves represented nearly 37% of the mineiro labour force. In 1872, although the participation of slaves in the mineiro work-force was not as large as in Rio de Janeiro, where slaves constituted more than 46% of the total work-force, it was still very significant. During this year, slaves still made up nearly 19% of the mineiro work-force.

Non-slave Brazilians constituted the largest group of the mineiro population. According to Table IX.5, non-slave Brazilians represented more than 80% of the total population in 1872. From 1890 onwards,

³ This number does not include the number of slaves of five counties.

⁴ This estimate, by Xavier da Veiga, is probably an exaggeration, as pointed out by F. Iglésias, Política Econômica do Governo Provincial Mineiro: 1835-1889, (Rio de Janeiro, 1958), p.130.

Table IX.4 - Participation of non-slaves and slaves in the work-force, 1831-1840 and 1872.

PROVINCES	1831-1840		1872	
	NON-SLAVES	SLAVES	NON-SLAVES	SLAVES
Minas Gerais	63.26	36.74	81.07	18.93
Rio de Janeiro	-	-	53.80	46.20
São Paulo	-	-	78.41	21.59
Bahia	-	-	84.92	15.08
Pernambuco	-	-	85.70	14.30
Rio Grde. Sul	-	-	81.57	18.43

Sources: Adapted from D.C. Libby, *op.cit.*, p.54.

Brazilians constituted more than 96% of the mineiro population, a participation very similar to that for Brazil as whole. Comparison with São Paulo and the city of Rio de Janeiro illustrates very well the weight of Brazilians in the mineiro population. In São Paulo, the participation of non-slave Brazilians in 1872 and 1890 is very similar to that observed in Minas Gerais for both years. However, in 1900 the participation of Brazilians in the paulista population decreased to 76.81%, increasing to 81.85% in 1920. In Rio de Janeiro, although the participation of Brazilians tended to increase during the period 1872-1920, Brazilians never represented more than 80%. Hence, Brazilians were, in quantitative terms, by far the most important source of labour in nineteenth-century Minas Gerais.

In contrast, foreigners constituted a small proportion of the mineiro population. As shown in Table IX.5, foreigners represented only 0.9% of the total population of the province in 1872. The participation of foreigners in the mineiro population was similar to that of São Paulo and Brazil during this year. However, comparison with the city of Rio de Janeiro shows clearly the small importance, in relative terms, of foreigners in Minas Gerais. During this year, foreigners represented 26.66% of the total population of the city of Rio de Janeiro. In 1890, the proportion of foreigners in Minas Gerais grew to 1.47%, less than it did in São Paulo where the participation of foreigners increased to 5.42%. During this year, the participation of foreigners in the mineiro population was still smaller than that in the city of Rio de Janeiro, where they represented 23.79%. At the beginning of the twentieth century, foreigners represented nearly 4% of the mineiro population. Nevertheless, at the same time foreigners represented 23.19% and 25.94% of the population of São Paulo and the city of Rio de Janeiro respectively. Despite the efforts from the provincial/state government, Minas did neither attract nor hold immigrants during the period of major population transfer from Europe to the American continent - 1880 to 1920. Immigration in Minas Gerais failed because coffee planters, for whom it was in large part intended, were both unwilling and unable to hold foreign labour, and state colonies, designed to promote new crops and new agricultural techniques, never achieved their objectives⁵. Therefore, foreigners could hardly be considered an important source of labour in quantitative terms.

However, if these demographic indicators are useful to give a broad idea of the possible sources of labour, to understand any aspect of the history of Minas Gerais in the last century it is necessary to bear

⁵ J.D. Wirth, Minas Gerais in the Brazilian Federation, 1889-1937, (Stanford, 1977), p.15.

Table IX.5 - Participation of foreigners and Brazilians in the total population of Minas Gerais, São Paulo, Rio de Janeiro and Brazil in 1872, 1890, 1900, and 1920.

YEARS/ PROVINCES	1872#	1890	1900	1920
MINAS GERAIS				
Total Pop.	2,039,735	3,184,099	3,594,471	5,888,174
Brazilians Percentage	1,650,867 80.94	3,137,312 98.53	3,452,824 96.06	5,800,161 98.50
Foreigners Percentage	18,409 0.90	46,787 1.47	141,647 3.94	88,013 1.50
SAO PAULO				
Total Pop.	837,354	1,384,753	2,282,279	4,592,188
Brazilians Percentage	664,175 79.32	1,309,723 94.58	1,753,092 76.81	3,758,479 81.85
Foreigners Percentage	16,567 1.98	75,030 5.42	529,187 23.19	833,709 18.15
R. JANEIRO*				
Total Pop.	274,972	522,651	811,443	1,157,873
Brazilians Percentage	152,723 55.54	398,299 76.21	600,928 74.06	917,481 79.24
Foreigners Percentage	73,310 26.66	124,352 23.79	210,515 25.94	240,392 20.76
BRAZIL				
Total Pop.	9,930,478	14,333,915	17,438,434	30,635,605
Brazilians Percentage	8,176,191 82.33	13,982,370 97.55	16,159,371 92.67	29,045,227 94.81
Foreigners Percentage	243,481 2.45	351,545 2.45	1,279,063 7.33	1,590,378 5.19

Source: Adapted from Ministério da Agricultura, Indústria e Commercio, Recenseamento do Brasil Realizado em 1 de Setembro de 1920, (Rio de Janeiro, 1924), IV, 2nd. part, p.48 and Directoria Geral de Estatística, Relatorio Anexo ao do Ministerio dos Negocios do Imperio de 1876, (Rio de Janeiro, 1877), p.15.

* Those figures refer only to the city of Rio de Janeiro.

Those figures do not include the slave population.

in mind that the economic and social order was deeply marked by the slave regime that prevailed in Brazil for most of that period (as shown in Chapter 8). Although the slave regime had created a stratified society

divided into masters and slaves, the occupational structure of nineteenth-century mineiro population was very diversified⁶.

Slave-owners occupied the top of the social pyramid, top which was surprisingly large. More than two-thirds of slave-owners had no more than 5 slaves. Despite their small possessions, the exploitation of slave labour provided them with an increased production, as well as the status of "slave-owner", symbol of complete participation in the slave regime. Small slave-owners were found either in the countryside or in urban areas. They were dedicated to every sort of economic activity: cultivation of basic foodstuffs, domestic textile industry, mechanical workshops, and trading. Large and medium slave-owners (and the number of these seems to have been small) constituted the local elite of the slave regime. They were in control of the most dynamic economic sectors of the slave economy such as large plantations and extensive livestock, mining and large muletrains enterprises, or even manufactures.

Among the non-owners of slaves, the most privileged stratum was the group constituted by craftsmen - the independent producers so common in the urban areas and even in the hamlets of the province. Their privileged position was due to their greater participation in the money economy and to the greater relative status provided by the performance of crafts. The second most privileged stratum was made up by independent producers dedicated to subsistence agriculture organized in small family units of production. Wage-earners constituted the lowest social stratum of non-owners of slaves. They occupied a position almost totally marginal in the structure of the slave regime, either in terms of their absence from the most dynamic and productive economic activities, or in terms of their complete exclusion from the political process of Imperial Brazil⁷.

Finally, at the bottom of the social pyramid there was the mass of slaves who were employed in all kinds of occupations. Contrary to what several authors have argued⁸, it is not true that the majority of slaves were employed in the subsistence sector. There is evidence to show that the mineiro slave economy was surprisingly diversified and flexible⁹. A large proportion of the slave population - both men and women - was employed as craftsmen, as skilled and unskilled workers in non-agricultural activities, and as domestic

⁶ D.C. Libby, Transformação e Trabalho em uma Economia Escravista: Minas Gerais no Século XIX (São Paulo, 1988), p.18.

⁷ *Ibid.*, pp.81-3.

⁸ See, R.B. Martins, "Growing in Silence: The Slave Economy of Nineteenth-Century Minas Gerais", Vanderbilt University, unpublished Ph.D. thesis, Nashville, 1980; R.B. Martins, "Minas Gerais, Século XIX: Tráfico e Apego à Escravidão numa Economia Não-Exportadora", in Estudos Econômicos, 13(1): 181-209, Jan.-Abr., 1983; A. Martins Filho and R.B. Martins, "Slavery in a Non-export economy: Nineteenth-Century Minas Gerais Revisited", in HAHR, 63(3), pp.537-568, 1983.

⁹ See, R.W. Slenes, "Os Múltiplos de Porcos e Diamantes: A Economia Escravista de Minas Gerais no Século XIX", in Caderno IFCH UNICAMP, 17, who shows how directly and indirectly some sectors of the mineiro economy were attached to the export economy, providing the necessary funds to the purchase of slaves; and Libby, *op.cit.*, who pointed out the importance of the iron, and the mining industry - which relied heavily on slave labour - in the mineiro economy of the last century.

servants¹⁰, as it was also the case in the city of Rio de Janeiro¹¹. According to the 1872 census, nearly 25% of the mineiro slave population were employed in non-farming occupations¹².

Equally important in the study of the mineiro labour market is the fact that slavery determined the terms according to which the stratum of non-owners of slaves participated in the economy. Slavery was the predominant form of labour in the most dynamic sectors of the mineiro economy until the 1880s¹³. Consequently, slavery had a great impact upon the working-relations in nineteenth-century Minas Gerais, as can be observed in several remarks made by entrepreneurs throughout the century. At the beginning of the last century, for example, Eschwege observed that an entrepreneur in Minas Gerais would only succeed if he could hire or buy slaves¹⁴. Thus, slaves were employed in every kind of work: as peasants, producing sugar, transporting, cooking, as carpenter, postman, tailor, and so on. In contrast, the white population, even the poor, did not engage in manual work because it was easy to find a way to survive. Very often even poor whites possessed a slave, who could make ends meet. Even the mulatto, who considered work as a degrading thing, would possess one. In the more populous areas, however, mulattos constituted the working class. Nevertheless, they were the example of idleness, rarely working¹⁵. The freed negro, in his turn:

“Never has the means to buy a slave. Enchanted by the happiness of being free, he avoids any kind of work and does not submit himself to a new master in any way. Thus, he works only the necessary not to starve. Furthermore, following the example of the mulatto, if he earns in only one day the sufficient to eat for a whole week he will only come back to work in the end of these 7 days.”¹⁶

Furthermore, a non-slave worker would immediately object to an order given by his employer by saying that he was not a slave¹⁷. In 1856, Mariano Procópio Ferreira Lage justified the recruitment of foreigners on the grounds that non-slave Brazilians were unreliable¹⁸. Moreover, he argued that the recruitment of Brazilians was difficult and very often they lacked regular habits of work¹⁹. The same kind of remarks about non-slave

¹⁰ Libby, op.cit., pp.19, 73-92.

¹¹ For a detailed account of the slave economy in the city of Rio de Janeiro see L.C. Soares, “Urban Slavery in Nineteenth-Century Rio de Janeiro”, University of London, unpublished Ph.D. Thesis, 1988.

¹² R. Conrad, The Destruction of Brazilian Slavery, 1850-1888, (1972), p.300.

¹³ Libby, op.cit., p.18.

¹⁴ W.L. von Eschwege, Pluto Brasiliensis, (Berlin, 1833; reprinted Belo Horizonte/São Paulo, 1979), II, pp.248-9.

¹⁵ *Ibid.*, pp.263-4.

¹⁶ *Ibid.*, p.264.

¹⁷ *Ibid.*, pp.249-64.

¹⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.13.

¹⁹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.22.

Brazilian workers were made by owners of textile mills in the last quarter of the century²⁰.

