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The Emergence and Development of Iron and Steel Industry in Colonial South India: A Case Study of the Mysore Iron and Steel Works [1918-1947]

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ABSTRACT

The present article wishes to explore the emergence and development of iron and steel industry in colonial south India through projecting the evolution of the Mysore Iron and Steel Works of Bhadravati. In other words, the article wishes to examine the emergence and development of the Mysore Iron and Steel Works during the colonial period, especially from 1918 to 1947. The article also deals with the early attempts to set up an iron works in south India as the emergence of iron industry in south India during the colonial period. After several attempts—such as at Porto Novo (on Madras Coast), Beypore (Malabar Coast)— and failure throughout the 19th century, it was in the first quarter of the 20th century, the plan for a small charcoal furnace at Bhadravati put into effect in the post-First World War phase. Thus, the construction of the Mysore Iron Works was begun in 1918 and production commenced in 1923. The works made good profit in the late 1920s, and during the mid-1930s the plant was modified and a steel plant was added in 1936 and the Mysore Iron Works was renamed as the Mysore Iron and Steel Works (MISW). The early 1940s witnessed further modification specially in the steel section, thus, MISW added appreciably to the country´s production of saleable steel. The present article, thus, is an evolutionary documentation of the Mysore Iron and Steel Works in order to trace the emergence and development of iron and steel industry in colonial south India.

Keywords: *Mysore Iron Works, Bhadravati, raw materials, charcoal, pig iron, steel*

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1. Introduction

During the colonial period, availability of essential raw materials such as iron ore, coal, limestone, manganese, dolomite etc. had enabled the establishment of modern iron and steel industries in several parts of India.[1] As, the eastern zones of British India had rich deposits of essential raw materials, therefore, most of the major iron and steel producing companies namely the Bengal Iron Company, TISCO and IISCO were established in the eastern zones. But, we have few instances of setting up modern iron works in south India during the colonial period. The early effort to set up a modern iron works was made by J. M. Heath at Porto Noto (Madras Coast) in 1830, but after few decades it was closed down. After several attempts and failure throughout the 19th century, it was in the first quarter of the 20th century, the Mysore Iron Works was established at Bhadravati in 1918 and began to produce pig iron in 1923. In 1936, a steel section was added and the plant was renamed as the Mysore Iron and Steel Works (MISW) and became country´s second integrated steel plant after TISCO. In this article, I have highlighted the emergence and development of the Mysore Iron and Steel Works from 1918 to 1947, with reference to the early attempts throughout the 19th century. The present article mainly deals with the development of the Mysore Iron and Steel Works but it also includes a brief account of Porto Novo and other iron works as the early attempts for setting up an iron works in south India during the colonial period. These early attempts can be considered as the emergence of iron industry in colonial south India which later culminated to the establishment of the Mysore Iron and Steel Works. Thus, the present article has dealt with the early attempts throughout the 19th century, availability of raw materials, construction of the

Mysore Iron Works, production of pig iron, production of saleable steel and development of the Mysore Iron Works from 1918 to 1947.

2. Early attempts

The early attempt to set up an iron and steel industry in India can be traced back in the early 19th century. The first attempt to set up an iron and steel industry in India was made by a civil servant of the East India Company named Mr. Josiah Marshall Heath in 1830.[2] Heath had established an iron works at Porto Novo (Parangipettai),[3] on the Madras Coast, supported by the East India Company and the Government of Madras. He made various experiments but had exhausted all his funds. Three years later the concern got government assistance and was named Indian Iron Steel and Chrome Co.[4] The main raw material, i.e., iron ore for this industry was obtained from South Arcot district.[5] This industry had used charcoal as fuel and the fuel (charcoal) was obtained from neighbouring areas.[6] Mr. Heath's smelting furnaces were then capable of yielding about 40 tons of pig iron per week.[7] The blast furnaces used at Porto Novo were about 36 feet high and the hearth being 5 feet high.[8] The blowing machine was driven by bullocks.[9] But the iron works had a terrible shortcoming regarding the fuel. For running one blast furnace, about 1-2 acres of forest per day was required for charcoal.[10] Mr. Heath proposed to manufacture bar iron in India and to export it to England, where he believed he could compete on highly favourable terms with Swedish iron.[11] In Heath´s license application, the price of bar iron was set at £30-40 per ton in England and £18-24 in India.[12] Heath had always faced heavy financial difficulties in respect to run the iron works. After few decades, the Iron works of Heath was closed down. On similar lines an iron works was set up at Beypore on the Malabar Coast in 1833.[13] For this industry, the ore (laterite) was obtained from Feroke and Calicut.[14] A new company called the East India Iron Company was formed in 1853.[15] This company was created to produce iron in the districts of North and South Arcot, Salem, Coimbatore and Malabar.[16] This and subsequent attempts at Salem and Coimbatore were all unsuccessful. By 1867 all the blast furnaces of south India had fallen into disuse.[17] There were several reasons of failure of the early ventures such as use of inferior ore; wood which was used as fuel not readily available etc. Moreover, the costs of production, including fuel, were too high to compete in foreign markets. After several attempts and failure throughout the 19th century, it was in the first quarter of the 20th century, the plan for a small charcoal furnace at Bhadravati put into effect in post-First World War phase. Thus, the Mysore Iron Works was established at Bhadravati in 1918 and began to produce pig iron in 1923.