Although the analysis of the mineiro population during the last century suggests that non-slave Brazilians constituted the main source of labour, they were only occasionally employed in the most dynamic sectors of the economy. Independent producers were mostly employed in crafts and subsistence agriculture. In contrast, despite being the second largest source of labour, slaves were employed in a wide range of occupations in both the agricultural and non-agricultural sectors of the mineiro economy. Thus, Minas Gerais - which had one the largest slave populations in Brazil - had its economic and social order deeply marked by slavery. Slavery had a major impact upon the pattern of employment of the non-slave population and was the predominant form of labour in the most dynamic economic activities of the province until its abolition in the late 1880s. Finally, foreigners were numerically the least important source of labour in Minas Gerais, although their importance as a source of skilled labour cannot be neglected, as it is going to be shown in the following part of this chapter.

9.2 - Sources of labour:

This part investigates the sources of labour from which mineiro entrepreneurs recruited their workforce. As the demographic indicators examined in the first part of this chapter have shown, the majority of the mineiro population was made up of non-slave Brazilians and slaves, who constituted the bulk of the labour force in almost every industry examined in this thesis as both skilled and unskilled labour. Nevertheless, some of these industries relied more than others on slave labour. This difference is due to several factors such as the local availability of slaves and alternative sources of labour, the timing of the emergence of each industry, the labour-intensity of each economic activity, and the nature of the technology involved in each specific industry. The iron industry, for example, relied heavily on slave labour since its emergence dates to the first decades of the nineteenth century. As indicated in Chapter 1, during this period there was a large flux of Africans to Brazil and a large stock of underemployed slaves (as a result of the demise of eighteenth-century gold-mining economy) in the central part of Minas Gerais, where the industry was largely concentrated. Furthermore, the most widely employed process of iron production was introduced by African slaves, who consequently represented a vital source of skilled labour for the industry. A large number of slaves were also employed in the construction of the União e Indústria turnpike, a highly labour-intensive enterprise. The turnpike was built in the 1850s, when slaves were still cheap and abundant. Moreover, it stretched across a coffee-growing region, where a large number of slaves was concentrated,

²⁰ In 1884, Francisco de Paula Mascarenhas - one of the founders of the Cachoeira mill and of the Companhia Cedro e Cachoeira - wrote his brother Bernardo complaining about the difficulties of recruiting people to the Cachoeira mill. See, Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 15 September 188", and Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 13 June 1884". In another occasion, he complained that it was time of feasts and that he would be forced to stop the mill since the workers would not turn up to work in any way. See, Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 22 April 1885".

and several shareholders of the company were both slave-owners and coffee farmers themselves (see Chapter 5). Although these two industries relied heavily on slave labour, they also employed a considerable number of Brazilians. In contrast with the iron and the transport industries, the textile industry did not employ a large number of slaves. Most of the mineiro textile mills emerged in the last quarter of the nineteenth century, a time when slaves were expensive and relatively scarce. Instead, they employed a large number of non-slave Brazilians, mostly women and children who were historically well suited to the work with textile machinery²¹. Among the industries investigated in this thesis, the electricity generating industry was the only one not to employ slaves at all, basically because the industry emerged after the abolition of slavery in Brazil. Therefore, the industry relied heavily on non-slave Brazilians, although the employment of foreigners cannot be neglected. Foreigners were employed in small numbers in all the industries examined. For most of the nineteenth century, they were the most important and accessible source of skilled labour.

There is some controversy over the time at which the production of iron in Minas Gerais began. According to Eschwege, iron was produced in the province from the first decade of the nineteenth century. At that point, many farmers and blacksmiths began to produce iron in small quantities for their own consumption. Until 1795 the production of iron for commercial purposes had been prohibited by the Portuguese colonial administration and manufacturing had also been limited by a lack of know-how about large-scale production²². Libby in turn argues that the production of iron in Minas Gerais began much earlier, probably in the middle of the eighteenth century, with rudimentary, domestic production on large estates. He argues that the 16 years - which separate the end of the restrictions on the industrial production of iron and the arrival of Eschwege in the province in 1811 - is too short a period to explain the large number of farmers and blacksmiths found by Eschwege producing iron. Thus, these farmers and blacksmiths must have started production much earlier, but only felt able to market their output commercially after the end of the restrictions. However, if there is some controversy over the time at which the production of iron began, there is general agreement that production in the province was introduced by African slaves²³. Iron would have been produced for the first time in Antônio Pereira by a slave belonging to Captain Antônio Alves, and also in Inficionado by another slave belonging to Captain Durães²⁴.

Slavery was thus of crucial importance for the iron industry in Minas Gerais for two main reasons. First, as mentioned above, slaves were responsible for the diffusion of the first productive method. Second, the regular supply of slave labour, together with the physical isolation of the province created by natural difficulties of transport, represented the main competitive advantage that small foundries had against foreign competition. Until the 1880s, the mineiro iron industry expanded by relying heavily on slaves as its main

²¹ See F. Engels, The Condition of the Working Class in England, (1987), p.161.

²² Eschwege, op.cit., p.203.

²³ Libby, op.cit., p.136.

²⁴ Eschwege, op.cit., p.203.

source of both skilled and unskilled labour²⁵.

Such a dependency on slavery can be observed in the first iron foundries established in the province. At the beginning, Eschwege did not buy slaves to work in his foundry. With his European anti-slavery background, he believed that the work could and should be carried out by non-slave Brazilians. Nevertheless, the difficulties in hiring a permanent and reliable work-force of non-slaves proved overwhelming. Workers would leave his foundry within months of being trained. Not even the existence of a contract signed by the workers changed the situation: they would run away during the night or would behave so badly that in the end it was a great relief to be rid of them. The consequence was that after several years Eschwege was not able to train even a master or an apprentice. Among the first 30 men he had trained, only two stayed at the foundry, mainly because they were offered a high salary, a house, and a small piece of land to cultivate²⁶. These demands illustrate well the difficulties encountered by nineteenth-century mineiro entrepreneurs to recruit non-slave native-born workers. It required greater material incentives to convince non-slave Brazilians to submit to the harsh discipline of a factory. These demands also show the attachment to land of the early non-slave Brazilian working-class and the backwardness of the money economy in Minas Gerais.

Furthermore, as Eschwege tried to organize the work at the charcoal-pit, the lack of habits of discipline, regularity, and obedience of non-slave Brazilians became obvious. He could not find anyone honest to oversee the work who would obey his orders punctiliously. The problems were worse on Sundays and holidays, when workers would leave the workplace unattended, thus causing fires in the woods and destroying the charcoal-pit on several occasions²⁷. According to Eschwege's own words:

"It is nearly impossible for an industry to thrive in Brazil when it depends on non-slave Brazilians."²⁸

He also tried to hire slaves, but this did not work either. As soon as their masters judged that they were capable of doing the work they requested them back, clear evidence of the scarcity of skilled labour and the competition for it. In the end, Eschwege came to the conclusion that it was absolutely necessary to buy slaves, because he could rely on his slaves after training them as foundry masters and apprentices, and punish them when necessary. From then on, his foundry functioned much better and more productively²⁹.

Slavery was therefore of utmost importance as the most viable source of labour available for the mineiro iron industry at the beginning of the century, although non-slaves Brazilians were also consistently being employed. During Eschwege's time - from 1811 to 1821 -, for example, the *Patriótica* foundry had

²⁵ Libby, op.cit., p.135.

²⁶ Eschwege, op.cit., p.248.

²⁷ *Ibid.*, pp.248-9.

²⁸ *Ibid.*, p.249.

²⁹ *Ibid.*, p.248.

a work-force made up of 20 slaves, 2 Brazilians, and occasionally a German foundry master. Slaves were mainly employed as woodcutters, charcoal burners, and as carriers of every type. Brazilians were employed in the smelting and reheating³⁰, operations which required more skill from the part of the worker. These two Brazilians were probably the only two he was able to train and hold before deciding to buy slaves, as mentioned above. In 1831, when Eschwege had already left the foundry, the *Patriótica* foundry continued to rely basically on slaves. At this time, it employed 55 slaves and one non-slave manager³¹. This implies that the skilled tasks were shifted from the hands of non-slave Brazilians to the hands of slaves and further confirms the dependence of one of the first iron foundries established in Minas Gerais on slaves as the main source of both skilled and unskilled labour.

The Morro do Pilar foundry seems to have employed both slaves and non-slaves. According to Schoenewolf - a German foundry master who worked at both the Morro do Pilar and the *Patriótica* foundries -, there were 34 people working at the foundry in 1814: 15 smelters and iron-founders, 8 blacksmiths, 6 carpenters, 2 negroes, 2 youths, and a overseer. Schoenewolf gives no information on the number of slaves and non-slaves within the work-force. However, based on evidence given by the German foundry master on how Câmara (the organizer of the foundry) beat one of the blacksmiths, it is reasonable to believe that part of the work-force was slave:

"Mr. Câmara became very angry and beat a certain blacksmith so severely that the man vomited blood for eight days. During the whole existence of the foundry, the whipping post was never empty."³²

In 1821, Schoenewolf described the work-force of the foundry as made up of one manager, 2 masters, 6 overseers, one blacksmith, 2 master-carpenters, 28 workers in the furnaces and the hammermill, 17 apprentices, and 70 slaves for the charcoal-box³³. Apart from the 70 slaves, the German foundry master gave no further information about the condition of the rest of the work-force. However, the number of overseers suggests that slaves were being employed in tasks other than the preparation of charcoal. The dependence of the Morro do Pilar on slave labour is indisputable. However, the employment of a large number of non-slave Brazilians is also beyond doubt.

Another important foundry in Minas Gerais in the first half of the last century was the Girau, considered one of the largest foundries in the period 1831-40. Founded in 1813, by 1840 it employed 49 slaves and one manager. Apart from the manager, all the skilled and unskilled workers were slaves, including 2 slave foremen, 3 smelters and iron-founders, and several blacksmiths³⁴. The São Miguel de

³⁰ Libby, *op.cit.*, p.162.

³¹ *Ibid.*, p.162.

³² Eschwege, *op.cit.*, p.209.

³³ *Ibid.*, p.213.

³⁴ Libby, *op.cit.*, pp.163-3.

Piracicaba foundry also employed a large number of slaves. In 1840, there were 151 slaves: 137 adults, 95 men and 42 women, and 14 children under ten years of age³⁵. This is the first conclusive evidence of the employment of women and children in the mineiro iron foundries. Although there is no further evidence, it is reasonable to believe that their employment was widespread. Thirteen years later the number of slaves employed at the São Miguel de Piracicaba had not changed considerably, as Monlevade (the owner of the foundry) observed in response to a survey of the iron industry in Minas Gerais organized by the president of the province:

"There are [in the São Miguel de Piracicaba foundry] 150 slaves already apprenticed to the art of iron production, to the making of charcoal in the European fashion, and to the manipulation of iron of any form and size."³⁶

The evidence given above shows clearly that the slaves employed at the foundry were performing all types work - skilled and unskilled.

The larger foundries were not the only concerns to employ slaves. The smaller factories did so also. However, they also employed a considerable number of non-slave Brazilians. In Itabira do Mato Dentro, for example, there were three small foundries in 1840 and all employed slaves. The owner, his blacksmith son, and 2 slaves worked in the first; the owner, a non-slave apprentice, and 4 slaves worked in the second one. In the third, the work-force was made up of 9 slaves. In Itabira do Campo in 1831, there were another three foundries: one employed 11 slaves and one non-slave worker; the other two employed 4 slaves, and 5 and 6 non-slaves respectively. From 1831 to 1840, there were 24 foundries in the Metalúrgica-Mantiqueira region of Minas Gerais³⁷, 22 employed slave labour. There is no information available about the work-force of the other two remaining foundries. Of the 22 foundries that employed slaves, 10 did not employ any non-slave workers, apart from the owner himself. Among the other 12, only 3 employed a larger number of non-slaves. Altogether, the 22 foundries employed 168 slaves and 70 non-slaves, giving indisputable evidence of the importance of slaves as a source of labour for the smaller foundries. However, it becomes clear that the iron industry also provided enough for non-slave labour even in the first half of the last century when slaves were abundant and relatively cheap.

There is very little information available for the second half of the century. Nevertheless, in Santa Bárbara - a district within the Metalúrgica-Mantiqueira zone - in 1864, there were 21 foundries. One of these, the São Miguel de Piracicaba foundry, is quoted as employing 103 workers, who most certainly were slaves. The remaining 20 foundries employed a total of 178 workers, each employing between 4 and 16 people, but there is no information about the balance between slaves and non-slaves. However, on the

³⁵ Ibid., p.165.

³⁶ F.A.M. Gomes, História da Siderurgia no Brasil, (Belo Horizonte/São Paulo, 1983), p.111.

³⁷ There is evidence suggesting that the iron industry was heavily concentrated in the Metalúrgica region in 1821. During the 1850s, 80% of the mineiro foundries were located in the Metalúrgica-Mantiqueira region and the same trend is observed for the period 1863-66, although the information is incomplete and scattered. Libby, op.cit., pp.152-60.

evidence provided by the São Miguel de Piracicaba foundry, it is reasonable to believe that a large proportion of the 178 workers employed by the other 20 foundries were slaves. In 1883, Gorceix - a researcher from the Mining School of Ouro Preto - observed that most of the foundries established in the four main producer districts³⁸ relied heavily on slave labour³⁹. Thus, until the very last years of slavery in Brazil most of the iron foundries established in Minas Gerais - large or small - depended on slaves as their main source of skilled and unskilled labour.

Further evidence of the importance of slaves as a source of labour for the iron industry is given by Ferrand - a researcher from the Mining School of Ouro Preto - in 1884. While examining the methods of production (cadinho and Italian) employed in Minas Gerais, Ferrand pointed out that most of the foundries employing the so-called Italian method of production - considered one of the most technologically developed method of production used in Minas Gerais at that time - employed slaves. These foundries employed on average 11 slaves and one youth: 8 slaves and the youth preparing the charcoal, one slave at the furnace, one at the hammermill, one as assistant, and one transporting ore. Furthermore, the owners of foundries employing the Italian method very frequently had to change to a simpler method of production when the master-slave died⁴⁰.

Thus, slaves represented the main source of skilled and unskilled labour for the mineiro iron industry until the abolition of slavery at the end of the 1880s. Their employment was widespread among both small and large foundries during this period. Nevertheless, as indicated above, there is evidence suggesting that non-slave Brazilians were also widely employed, although to a lesser extent.

Foreigners were another important source of skilled labour for the mineiro iron industry. Foreign ironworkers played a critical role in the industry at the beginning of the nineteenth century. As Eschwege pointed out, foreign ironworkers played a vital role in setting-up iron foundries in Minas Gerais. They were essential not only for assembling machinery, but also for training the native work-force and supervising production. The largest mineiro foundries established during this period relied upon foreign technicians. In the operation of the Patriótica foundry Eschwege depended on the help of a fellow German foundry master⁴¹. At the Morro do Pilar, Schoenewolf, the German foundry master who had worked at the Patriótica foundry, was hired as supervisor of the production in 1814. He proved to be absolutely vital to the successful production of the foundry. Before his arrival all attempts to produce iron had failed⁴². Moreover, in an attempt to improve production at the foundry, English ironworkers were requested from the Imperial

³⁸ The districts are: Itabira do Mato Dentro, Santa Bárbara, Conceição do Mato Dentro, and Caeté.

³⁹ *Ibid.*, p.174.

⁴⁰ P. Ferrand, "A Indústria de Ferro no Brazil (Provincia de Minas Gerais)", in Annaes da Escola de Minas, (Ouro Preto, 1885), No.4, pp.176-88.

⁴¹ Gomes, História da Siderurgia no Brasil, p.83.

⁴² Eschwege, op.cit., p.208.

government, as Schoenewolf informed Eschwege in his report of 1815:

"The blast furnace will not produce anymore until the arrival of the workers that Mr. Câmara requested from the government (...). With them will also come the refractory material from England."⁴³

After Schoenewolf had returned to Germany in 1821, 7 German technicians were recruited to work at the Morro do Pilar foundry. Nevertheless, the foundry was finally shut down ten years later. One of those German technicians continued in Minas Gerais and was found by Gardner, an Englishman, in 1840 operating a small foundry close to the village of Conceição⁴⁴.

Thus, until the abolition of slavery in 1888 slaves constituted the main source of skilled and unskilled labour for most of the large and small mineiro foundries. African slaves were responsible for the introduction of the first method of production. However, non-slave Brazilians were also widely employed, although in smaller numbers when compared with slaves. Foreigners represented an important source of skilled labour, at least in the first half of the century. Their importance as a source of skilled labour tended to decrease as more and more slaves and non-slave Brazilians became acquainted with the main methods of production. Nevertheless, the fact that foreigners continued to own the main foundries of this period (see Chapter 3) is a testimony of their qualitative - rather than quantitative - importance.

The Companhia União e Indústria (CUI) had a large number of slaves in its work-force, especially during the years of the construction of the turnpike. The company also employed a considerable number of non-slave Brazilians, as both skilled and unskilled labour. There were also a considerable number of foreigners employed, who were mainly employed as skilled labour.

Table IX.6 - Participation of slaves and non-slaves in the work-force of the Companhia União e Indústria, 1855-65.

YEARS	TOTAL	SLAVES	%	NON-SLAVES	%
1855	-	515 - 818	-	-	-
1856	1,102	900	82	202	18
1857	-	804	-	-	-
1st Section	1,136	800	70	336	30
1858 2nd Section	1,500	-	-	-	-
Total	<u>2,636</u>	-	-	-	-
1859	3,500	-	-	-	-
1865	344	-	-	-	-

Sources: Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), pp.13-5; (1857), pp.21-3; (1860), p.7; (1866), Anexo 12.; A.O. Esteves, "Mariano Procópio", Revista do Instituto Histórico e Geográfico Brasileiro, Vol.230, Jan-Mar, 1956, p.138; D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980, p.30.

⁴³ Ibid., p.211.

⁴⁴ Libby, op.cit., p.163.

As shown in Table IX.6, in 1855 the company employed between 515 and 828 slaves. Slaves most probably represented a large proportion of the total work-force during this period, as the figures for the following years suggest. In 1856, the company employed 1,102 people; among them, 900 slaves who constituted nearly 82% of the total work-force. Of the 900 slaves, 48 were elderly or youths, some of whom were employed in the making of charcoal; 96 were employed as bricklayers, cooks, etc., and as their assistants and apprentices, in the several workshops and sections of the turnpike; and the remaining 756 worked in the construction and maintenance of the turnpike. This demonstrates that in 1856 slaves were employed as both skilled and unskilled labour. The remainder 202 were non-slaves, the majority probably constituted of Brazilians. In 1857, there were 804 slaves working for the company, but there is no information about the total number of workers employed, as indicated in Table IX.6. However, on the basis of the number of workers employed in 1856 (1,102) - and as there is no information of any important alteration in the work-force -, it is realistic to suggest that the total number employed in 1857 may have been around 1,000 and that slave labour continued to account for a large proportion of the work-force. It is also reasonable to conclude that non-slaves must have constituted approximately 20% of the work-force, of whom a large proportion was most probably made up of Brazilians. In 1858, according to a report sent by the chairman of the company, Mariano Procópio Ferreira Lage, to the president of the province of Minas Gerais, the company employed 2,636 workers. Among them, 1,136 were employed on the section of the turnpike between Juiz de Fora and Paraíba. Of this number, 800 were slaves that is 70% of the 1,136. The other 1,500 were employed on the section between Petrópolis and Paraíba do Sul, although there is no information about the status of these workers⁴⁵. On the basis of the number of slaves working on the first section, it is reasonable to believe that slave labour represented a large proportion of the remaining 1,500 workers. Furthermore, if the proportion of slaves and non-slaves employed on the first section was about the same on the second section, it is reasonable to conclude that approximately 500 non-slaves were employed by the company in 1858. In 1859, with the construction of the section between Pedro do Rio and the Paraibuna river, the company employed a total of 3,500 workers, as shown above in Table IX.6. However, there is no indication of the balance between slaves and non-slaves, nor between skilled and unskilled workers, nor about those employed directly by the company and those employed by contractors hired to build parts of the turnpike. With the completion of the construction of the turnpike in the following year, the number of workers employed by the company fell steadily. In 1865, for example, the company employed a total of 344 people, but there is no information concerning the employment of slaves or non-slaves. However, from the 30 names listed as forming the staff of the company, 22 are without any doubt names of a Portuguese origin, which is strong evidence of the employment of Brazilians⁴⁶. For the period 1866 onwards, there is no information about either the total number of workers employed by the company

⁴⁵ D.A. Giroletti, "A Companhia e a Rodovia União e Indústria e o Desenvolvimento de Juiz de Fora, 1850 a 1900", Universidade Federal de Minas Gerais, Mimeo., Belo Horizonte, 1980, p.30.

⁴⁶ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1866), Anexo 12.

nor about the employment of slaves.

Slaves employed by the Companhia União e Indústria (CUI) were recruited basically from three sources: from other companies, directly from private masters, and from the company's own shareholders. On 7 June 1855, for example, the CUI signed a contract with the Companhia de Cocaes to hire 305 slaves. Furthermore, in the company report of 1856, slave owners - to whom the company had advanced payment for the hire of their slaves - appeared as the company's sole sundry debtors. In the same report, the chairman of the company informed the shareholders that at the end of 1855 the company had increased by more than 25% the price it had previously been offering to slave owners for the hire of slaves. Several reasons accounted for this change in the company's recruitment policy: the increase in the cost of labour caused by competition from other employers, the small supply of workers, and the increasing amount of work caused by the development of the construction of the turnpike União e Indústria⁴⁷. In the report of 1857, the chairman thanked two shareholders for the services they had rendered to the company: José Antonio da Silva Pinto and Lino José Ferreira Armond. Among other things, Pinto hired out to the company more than a hundred slaves from his own stock who were working on the construction of the turnpike between Mathias and the bridge over the Parahybuna river⁴⁸.

The idea that non-slave Brazilians were not a very reliable source of labour also prevailed at the CUI. For example, in the report of 1856, Lage justified the recruitment of foreign workers on the grounds of their greater skill:

"Such changes, (...), refer (...) to the recent recruitment of several craftsmen in Hamburg, who arrived this year. (...).

I try to employ as many nationals as I can, but unfortunately they are not reliable. Although there was a sufficient number of workers available for any kind of work, I am convinced of the advantages offered by work assisted by intelligence over routine and practical work. Thus, I do not hesitate to hire skilled workers who can satisfy the necessities of the company (...)."⁴⁹

In the company report of the following year, Lage observed that the recruitment of Brazilians was irregular and difficult. Although the number of Brazilians recruited had increased, it lagged behind what would have been expected from such a large population as that of the province of Minas Gerais. Moreover, Brazilians lacked regular habits of work and were reluctant to leave their families, preferring to work close to home for a significantly smaller salary⁵⁰.

Despite the complaints about their reliability, quality, and availability, non-slave Brazilians were nevertheless a source of skilled and unskilled labour for the CUI, as pointed out above. In 1856, for

⁴⁷ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), pp.14-32.

⁴⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.38.

⁴⁹ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.13.

⁵⁰ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.22.

example, the company employed a total of 80 non-slave Brazilians for the gravelling of the road⁵¹. The report of 1857 informed the shareholders that a Brazilian engineer, Bulhões, was hired to take the place of one of the French engineers whose contracts had expired. It also stated that the number of Brazilians recruited had increased and that the workshops established in Juiz de Fora employed both Germans and Brazilians⁵².

Finally, foreigners were also an important source of labour for the CUI. The company employed several foreigners in the construction and operation of the turnpike. In 1856, for example, 20 German workers were recruited in Hamburg to work in the company's workshops⁵³. From 1853 to 1856, the company employed two French engineers to supervise the construction of the road: J.J. Regnier Vigouroux and Theodoro Flagolot⁵⁴. According to the report of 1857, the French engineers - whose contracts had expired - had been replaced by a German and a Brazilian engineer, as mentioned above. During the same year, the company also hired the two sons of the German engineer to work as his assistants⁵⁵. Apart from the engineers already mentioned, the company also employed two foreign architects, Gambis and Lallemand, and a foreign surveyor, Mynssen⁵⁶. In 1860, the company employed more than 50 free Africans in the construction of a bridge over the river Kagado and of a branch of the turnpike to Mar de Hespanha. These Africans workers were paid by local farmers interested in the construction of the branch⁵⁷. Further evidence of the employment of foreigners in the operation of the turnpike is found in the list of the staff of the company in the report of 1866: William Morrit, inspector; Theodor Krauss, treasurer; León Boullié, Julien Audemars, César Ansaldi, and Ulysse Dauphin, drivers⁵⁸. Another important source of foreign labour was the colony of immigrants "D. Pedro II" set-up by the CUI in Juiz de Fora. According to the decree which granted the concession for the construction of the turnpike, the company was obliged to establish a colony of immigrants and settle 2,000 people there. By 1858, a total of 950 had arrived in the colony. Two years later, 1,144 lived there. Among the 667 adults living in the colony in 1860, approximately 196 worked for

⁵¹ A.O. Esteves, "Mariano Procópio", in Revista do Instituto Histórico e Geográfico Brasileiro, Vol.230, Jan-Mar, 1956, p.138.

⁵² Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), pp.21-3.

⁵³ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1856), p.13.

⁵⁴ Esteves, op.cit., pp.149-52.

⁵⁵ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1857), p.21.

⁵⁶ Giroletti, A Rodovia e a Companhia União e indústria, p.27.

⁵⁷ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1861), p.7.

⁵⁸ Companhia União e Indústria, Relatório da Assembléia Geral dos Acionistas, (1866), Annexe No.12.

the company, most of whom as skilled labour⁵⁹. In 1867, there were 1,082 Germans and 117 Brazilians living in the colony⁶⁰.

Thus, from evidence presented above, it is reasonable to conclude that slaves constituted an important source of both skilled and unskilled labour for the CUI, at least during the years of the construction of the turnpike, and that they made up a large proportion of the total work-force employed by the company during the period. Slaves were mainly recruited from slaves owned by other businesses, directly from private masters, and from the company's own shareholders. There is also evidence that non-slaves, of whom Brazilians were probably the majority, constituted around 20% to 30% of the work-force during the years of the construction of the turnpike. It seems that after the completion of the turnpike the participation of non-slaves increased and that a large part of the staff of the company was probably made up of Brazilians. Finally, foreigners were employed as both skilled and unskilled labour. Foreigners were recruited directly in their country of origin or from the immigrants of the Colony "D. Pedro II" established by the company.

Table IX.7 - Evolution of the mineiro slave population, 1864-1887.

YEARS	SLAVE POPULATION	EVOLUTION (Base 1874)	EVOLUTION (Year by Year)
1864	275,000	88.3%	
1874	311,304	100.0%	+24.5%
1884	301,125	96.7%	- 3.3%
1885	276,275	88.7%	- 8.2%
1887	191,952	61.7%	-30.5%

Source: Adapted from Conrad, op.cit., pp.285, 292.

In relation to the mineiro textile industry, slaves were not an important source of labour. Basically this is because the first mills were established in the middle of the 1870s (see Chapter 5), a time when slaves were scarce, expensive, and mostly concentrated in the coffee-growing areas. As shown in Table IX.7, from 1874 onwards the mineiro slave population started to decrease steadily. In 1874, there were 311,304 slaves in Minas Gerais. A decade later the number of slaves had declined more than 3%. In 1885, the number of slaves reduced 8.2% in comparison with that of the previous year. In 1887, the mineiro slave population was just over 60% of what it had been in 1874. Furthermore, the analysis of the evolution of the stock of slaves within the various sub-regions of Minas Gerais shows that slaves were becoming even more scarce where the textile mills were situated. As shown in Table IX.8, during the period 1874-1883 the number of slaves in the mineiro coffee counties increased in nearly 10,000, or 13%. During the same period, the number of slaves in the central part of Minas Gerais, where the bulk of the textile industry was

⁵⁹ Giroletti, A Rodovia e a Companhia União e Indústria, pp.31-8.

⁶⁰ Ministerio da Agricultura, Commercio e Obras Publicas, Relatorio da Repartição dos Negocios da Agricultura, Commercio e Obras Publicas, (Rio de Janeiro, 1869), Anexo L, p.130.

concentrated, decreased by 50,647, or 33.6%.

Yet, slaves were employed in small numbers, as in other mills all over Brazil⁶¹. They usually worked as domestic servants, in construction work, in the carpenter and blacksmith workshops and the sawmill, in transport, in the cleaning of mills, and in several activities related to the breeding of animals and farming. However, there were occasions in which a few slaves were employed as operatives in the mills⁶². Textile mills usually resorted to the hiring of slaves, a practice very common among industrialists in Brazil during the nineteenth century. In the city of Rio de Janeiro, for example, workshops and industrial establishments which did not have resources to buy slaves, or only needed their services temporarily, had to resort to the hiring of slave workers⁶³.

From 1873 to 1877, the Companhia Mascarenhas Irmãos, which owned the Cedro mill, consistently employed slaves. In 1873, for example, the mill hired two slaves, Clemente and Samuel, paying their owner 140\$000 Milreis and 70\$000 Milreis respectively for an annual contract⁶⁴. The company also hired slaves from its own shareholders' stock. In 1878, the company paid 106\$000 Milreis to Antônio Cândido Mascarenhas - one of the founders and owner of the Cedro mill - for the hiring of the slave Manoel for 212 days. In the following year, Bernardo Mascarenhas - manager of the mill - credited his brother and shareholder, Caetano Mascarenhas, 80\$000 Milreis for the hiring of his slaves⁶⁵. But the Cedro mill also possessed its own slaves. In 1873, the company bought a slave, Manoel Cabra, for 1:500\$000 Conto⁶⁶.

There is evidence that the Companhia Mascarenhas & Barbosa, owner of the Cachoeira mill, also hired slaves. In 1878, the manager of the mill - Francisco de Paula Mascarenhas - wrote to Francisco de Assis Vianna saying that:

"We believe that you made a mistake when you counted the number of days that your slave worked here (...)." ⁶⁷

Taking into account the fact that the Cedro and the Cachoeira mills were owned by members of the same

⁶¹ Although the total employment of slaves tended to decrease after the 1850s, they were still being employed in the Brazilian textile mills, as mentioned by S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850/1950, (Rio de Janeiro, 1979), p.64.

⁶² D. Giroletti, Fábrica Convento Disciplina, (Belo Horizonte, 1991), pp.61-2.

⁶³ Soares, op.cit., p.72.

⁶⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.5", "Contrato de Aluguel de Escravos".

⁶⁵ Companhia Cedro e Cachoeira, "Copiador de Cartas, 1872-1879 - Mascarenhas & Irmãos", "Letter from Bernardo Mascarenhas to Caetano Mascarenhas, 27 October 1879", p.108.

⁶⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondência Recebida No.5", "Escritura de Compra e Venda de Manoel Cabra".

⁶⁷ Companhia Cedro e Cachoeira, "Copiador de Cartas, 1878-1880 - Mascarenhas & Barbosa", "Letter from Francisco de Paula Mascarenhas to Francisco de Assis Vianna, 10 October 1878", p.118.

Table IX.8 - Registered Growth and Decline of Slave Population in Minas Gerais, 1874-1883 (Major Counties).

COUNTY	1874	1883	GROWTH	DECLINE
Coffee Counties (Southeastern Minas Gerais)				
Juiz de Fora	14,368	21,808	7,440	
Leopoldina	15,253	16,001	748	
Mar de Espanha	12,658	15,183	2,525	
Pomba	7,028	6,392		636
Rio Novo	6,957	7,336	379	
Rio Preto	6,313	6,120		193
São Paulo do Muriaí	6,938	7,775	837	
Ubá	7,149	6,020		1,129
	76,664	86,635	11,929	1,958
Coffee Counties Net Growth			9,971	
Mining Counties (Central Minas Gerais)				
Bomfim	5,824	2,919		2,905
Bom Sucesso	2,324	1,919		405
Caeté	2,798	1,310		1,488
Curvello	1,429	3,217	1,788	
Diamantina	2,036	7,510	5,474	
Formiga	3,625	3,352		273
Grão Mogol	3,701	2,604		1,097
Itabira	7,464	5,305		2,159
Januária	1,115	997		118
Lavras	8,380	6,322		2,058
Mariana	8,422	6,389		2,033
Minas Novas	4,312	3,368		944
Montes Claros	4,046	3,249		797
Oliveira	7,889	5,630		2,259
Ouro Preto	5,632	2,359		3,093
Paracatú	2,638	1,638		1,000
Pitangui	6,590	3,189		3,401
Queluz	13,998	4,322		9,676
Rio Pardo	6,722	3,667		3,055
Sabará	8,982	3,123		5,859
Santa Barbara	7,610	3,379		4,231
Santa Luzia	5,953	2,399		3,554
Santo Antônio do Monte	1,842	1,512		330
São João d'El Rei and São José d'El Rei	10,827	10,281		546
Serro	9,420	4,473		4,947
Sete Lagoas	2,295	2,527	232	
Tamanduá	4,764	2,851		1,913
	150,638	99,991	7,494	58,141
Mining Counties Net Decline				50,647

Source: Conrad, *op.cit.*, p.293

family, Mascarenhas, that the mills were close to each other, and that the Companhia Cedro e Cachoeira (CCC) - the company resulting from the merger of the two mills - employed and owned slaves, it is reasonable to conclude that the employment of slaves at the Cachoeira mill was not sporadic.

The employment of slaves by the mineiro textile mills continued until the last years of slavery. The

only textile mill to be operated basically by slaves was the São Sebastião mill, set-up in 1884⁶⁸. Apart from a few non-slave operatives, the large majority of the 75 workers⁶⁹ employed at the mill was made up of slaves. According to Victor Mascarenhas, the director of the mill:

"Due to the condition of its workforce, and apart from a machinist and a few non-slave workers, no salary is paid at this establishment."⁷⁰

In 1883, the CCC bought a slave, as shown in the following receipt:

"I have received from Mr. Theóphilo Marques Ferreira, manager of the Cedro mill, the amount of one conto and three hundred and fifty thousand reis, the sum for which I sold my slave Joaquim to the Companhia Cedro e Cachoeira, (...)."⁷¹

A year later Francisco de Paula Mascarenhas wrote to Bernardo Mascarenhas that he was sending a slave belonging to João Vianna to work at the Cedro mill. If Bernardo considered the price paid for the slave (Rs.1\$500 per day) too high, Francisco asked him to return the slave to the Cachoeira mill, evidence that the hiring of slaves continued at the CCC. In 1885, Francisco wrote again to Bernardo Mascarenhas, concerning the employment of slaves as bricklayers in the Cachoeira mill:

"Dias needs not bring any worker because I have 3 or 4 slaves here, who work as bricklayers."⁷²

In the company report of 1887 there is a note referring to the depreciation in the value of the slave Theodorico, who belonged to the CCC and worked at the Cachoeira mill⁷³. During the same year, Francisco de Paula Mascarenhas wrote to Bernardo Mascarenhas concerning the registration of the slave Joaquim⁷⁴. In 1886, the director and shareholder of the Cassu mill in Uberaba stated that a total of 61 people worked at the mill: among them, 3 slaves. During the same year, the Bom Jesus D'Água Fria mill employed 10 slaves⁷⁵. Thus, although slaves did not represent an important source of labour for the mineiro textile industry, they were consistently employed in small numbers.

Concerning non-slave Brazilians, the idea that they were not a reliable source of labour also

⁶⁸ Libby, op.cit., p.229.

⁶⁹ P. Tamm, Uma Dinastia de Tecelões, (Belo Horizonte, 2nd.ed. 1960), p.110.

⁷⁰ Libby, op.cit., p.229.

⁷¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.14", "Receipt of Rs.1:350\$000 signed by Antônio Diniz Mascarenhas, 27 July 1883".

⁷² Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 14 August 1885".

⁷³ Companhia Cedro e Cachoeira, "Quarto Relatório apresentado á Assembleia Geral dos Accionistas da Companhia Cedro & Cachoeira, em 15 de Março de 1887".

⁷⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências No.21", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 1 February 1887".

⁷⁵ Libby, op.cit., pp.234-5.

prevailed in the mineiro textile industry, as shown in the case of the iron industry and of the CUI. As mills were located in the countryside, in times of planting Brazilians were not easily recruited, as shown in the following letter:

"It has been very difficult to find workers; it is time of clearing the land."⁷⁶

In another occasion, Francisco de Paula Mascarenhas, manager of the Cachoeira mill, expressed the difficulties in finding people to work and how he was managing to overcome this problem:

"It does not matter how hard you try, the result will always be the same: more people will not come. The better way to hold people was studied by me and applied since the beginning - if one works from 30 to 40 days, he will earn 660, from 50 to 60 days, 680, and from 85 to 90 days, 700. The rewards will be paid for the day worked, when the job is finished. In this way, I have managed to hold a great number of people whose interest in the rewards have kept them here until the end."⁷⁷

In 1885, Francisco complained about the monthly festivals when nobody wanted to work and he was powerless to force the work-force otherwise⁷⁸. During the same year, he wrote that he was very busy having to supervise the work at the mill and the construction of a dam, since he did not have a reliable assistant. He could not trust the work to the workers themselves, who required a strict, intense and personal supervision⁷⁹.

Nevertheless, non-slave Brazilians were the most important source of unskilled labour for the mineiro textile industry. As mentioned above, to the exception of the São Sebastiao mill, which was operated basically by slaves, the larger part of the work-force employed by the mineiro mills was made up of non-slave Brazilians. The Cassu mill, for example, employed a total of 61 people in 1886. Among them, there were 3 slaves and a foreigner machinist. The remaining 57 people were all non-slave Brazilians. In 1883, the Biribiry mill employed 130 people: apart from the foreigner machinist, all of them were Brazilians⁸⁰. Although there is very little information available about the composition - in terms of nationality - of the work-force of other textile mills for any specific year, there is evidence of the wide employment of Brazilians, especially of women and children.

The large employment of women and children is not peculiar to the mineiro textile mills since in many different countries the bulk of the work-force employed in textile mills was made up of women and

⁷⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 15 September 1884".

⁷⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 13 June 1884".

⁷⁸ Companhia Cedro e Cachoeira, "Caixa Correspondências Recebidas No.17", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 22 April 1885".

⁷⁹ Companhia Cedro e Cachoeira, "Caixa Correspondências Recebidas No.18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 16 September 1885".

⁸⁰ Libby, op.cit., pp.234, 236.

children. In England, for example, between one-third and one-half of the labour force employed in the cotton-mills in the early 1830s were under the age of 21. In worsted the proportion of juveniles was even higher. Among adults, women constituted the majority. In 1834, of the 191,671 adults employed in all textile mills in the United Kingdom 102,812 were women⁸¹. In the middle of the century, there were almost 1.2 million people working in all sides of the British textile industry. In almost every branch there were more women than men employed⁸². This pattern of employment can also be observed later in newly industrialized countries. In Japan in the early twentieth century, for instance, female operatives comprised more than 85% of the total work-force of the local textile industry. Moreover, most of these female operatives had been recruited from the rural sector and were characteristically young in age. According to a 1900 survey of eight large cotton-mills in Osaka, more than 70% of the female operatives aged between 14 and 24 years. In the weaving factories, this proportion was even higher (77.2%)⁸³.

The reasons for the large employment of women and children in the textile industry are various. Engels, for example, suggests that the human labour involved in spinning and weaving consisted chiefly in piecing broken threads. Machines did all the rest and work did not require muscular strength, but only flexibility of finger. Hence, men were not only not needed, but, by reason of the greater muscular development of their hands, less fit for it than women and children. Women's and children's labour was also cheaper than men's⁸⁴ and they were more docile and easier to control⁸⁵.

In the case of Minas Gerais, as most mineiro mills were established in rural areas, and as the majority of adult men were employed on the land, the most accessible source of labour for the mills were women and children, especially orphans⁸⁶. Orphans were usually concentrated in orphanages and were thus more easily recruited.

The first records of the labour force of the Companhia Cachoeira de Macacos (CCM) appeared only in the 1920s. Nevertheless, from the records of those workers who started to work at mill at the turn of the century, it is possible to observe that they were all Brazilians and locals. Furthermore, most of them were children and teenagers when they were first admitted. Among the 32 records found, 18 (54%) of them belonged to male workers. As shown in Table IX.9, among male workers, the eldest one was 23 years old when he was admitted at the CCM and the younger was 5. Four (22%) were aged 21 years old and over,

⁸¹ E.P. Thompson, The Making of the Working Class, (1980), p.341.

⁸² P. Mathias, The First Industrial Nation: The Economic History of Britain, 1700-1914, (2nd. ed. 1983), p.242.

⁸³ K. Odaka, "Redundancy Utilized: The Domestic Economics of Female Domestic Servants in Pre-War Japan", in Japanese Women Working, ed. J. Hunter (1993), p.17.

⁸⁴ Engels, op.cit., pp.164-5.

⁸⁵ See Thompson, op.cit., Chapter 9 and 10, part IV.

⁸⁶ A.M. Vaz, Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987, (Belo Horizonte, 1990), pp.193-7.

and one of them, Herculano Luiz Moreira, worked at the mill as bookkeeper in the 1920s. He was 22 years old when he was employed in 1902⁸⁷. Eight (45%) were between 10 and 20 years old. The remaining 6 (33%) were under 10 years old. Among the 14 female operatives, the elder one was 20 years old and the younger one was 5, as indicated in Table IX.10. Only 5 (36%) of them were aged between 10 and 20 years old. The remainder 9 (64%) aged between 8 and 5 years old.

Table IX.9 - Companhia Cachoeira dos Macacos: male workers admitted until the beginning of the twentieth century, their place of birth, age at the time of admission, and year of admission.

WORKERS	PLACE OF BIRTH	AGE OF ADMISSION	YEAR OF ADMISSION
Antônio Ribeiro Freitas	Paraopeba	23	1900
Herculano Luiz Moreira	Inhaúma	22	1902
Emílio Augusto de Mello	Pará de Minas	21	1889
Manoel A. de Oliveira	Contagem	21	1889
Carlos Luiz de Moura	Sete Lagoas	20	1887
Amador Pereira Guimarães	Pitanguy	14	1890
Euclides P. de Camargos	Santa Quitéria	13	1901
Raymundo I. de Paula	Sete Lagoas	12	1895
Francisco Assis Cotta	Jequitibá	11	1890
Joaquim Gonçalves Cotta	Jequitibá	10	1890
Gercino Fernandes Diniz	Jequitibá	10	1905
Raymundo P. de Miranda	Lagoa Santa	10	1906
José Cesario da Rocha	Contagem	9	1896
Antônio Leandro	Cachoeira dos Macacos	9	1893
Pedro Gonçalves Cotta	Jequitibá	7	1890
Francisco Simão Faria	Santa Quitéria	7	1892
Benevides D'Anunciação	Santa Quitéria	6	1890
João Baptista Marques	Sete Lagoas	5	1896

Source: Compiled from Companhia Cachoeira dos Macacos, "Livro de Registro de Empregados, 1926-1931", pp.1-56 and "Livro de Registro de Empregados, 1935", pp.3-203.

Among the 32 workers employed by the CCM whose records were found, some were brothers and sisters such as Balbina Pires de Miranda and Raymundo Pires de Miranda - both of them were born in Lagoa Santa and were 10 years old of age when they were admitted at the mill in 1891 and 1906 respectively -, and Joana Iria Candelária and Thereza Candelária de Jesus - both 8 years old of age when they began to work at the mill in 1904 and 1910 respectively. There is also the case of 3 brothers Francisco Assis Cotta, Joaquim Gonçalves Cotta and Pedro Gonçalves Cotta - who started to work at the mill at the age of 11, 10 and 7 years old respectively -, and their sisters, Rita Cotta (born in 1886) and Augusta Ferreira

⁸⁷ Companhia Cachoeira dos Macacos, "Livro de Registro de Empregados, 1926-1931".

Cotta (born in 1895) - who were both 8 years old when they started to work at the mill⁸⁸. This seems to indicate that family relations were an important way of recruitment.

Table IX.10 - Companhia Cachoeira dos Macacos: female workers admitted until the beginning of the twentieth century, their place of birth, age at the time of admission, and year of admission.

WORKERS	PLACE OF BIRTH	AGE OF ADMISSION	YEAR OF ADMISSION
Perpetua de Paula	Sete Lagoas	20	1895
Carlota Ferreira de Sá	Três Barras	17	1889
Maria M. Gonçalves	Inhaúma	11	1901
Balbina P. de Miranda	Lagoa Santa	10	1891
Macrina M. de Abreu	Sete Lagoas	10	1898
Joana Iria Candelária	Sete Lagoas	8	1904
Thereza C. de Jesus	Sete Lagoas	8	1910
Anna Pereira Franco	Jequitibá	8	1890
Rita Cotta	Jequitibá	8	1894
Augusta Cotta	Jequitibá	8	1903
Thomazia Ferreira	Sete Lagoas	8	1892
Maria M. Fernandes	Inhaúma	7	1900
Dolores Moreira de Sá	Sete Lagoas	5	1900
Maria Fernandes	Sete Lagoas	5	1905

Source: Companhia Cachoeira dos Macacos, "Livro de Registro de Empregados, 1926-1931", pp.1-56 and "Livro de Registro de Empregados, 1935", pp.3-203.

The analysis of the records of the labour force of the Companhia de Tecidos Santanense (CTS) leads to the same conclusions: most of them indicate the employment of locals, notably children, teenagers, or women. Of the 14 records available, 6 (43%) refer to male workers, as shown in Table IX.11. Among male operatives, the eldest one was 17 when he started to work at the mill. Other three operatives were over 10 years old and the remaining 2 were aged 9 and 8. These last two ones, Josias Alves Franco and José Alves Franco, were brothers⁸⁹. Among the 8 (57%) female workers, the eldest one was Francelina Balbino, who was 23 when she started at the mill in 1895. Five of the female operatives were aged between 10 and 20 years old. The younger female workers were aged 7 when they began to work at the CTS, as indicated in Table IX.11.

The same phenomenon can be observed in other mills in Minas Gerais. The Cedro mill, for

⁸⁸ Companhia Cachoeira dos Macacos, "Livro de Registro de Empregados, 1926-1931", pp.1-56 and "Livro de Registro de Empregados, 1935", pp.3-203.

⁸⁹ Companhia de Tecidos Santanense, "Registro de Empregados".

example, employed a total of 130 workers in 1882, 60 of whom were children⁹⁰. The Cassu mill employed in 1886 15 women over 14 years old, 10 girls between the ages of 8 and 14 years old, and 20 boys between the ages of 8 and 14 years old. During the same year, the textile mill of Montes Claros employed a total 81 people; 70 workers were orphans or abandoned youths. Among the 66 people employed by the União Itabirana mill, 40 were boys and girls. Women made up the majority of the work-force of the Bom Jesus d'Água Fria mill: of the 140 workers employed at the mill, 80 were women. The same can be observed at the Biribiry mill in 1883. Of the 130 workers employed at the mill during this year, 110 were female aged between 10 and 30 years old⁹¹.

Table IX.11 - Companhia de Tecidos Santanense: female and male workers admitted until the beginning of the twentieth century, their place of birth, age at the time of admission, and year of admission.

WORKERS	PLACE OF BIRTH	AGE OF ADMISSION	YEAR OF ADMISSION
<u>Female</u>			
Francelina Balbino	Itaúna	23	1895
Maria da Costa Leite	Itaúna	20	1915
Maria Raymunda Leal	Igaratinga	16	1910
Maria Lydia de Jesus	São Gonçalo Pará	14	1902
Augusta Alves Franco	Pitanguy	14	1899
Maria G. Monteiro	Sete Lagoas	13	1895
Nazareth Maria Jesus	Itaúna	7	1885
Augusta Nogueira	Itaúna	7	1914
<u>Male</u>			
Firmino José de Faria	Itaúna	17	1895
Joaquim Leite	Itaúna	14	1903
João Monteiro	São Gonçalo Pará	13	1900
Antônio Sudario Leroy	Santa Quitéria	12	1904
Josias Alves Franco	Itaúna	9	1908
José Alves Franco	Itaúna	8	1899

Source: Compiled from Companhia de Tecidos Santanense, "Registro de Empregados".

The CCC also employed a large proportion of women, and children. In 1883, for example, only 20% of the work-force was made up of men. The rest was made up of women and children, as shown in Table IX.12. The composition of the work-force did not change in the following year, as women, boys, and girls represented 45%, 23%, and 12% of the total work-force respectively. For the years 1885 and 1886, there is no information about the percentage of men, women, and children employed by the company.

⁹⁰ Companhia Cedro e Cachoeira, "Copiador de Cartas de 1881 - Mascarenhas & Irmãos", "Inquiry of the Sete Lagoas District Council on 13 March 1882", pp.488-92.

⁹¹ Libby, *Transformação e Trabalho*, pp.234-6.

Nevertheless, there is evidence of the continuing employment of children at the company in 1885, as a letter written by Francisco de Paula Mascarenhas, manager of the Cachoeira mill, suggests:

"The sooner we have the steam machine in the spinning section the better will be the results.

What I make with 40 children, with a great waste of cotton, I will make with 20 without any waste, doubling the production and improving the quality of the thread."⁹²

In the years 1887, 1888, and 1889, the percentages shown in Table IX.12 refer only to the work-force employed at the Cedro mill. Nevertheless, the conclusion is the same: the largest proportion of the work-force was made up of women and children. In 1887, the Cedro mill employed a total of 233 workers, out of whom 21% were men, 45% women, 23% boys, and 11% girls. In the following year, the mill employed a total of 253 workers: 45% were women, 23% were boys, and 9% were girls. In 1889, the figures for boys and girls are included in the figures for men and women respectively. Nevertheless, the group of women made up the larger proportion of the total work-force representing 65%. There is further evidence that the company continued to employ women and children in large proportions. In 1893, for example, Francisco de Paula Mascarenhas wrote the following letter urging the recruitment of children:

"It is urgent that you find to this mill (...) as many the children as you can to work in the spinning machines, because it is nearly impossible to find them here."⁹³

Table IX.12 - Composition of the work-force of the Companhia Cedro e Cachoeira for the years 1883-1889.

YEAR	TOTAL WORK-FORCE	MEN %	WOMEN %	BOYS %	GIRLS %
1883	264	20	24	24	14
1884	268	20	45	23	12
1885	319	-	-	-	-
1886	378	-	-	-	-
1887*	446	21	45	23	11
1888#	489	23	45	23	9
1889+	485	35	65	-	-

Source: Adapted from A.M. Vaz, *Cia. Cedro e Cachoeira: História de uma Empresa Familiar, 1883-1987*, (Belo Horizonte, 1990), p.196.

* The percentages for this year refer only to the Cedro mill which employed 233 workers.

The percentages for this year refer only to the Cedro mill which employed 235 workers.

+ The percentages for this year refer only to the Cedro mill, which employed 253 workers, and include men and boys and women and girls.

In 1894, Caetano Mascarenhas wrote that he had ordered José Domingues Alves Barroso to recruit in

⁹² Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 9 October 1885".

⁹³ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.35", "Letter from Francisco de Paula Mascarenhas to Theóphilo Marques Ferreira, 8 January 1893".

Medanha the young women needed to work in the new spinning machines being set-up at the São Vicente mill⁹⁴.

As the above mentioned analysis of the records of the work-force of both the CCM and the CTS indicates, non-slave Brazilians were frequently recruited within the region where the mills were located. All of the workers listed by the records of both companies were born in the Metalúrgica zone, where both mills were located. Of the 32 workers listed in the records of the CCM, 76% of them were born in the district where the mill was established, Inhaúma, or in neighbouring districts such as Fortuna de Minas, Sete Lagoas, Paraopeba, Pitangui, and Jequitibá, as shown in Table IX.13. The records of the CTS indicate a similar trend. Of the 14 workers listed, 8 of them were born in the district where the mill was established (Itaúna).

Table IX.13 - Place of birth of the 32 workers listed in the records of the Companhia Cachoeira dos Macacos, 1926-1935.

DISTRICTS	WORKERS	PERCENTAGE
Fortuna de Minas	8	25%
Jequitibá	6	19%
Inhaúma	4	13%
Sete Lagoas	4	13%
Santa Quitéria	3	09%
Lagoa Santa	2	06%
Contagem	2	06%
Pará de Minas	1	03%
Paraopeba	1	03%
Pitangui	1	03%

Sources: Companhia Cachoeira dos Macacos, "Livro de Registro de Empregados, 1926-1931", pp.1-56; Companhia Tecidos Santanense, "Livro de Registro de Empregados, 1935", pp.3-203.

The CCC also recruited mainly locals. In 1885, for example, Francisco de Paula Mascarenhas, manager of the Cachoeira mill, wrote to Bernardo asking him:

"If you can find there [Cedro] some orphans or even if you have there some children available, without family, I would appreciate if you could send me 6 of them (...)"⁹⁵

In 1893, Caetano Mascarenhas recruited in the neighbourhood of his farm (located in Jequitibá, not very far

⁹⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Caetano Mascarenhas to Francisco de Paula Mascarenhas, 16 July 1894".

⁹⁵ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No. 18", "Letter from Francisco de Paula Mascarenhas to Bernardo Mascarenhas, 30 October 1885".

away) two families of workers and 26 women to work at the Sao Vicente mill⁹⁶. Furthermore, the CCC often recruited children in the orphanages from the neighbouring towns⁹⁷.

Non-slave Brazilians were also recruited in orphanages, as mentioned above, and through relatives. In 1884, for example, Bernardo Mascarenhas wrote to his brother, Antônio Pinto Mascarenhas, who lived in Capim Branco, asking him:

"I am about to begin some carpenter work which I wish to be finished during this year. As I need 20 or more carpenters and the number of carpenters available here is not sufficient, I would like to ask you the favour of recruiting them (...)." ⁹⁸

During the same year, Francisco de Paula Mascarenhas, manager of the Cachoeira mill, wrote that he had with him a young man who had been recommended by his mother and two of his brothers (Victor and Antonino). Nevertheless, he did not have any place for the young man at the mill at the moment⁹⁹. In September of 1884, Francisco de Paula Mascarenhas wrote to Caetano Mascarenhas about the workers the latter had recruited:

"Of the 7 workers you have sent only 3 arrived. The remaining 4 are still in Curvello, but are coming tomorrow."

In the same letter he asked his brother to send him, as soon as possible, as many workers as he could find¹⁰⁰.

In 1894, Caetano Mascarenhas wrote that:

"José Domingues Alves Barroso has agreed to send me lots of young women and good workers from Medanha, (...). Barroso is Priest Pedro's brother-in-law (...)." ¹⁰¹

During the same year, Caetano Mascarenhas wrote that he could not send the 12 weavers of the São Vicente mill that were requested by his brother Francisco de Paula Mascarenhas, then general manager of the CCC and manager of the Cedro mill, as his mill was short of weavers¹⁰².

Suppliers, agents, and clients were also an important channel of recruitment of Brazilian workers. In 1878, the manager of the Cachoeira mill, Francisco de Paula Mascarenhas, asked Kerr, an agent in

⁹⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Caetano Mascarenhas to Francisco de Paula Mascarenhas, 24 October 1893".

⁹⁷ Vaz, *op.cit.*, p.193.

⁹⁸ Letter from Bernardo Mascarenhas to Antônio Pinto Mascarenhas on 14 March 1884, reproduced in Giroletti, *Fábrica Convento Disciplina*, pp.64-5.

⁹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas, 11 August 1884".

¹⁰⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Francisco de Paula Mascarenhas to Caetano Mascarenhas, 6 September 1884".

¹⁰¹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Caetano Mascarenhas to Francisco de Paula Mascarenhas, 16 July 1894".

¹⁰² Companhia Cedro e Cachoeira, "Caixa de Correspondências Caetano Mascarenhas, 1883-1912 - No.149", "Letter from Caetano Mascarenhas to Francisco de Paula Mascarenhas, 16 July 1894".

Manchester, to recruit 3 workers for the mill¹⁰³. In 1891, Theóphilo Marques Ferreira, general manager of the CCC and manager of the Cedro mill, wrote to Gontijo, Mascarenhas & Cia., an agent in Rio de Janeiro:

"The dyer of this mill has left, and (...), I will be grateful if you could inform me if it is possible to recruit a good master, national or foreigner, in this job there in Capital, (...)." ¹⁰⁴

In 1896, Antônio Hygino M. do Rego, a merchant from Bagre, wrote that he had recruited a family made up of 5 girls, 1 boy, and widow, as had been requested by the general manager of the CCC. Two years later, Manoel Pimenta Figueiredo, a merchant from Capelinha, wrote to the general manager of the CCC that he was sending the boy the company had requested to look for the muletrain of the São Vicente mill¹⁰⁵.

Although foreigners were not quantitatively important, they represented an important source of skilled labour for the mineiro textile industry. Until the last decades of the nineteenth century neither slaves nor Brazilian wage-earners had the required mechanical skills. Mill owners needed competent technicians and were thus willing to hire foreigners¹⁰⁶. First in England and later in the USA and in continental Europe, foreigners were recruited to set-up mills, to operate and maintain the machinery, to train the work-force, and to supervise production.

In 1875, the Brazil Industrial textile mill recruited five English technicians to assemble machinery¹⁰⁷. The CCM also hired an English technician to install the machinery of the company, but he soon returned to England¹⁰⁸. The Cassu mill also depended on foreign technicians, as a shareholder who was manager of the mill stated:

"At the moment work at the mill 61 people, including the manager, the machinist George Gedney, (...)." ¹⁰⁹

In 1893, the CTS requested the help of a foreign technician from the CCC to assemble and put into operation its machinery:

"As I needed a mechanic to assemble four spinning and carding machines in the mill that

¹⁰³ Letter from Francisco de Paula Mascarenhas to Robert L. Kerr, 1 June 1878, reproduced in Giroletti, Fábrica Convento Disciplina, p.67.

¹⁰⁴ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.29", "Letter from Theóphilo Marques Ferreira to Gontijo, Mascarenhas & Cia., 1 April 1891".

¹⁰⁵ Letters from Antônio Hygino M. do Rego to Francisco de Paula Mascarenhas, 17 April 1896, and from Manoel Pimenta Figueiredo to Aristides José Mascarenhas, 15 July 1898, reproduced in Giroletti, Fábrica Convento Disciplina, p.67.

¹⁰⁶ For the employment of foreigner technicians in the country as a whole during the last century see Stein, op.cit., pp.64-5.

¹⁰⁷ Ibid., p.52.

¹⁰⁸ N.A.M. Freitas, "Cia. Têxtil Cachoeira dos Macacos: Empresa que deu Origem a uma Cidade", Fundação Mineira de Arte Aleijadinho/Escola Superior de Artes Plásticas, Mimeo., Belo Horizonte, 1990, p.27.

¹⁰⁹ Reproduced in Libby, op.cit., p.234.

I am setting-up here, I wrote to Mr. John Lomas. Nevertheless, when he arrived he informed me that it would be difficult for him to work here since he was still an employee of the Companhia do Cedro.

"(...).

"As the work of assembling the machines we have here will not take more than one or two months, I would like to ask if you could release Mr. Lomas to assemble our machines and put them into operation."¹¹⁰

At least in the first years, every master in the Cedro mill, apart from the blacksmith and carpenter masters, was recruited abroad. They were recruited by agents, preferably from the same country where the machinery had been bought¹¹¹. The purchase contract for the machinery of the Cedro mill, for example, included the provision of a technician to assemble and operate it¹¹². However, as the first technician sent from the USA as part of the contract never arrived, two other foreign technicians were recruited, Barnes and Nicholson. Barnes left the company five months after his arrival¹¹³, but Nicholson and his wife - the latter being responsible for the training of the weavers -, stayed longer. In 1879, another two English technicians, George Jates and Nathanael Holt, were recruited to work at the mill. Both of them left the Cedro mill in 1882. During the same year, the company hired another foreign technician, John Smith, who had previously worked at the Fábrica do Brumado, a textile mill located in Pitanguy¹¹⁴. This indicates that foreigner technicians were also recruited from other textile mills in the province.

Before merging with the Cedro mill, the Cachoeira mill had also hired foreign technicians to supervise work. William Hutchinson, an Englishman, was hired in 1876 for two years to supervise the setting-up and operation of the mill, and to train the work-force. Three years later, two foreign machinists, John and William Lomas, and a foreign weaver, Andrew White, replaced William Hutchinson, who had returned to England. In 1882, all three technicians left the company. John Lomas did not return from a visit to England, and William Lomas and Andrew White ran away during the night. In the following year another Englishman, James Winders, was hired¹¹⁵. Such a high turn-over of foreign workers indicates that their employment was erratic, either because the conditions of employment were far from ideal or because foreign workers were not as reliable as many in Brazil thought, or even both.

The employment of foreign technicians continued after the merger of the Cedro and the Cachoeira

¹¹⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.35", "Letter from Manoel José de Souza Moreira to Aristides Mascarenhas, 24 April 1893".

¹¹¹ Vaz, *op.cit.*, p.53.

¹¹² Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.2", "Contract of purchase of machinery signed by Mascarenhas & Irmãos and Gme. Van Vlick Lidgerwood, 27 September 1870".

¹¹³ Companhia Cedro e Cachoeira, "Copiador de Cartas da Fábrica do Cedro, 18/10/1872 a 10/04/1879", "Letter from Mascarenhas & Irmãos to Meilford de Lidgerwood, 18 February 1873".

¹¹⁴ Giroletti, *Fábrica Convento Disciplina*, pp.82-6.

¹¹⁵ *Ibid.*, pp.86-8.

mills into the CCC until the last years of the century. James Winders, for example, continued to work for the new company until 1889. In 1883, the company tried to hire William Hutchinson once again, but he decided not to go back to Brazil¹¹⁶. In 1884, the company looked for an experienced and skilful dyer in England¹¹⁷. In 1886, William Hutchinson agreed to consider the matter of rejoining the company, as he was approached by the CCC once more¹¹⁸. At the end of this year, Kerr gave the following account of the conditions to recruit a mechanic in England:

"With reference to looking out for another mechanic I presume I must not send any one until I hear from you again. I should like to know if you require a man who understand carding, spinning and weaving, and also the same man capable of erecting machinery and keeping the same in good order. It is rather difficult to find a man who is capable of doing all these things, but I would do my best for you."¹¹⁹

The above letter shows how limited the mineiro labour market was. It seems that it was easier to find a general technician abroad - which was not an easy task per se - than to find a more specialized local skilled worker. In the same letter, Kerr stated that Hutchinson was reluctant to accept the company's offer unless he was offered greater inducements¹²⁰. It seems that the CCC did not have a better alternative and decided to pay what Hutchinson was requesting. In 1889, Hutchinson rejoined the company, but two years later he returned to England leaving his son, Hebert, and a relative, William, in his place. They had come out with him two years previously. Both of them worked for the company for another three years, before returning to England for good. William Hutchinson returned to the company in 1892 to assemble machinery of the São Vicente mill and stayed until 1894¹²¹. In the following year, as William Hutchinson again declined to return to the company¹²², Kerr tried to recruit another foreign machinist for the company¹²³. The company finally decided to recruit John Lomas, who had worked at the Cachoeira and the São Sebastião mills. John

¹¹⁶ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.14", "Letter from William Hutchinson to Robert L. Kerr, 7 January 1883".

¹¹⁷ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.16", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 8 July 1884".

¹¹⁸ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 2 August 1886".

¹¹⁹ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebida No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 11 December 1886".

¹²⁰ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebida No.20", "Letter from Robert L. Kerr to Bernardo Mascarenhas, 11 December 1886".

¹²¹ Giroletti, Fábrica Convento Disciplina, pp.94-5.

¹²² Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.41", "Letter from Robert L. Kerr to Francisco de Paula Mascarenhas, 23 May 1895".

¹²³ Companhia Cedro e Cachoeira, "Caixa de Correspondências Recebidas No.18", "Letter from Robert L. Kerr to Francisco de Paula Mascarenhas, 8 August 1895".

Lomas left the company months later and until the beginning of this century the company did not hire any other foreign technician¹²⁴.

The decision of the Companhia Cedro Cachoeira not to hire any other foreign technician points to a trend which can be observed in other mills too. In 1883, the manager of the União Itabirana mill stated that:

"The machinist who is supervising production for 18 months is a Brazilian, who is a local and learned the work at the mill; (...)."¹²⁵

The substitution of Brazilians for foreigners in the more technical jobs at the end of the nineteenth century could be the result of several factors: the emergence of a pool of local skilled labour; the result of the various problems faced by mineiro entrepreneurs with foreigners previously employed (see Chapter 7); a reluctance of foreign workers to return to - or work - in Brazil, because conditions of employment were not as promised or expected; or/and the inability of mineiro entrepreneurs to pay sufficiently high wages to attract foreign workers.

To sum up, slaves were consistently employed in small numbers by the mineiro textile industry, but only occasionally as operatives in the mills. Mills owned slaves, but they also hired slaves from their shareholders' stock and from private masters. Non-slave Brazilians were the most important source of unskilled labour. Mills employed large numbers of locals, mainly women and children, who were recruited in orphanages, by relatives, agents, clients, and suppliers. Finally, foreigners were an important source of skilled labour, setting-up mills, operating and maintaining the machinery, training the work-force, and supervising production. They were mainly recruited through agents and suppliers, and towards the end of the last century they were being replaced by Brazilians.

Finally, regarding the electricity generating industry, there is very little information concerning the work-force employed by both the Companhia Mineira de Eletricidade (CME) and the Companhia Força e Luz Cataguazes-Leopoldina (CFLCL). Nevertheless, it is possible to draw some conclusions. First of all, as the CME - the first electricity generating company to be organized in Minas Gerais - was established at about the same time of the abolition of slavery in Brazil (the company was established in January 1888, four months before the abolition of slavery) it seems very unlikely that the company had employed slaves in its work-force. Thus, the mineiro electricity generating industry could only resort to two sources of labour: non-slave Brazilians and foreigners.

Foreigners were regularly employed at the CME. In 1889, for example, during the installation of the plant, the company hired two US technicians, who arrived together with the equipment ordered from the Westinghouse Electric Company (WEC). Moreover, in 1891, Bernardo Mascarenhas sent his electrician, Wan Wagenen, who was certainly a foreigner, to the USA to discuss the project of the new plant he was

¹²⁴ Giroletti, Fábrica Convento Disciplina, p.96.

¹²⁵ Reproduced in Libby, op.cit., p.238.

planning to build with the engineers of the WEC¹²⁶. Thus, it seems that foreigners were employed mainly in those more technical positions. Furthermore, in 1893 the company informed its customers that the increase of the price of the domestic lighting service was due, among other things, to the increase in the salaries of its foreign employees¹²⁷.

Non-slave Brazilians were certainly employed by the CME, as the following letter issued to the company's customers in 1893 shows:

"The company informs its customers that due to the doubling in the prices of imported materials and machinery, to the increase in the salaries of the foreign employees, (...), to the increase in the price of national materials and the increase in the salary of national employees, (...)." ¹²⁸

However, there is no information concerning the number of Brazilians and the composition - in terms of sex, age, occupation, etc. - of the work-force employed by the company. Nevertheless, based on the information about the employment of foreigners, it is reasonable to believe that, at least at the beginning, Brazilians were mainly employed in the less skilled jobs.

The CFLCL did not employ any slaves at all, simply because the company was organized in 1905, 17 years after the abolition of slavery in Brazil. It also seems that the company employed only Brazilians, since there is no reference of the employment of any foreigner even for the most technical jobs. The first manager of the company, hired to supervise the construction of the plant and the installation of the equipment, was Elpidio de Lacerda Werneck, an electrical engineer who lived in Leopoldina and was most probably a Brazilian¹²⁹. The construction of the power station and the installation of its equipment involved a number of engineers whose names suggest that they were all Brazilians. These engineers were hired by Trajano de Medeiros & Company, the building company contracted to set-up the plant and assemble its equipment. The person in charge of the setting-up work was Octavio Carneiro, the chief-engineer¹³⁰. His deputy-engineer was Ferreira Martins:

"(...) a well known professional who, during the administration of Mr. Passos in Rio de Janeiro, was the chief-engineer of the palace of the Mayor of this city, and who supervised important works in several railways (...)." ¹³¹

¹²⁶ P. Oliveira, Companhia Mineira de Eletricidade: Pioneira da Iluminação Hidrelétrica na América do Sul, (Juiz de Fora, 1969), pp.33-9.

¹²⁷ Companhia Mineira de Eletricidade, "Declaração da Companhia Mineira de Eletricidade". Letter issued by the Companhia Mineira de Eletricidade informing its customers the increase in the price of the domestic lighting service, 10 June 1893".

¹²⁸ Companhia Mineira de Eletricidade, "Declaração da Companhia Mineira de Eletricidade". "Letter issued by the Companhia Mineira de Eletricidade informing its customers the increase in the price of the domestic lighting service, 10 June 1893".

¹²⁹ "Companhia Força e Luz", in Jornal Cataguazes, 12 March 1906.

¹³⁰ "Companhia Força e Luz", in Gazeta de Leopoldina, 24 March 1907.

¹³¹ "Companhia Força e Luz", in Gazeta de Leopoldina, 24 March 1907.

The hydraulic work at the power station was under the supervision of the resident-engineer, Alfredo do Paço. The assemblage of the power station and of the sub-stations of distribution was supervised by an engineer, Paulo Saboia, who had been sent to the USA in order to improve his knowledge of electricity¹³². Two years later, by the time of the inauguration of the power and lighting services, a report of the company stated that the board of directors decided to entrust the management to Octavio Carneiro¹³³. Octavio Carneiro lived in Cataguazes, as the following newspaper report shows:

"At 2 o'clock in the afternoon the electrical engineers and their assistants went to Mrs. Luiza Barbosa Carneiro in order to offer her a photograph of her honourable son, Octavio Carneiro (...)." ¹³⁴

There is very little information about the nationality of work-force employed by the CFLCL after the inauguration of the power station. Nevertheless, there is evidence that the company continued to employ basically Brazilians, as in 1911 the company regretted the death of one of its employees, Jeronimo Duarte Ferreira, who was most probably a Brazilian¹³⁵. Such a large employment of Brazilian skilled workers can only be explained by the emergence of a local pool of skilled labour, which was possible most probably due to the previous establishment of other electricity generating companies in the country such as the CME (1888), the SPTLPC (1899), the Companhia Ituana de Força e Luz (1903), and the Empresa Luz e Força de Jundiá S/A (1904)¹³⁶.

Thus, for obvious reasons, both the CME and the CFLCL did not employ slaves. Whereas the former company employed Brazilians and foreigners, who performed the more technical work, it seems the latter one employed only Brazilians.

¹³² "Companhia Força e Luz", in Gazeta de Leopoldina, 24 March 1907.

¹³³ "Companhia Força e Luz Cataguazes-Leopoldina", in Jornal Cataguazes, 8 August 1908.

¹³⁴ "Inauguração da Luz Eléctrica", in Jornal Cataguazes, 19 July 1908.

¹³⁵ Companhia Força e Luz Cataguazes-Leopoldina, Relatorio da Diretoria, (1911), p.5.

¹³⁶ F.A.M. Gomes, "A Eletrificação no Brasil", in Caderno História & Energia, (São Paulo, 1986), No.2, October, pp.5-12.

Conclusion

This account of the making of the Brazilian working-class has shown that slavery represented a major influence on the working-relations throughout the last century. Its impact can be seen even years after its abolition at the end of the 1880s. In nineteenth-century Minas Gerais, which had one of the largest stocks of slaves, slavery also served as the reference point for most working-relations. The legacy of slavery influenced the way in which non-slave Brazilians, and in several occasions even foreigners, were treated. Therefore, the examination of the sources of labour in Minas Gerais has shown that until the abolition of slavery in 1888, slaves were employed - in a greater or a lesser extent - in almost all the industries examined in this thesis. The mineiro iron industry and the CUI employed a large number of slaves, basically because when these industries emerged slaves were cheap and abundant. The textile industry consistently employed slaves in small numbers. The bulk of the industry, located at the central part of Minas Gerais, emerged at a time when slaves were more scarce and mostly concentrated in the coffee areas in the southern parts of the province. The only industry which did not employ slaves during the nineteenth century was the electricity generating industry. The first electricity generating company founded in Minas Gerais, the CME, was established at about the same time of the abolition of slavery. Brazilians were more and more employed, either in skilled or in unskilled jobs, towards the end of the century, notwithstanding all the prejudice against them and doubts about their ability and reliability, and all complaints about their unavailability. They were found in small numbers in iron foundries in the first three-quarters of the century. They worked alongside slaves and foreigners in the construction and operation of the União e Indústria turnpike, either in skilled or in unskilled jobs. They made up the bulk of the work-force of the textile mills. Finally, they were certainly employed in the first electricity generating companies established in Minas Gerais, sometimes alongside foreign technicians. Foreigners were an important source of skilled labour for every firm examined. They were vital not only in the setting-up of plants and mills, but also in the operation and maintenance of machinery, in the supervision of production, and in the training of the native work-force.

The analysis of the sources of labour in Minas Gerais has also shown that slave labour is not incompatible with more modern forms of capitalist production. They were employed in several different economic sectors of the mineiro economy and there is no indication that their employment was less rational or productive. The undesirable effects of slavery upon economic development seems to be the same of those also observed for all other forms of compulsory labour.

Finally, this section has revealed that the differences between the business environment of latecomer and advanced economies were not restricted to the role played by economic agents (entrepreneurs, banks, and State). There were important differences in the use of the factors of production themselves. The absence of a developed labour market forced mineiro capitalists to adapt in the face of imperfect conditions. Therefore, they employed slaves when non-slave Brazilians were not reliable and available, and when foreigners were to risky and expensive. The combination, to a certain extent successfully, of old forms of labour - forced - with other more modern ones is a clear indication of the capacity of capitalism to adapt to different economic environments.

CONCLUSION

This analysis of the mineiro businessman has revealed that he shared many of the characteristics of the entrepreneur described in the literature. He assembled factors of production. He was a capitalist, manager, leader, innovator, and risk-taker. The analysis has also shown that the intellectual formation of the mineiro entrepreneurial class was based on principles very similar to that of early European entrepreneurs. Furthermore, the thesis shows that apart from the Mata zone where immigrants were an important source of entrepreneurship, the social background of the mineiro entrepreneur contrasted with that of his counterparts in São Paulo and Rio de Janeiro where immigrants were present in larger numbers within the pioneering local entrepreneurial classes. In Minas Gerais, several of the most prominent entrepreneurs came from traditional ruling families. In addition, although trade and farming represented the main sources of entrepreneurship and capital as they did in São Paulo, in Minas Gerais these activities were of a different nature owing to the peculiarities of the mineiro economy. In Minas, coffee cultivation was confined to the southern parts of the province/state. Elsewhere a different range of activities were undertaken, notably gold mining, cattle-raising, and the production of food staples. Hence, the commercialization of coffee was less important in the mineiro economy than in the paulista and carioca. Nevertheless, coffee capital did provide - directly or indirectly - part of the funds invested in the industries established in the coffee-growing parts of Minas Gerais. In other parts of the province local trade of a more general nature and food production farming represented the starting point in the career of most entrepreneurs. Finally, the general social attitude towards entrepreneurship seems to have been positive and it was possible to observe the existence of a great deal of entrepreneurial initiative and the availability of local sources of capital in nineteenth-century Minas Gerais. Lack of direct access to international markets, inefficient means of transportation, and scattered and diluted consumer markets, seems to have been the main restrictions to the development of a more dynamic business environment.

The analysis of the organization of firms has shown that, generally speaking, most mineiro firms were small traditional business enterprises, operating single units, fulfilling a single economic function, producing a limited range of products, and restricted to local markets. Most of them also made use of traditional methods and sources of energy - such as wood, wind and water, man and beast - in the production and distribution of daily output. Furthermore, in terms of their administrative structure mineiro firms were even more traditional and less complex. Very often they were owned and/or controlled by a small number of people, mainly locals who managed the companies themselves: administrative structures were primitive. In the cases where a more structured administration existed, it consisted of a few layers of managers and top administration positions were filled by members of the controlling families. Managers were responsible for a wide range of activities, and there was little evidence of departmentalization or specialization. Towards the end of the century firms tended to become more bureaucratic as they grew in size or were replaced by larger firms. However, traditional firms continued to dominate the mineiro economy and from an organizational point of view the business environment in nineteenth-century Minas Gerais was characteristic of the first stage of capitalist industrial development - traditional and personal capitalism.

During the nineteenth-century, most mineiro firms relied strongly on foreign technology, mainly British and US. In order to acquire the minimum level of technological skill required for the selection of a foreign technology, mineiro entrepreneurs had to spend long periods studying abroad, to visit similar establishments in Brazil and overseas, to establish direct and indirect contacts with foreign producers of machinery, to make use of technical books, and even to ask the help of foreigners living in Minas Gerais. The relationship between users and suppliers of foreign technologies was often disturbed by problems (delays in delivery, adulterated orders, inevitable misunderstandings, loss of goods, lack of sensitivity on the part of suppliers to the specific circumstances of foreign customers, unfulfilled promises, difficulties of communication, and so on) created by geographic distance and cultural, socio and economic differences. Moreover, mineiro firms relied heavily on foreign technicians for setting-up and operating equipment. But these technicians were often difficult to find, unreliable, expensive, and relationships with them usually proved difficult. Finally, although some capacity of adaptation and modification can be observed in nineteenth-century Minas Gerais, this capacity had strict limits and was too narrow to be characterized as a specific mineiro way of manufacturing. The existing informal and spontaneous technological innovative system was not developed enough to produce an indigenous technological alternatives and Minas Gerais proved to be in this respect an inhospitable environment for the entrepreneur. The narrowness of the capacity of its economy to absorb and refine imported technology was confirmed by the failure to develop an indigenous capital goods industry. The only industry to employ an indigenous technology - the iron foundries established in the first three-quarters of the last century - faced strict limits on its development and virtually disappeared when it had to compete against foreign products at the end of the century.

Slavery represented a major influence on the making of the Brazilian working-class during the nineteenth century and its impact can be seen even years after its abolition in the late 1880s. In Minas Gerais, slavery also served as the reference point for most working-relations, influencing the way in which non-slave Brazilians, and even foreigners, were treated. Therefore, until the abolition of slavery in 1888, slaves were employed to a greater or a lesser extent in almost all the industries examined. The only exception was the electricity generating industry which began to emerge at about the same time of the abolition of slavery. The research has shown that their employment is not totally incompatible with capitalist production. There is no reason to believe that their employment was less rational or productive and the undesirable effects of slavery upon the economy were the same of other forms of compulsory labour. Towards the end of the century, national labour was increasingly employed, both in skilled and unskilled jobs, despite all the prejudice against their ability and reliability, and all the complaints about their shortage. Although they were employed in small numbers, foreigners constituted an important source of skilled labour for every firm examined. They were crucial for the setting-up of plants and mills, the operation and maintenance of machinery, the supervision of production, and the training of the native labour force.

The research strongly supports the view that the economic development of backward countries does not necessarily follows the same path taken by advanced economies. This study of the business environment in nineteenth-century Minas Gerais shows that it differed from that of the more advanced countries in

several important respects. As in the case of many backward European countries, on many occasions mineiro entrepreneurs failed to establish the necessary infrastructure by themselves and the intervention of the State was inevitable. However, this research has also shown that differences between the business environment of latecomer and advanced economies were not only restricted to the role played by economic agents (entrepreneurs, banks, and State). There were important differences in the use of factors of production themselves. In the absence of a developed labour market entrepreneurs resorted to whatever form of labour was available. Therefore, slaves were employed in every sort of work whenever non-slave Brazilians were (perceived as) unreliable and unavailable and foreigners too risky and expensive. Moreover, the combination, to a certain extent successful, of compulsory forms of labour with modern forms of production is a clear indication of the capacity of capitalism to adapt to different economic environments. Furthermore, the lack of indigenous technology and capital goods industry imposed solutions to problems that entrepreneurs in more technologically advanced countries rarely had to worry about. Local entrepreneurs were often faced with the problem of making use of foreign technical packages that were not entirely suited to local resources, to the scale of the businesses, and to market requirements.

Finally, the research has also shown that entrepreneurial initiative was not restricted to coffee-growing areas. In the case of Minas Gerais, non-coffee regions were neither restricted nor dominated by subsistence activity as many early historians believed. Minas Gerais was without any doubt a backward region and its economy could not be compared in terms of dynamism with that of São Paulo. Nevertheless, its business environment was fairly dynamic, active and diverse.

APPENDIX

Appendix 1 - Annual Average Exchange Rates (pence per milreis), 1845-1915.

YEAR	p	YEAR	p	YEAR	p	YEAR	p	YEAR	p
1845	10.59	1859	10.43	1874	10.74	1888	10.52	1902	5.00
1846	11.21	1860	10.74	1875	11.33	1889	11.01	1903	5.05
1847	11.65	1862	10.64	1876	10.55	1890	9.40	1904	5.73
1848	10.41	1863	10.95	1877	10.23	1891	6.21	1905	6.80
1849	10.77	1864	11.34	1878	9.55	1892	5.01	1906	6.56
1850	11.97	1865	10.41	1879	8.94	1893	4.83	1907	6.35
1851	12.12	1866	10.09	1880	9.20	1894	4.20	1908	6.33
1852	11.42	1867	9.34	1881	9.12	1895	4.14	1909	6.41
1853	11.86	1868	7.07	1882	8.81	1896	3.77	1910	6.93
1854	11.63	1869	7.83	1883	8.98	1897	3.21	1911	6.77
1855	11.48	1870	9.19	1884	8.61	1898	2.99	1912	6.77
1856	11.48	1871	10.01	1885	7.74	1899	3.09	1913	6.69
1857	11.09	1872	10.40	1886	7.78	1900	3.95	1914	5.62
1858	10.64	1873	10.87	1887	9.34	1901	4.89	1915	5.10

Sources: Calculated from C.M. Lewis, Public Policy and Private Initiative: Railway Building in São Paulo, 1860-1889, (1991), p.58; S.J. Stein, Origens e Evolução da Indústria Têxtil no Brasil, 1850-1950, (Rio de Janeiro, 1979), p.98; T.H. Holloway, The Brazilian Coffee Valorization of 1906, (Madison, 1975), p.89; and L.C.T.D. Prado, "Commercial Capital, Domestic Market and Manufacturing in Imperial Brazil: The Failure of Brazilian Economic Development in the XIXth Century", University of London, unpublished Ph.D. thesis, 1991, pp.380-2.

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