3. Availability of Raw Materials

Availability of essential raw materials had played a vital role in the development of the Mysore Iron Works during the colonial period. Rich deposits of iron ore in Mysore state had enabled the development of this iron works. The Mysore deposit consisted of hematite having an average content of probably 60 per cent of iron. Richard Mather (1927) has shown that, the deposit occurred mainly in the Bababudan Hills and was believed to contained about 25 to 60 million tons of ore.[18] But on the other hand, John E. Brush (1952) has shown, the deposits at Bababudan (Mysore) contained about 100 million tons of ore.[19] It may be noted that, the choice of site for the Mysore Iron Works was influenced most directly by the presence of good ore in the Bababudan Hill and of Tungabhadra River.[20] Though the quantity of ore available was much smaller than in the north-eastern (especially in Bihar-Orissa) and central Indian deposits, but it seems ample for the needs. The iron deposits were situated some 2000 feet above the Mysore plateau and some 5000 feet above the sea level.[21] Ore was taken from open quarries to the foot of the hills by gravitational ropeways and thence 25 miles by tramway to the blast furnace.[22] It may also be noted that, for the first two years, i.e., 1923 and 1924, the required quantity of iron ore for the Mysore Iron Works was obtained from the limonite deposits of Chattanahalli near Kumsi.[23] As there were large forests in Mysore, but no coal, therefore, the blast furnace of the Mysore Iron Works had used charcoal as fuel instead of coke.[24] The wood was carbonised in retorts connected with a by-products plant, which recovers or produces wood-tar, methyl alcohol and calcium acetate.[25] The fuel was obtained in state owned tracts within a radius of 30 miles of the plant.[26] This fuel was transported to Bhadravati either as wood or as charcoal by a network of narrow-gauge tramways.[27] Other essential raw materials such as manganese and limestone were available within a radius of 27 miles at points accessible by railways.[28] As the Mysore Iron Works was located on the left bank of the upper Tungabhadra River, therefore, essential water was obtained from the Tungabhadra River, which supplied adequate water for the blast furnaces.[29] So, it cannot be denied that availability of essential raw materials had enabled the establishment of the Mysore Iron Works at Bhadravati and played an important role in the development of the works.

4. Construction of the Mysore Iron Works: Initial Phase (1918-23)

The Mysore Iron Works, which had been originally named as the 'Mysore Wood Distillation and Iron Works Ltd.', was located on the bank of the river Bhadra at Bhadravati.[30] A preliminary investigation about the possibility of the establishment of an iron and steel factory at Bhadravati was made in 1915-16.[31] It is interesting to note that Bhadravati was formerly known as *Benkipura*,

i.e., '*Fire-town*'.[32] The question of manufacturing pig iron on a small-scale with the aid of charcoal fuel was investigated by a firm of New York. When Bhadravati was found suitable for setting up an iron works then initiatives were taken by the Maharaja of Mysore. The Maharaja of Mysore, Shri Krishnaraja Wodeyar IV, and his Dewan, the great engineer-statesman Sir Mokshagundam Visvesvaraya, took an important decision to install a wood distillation plant for manufacturing charcoal and a blast furnace for smelting iron.[33] The scheme was financed by the Government of Mysore and the Tata Iron and Steel Company (TISCO) was appointed, in 1918, to manage the technical side of the plant under the general supervision of a Board of Management.[34] It was one of the first large-scale industrial enterprises run by the state anywhere in India, as it was set up by the Government of Mysore; the consultant was Mr. C. P. Perin[35], the chief engineer and technical adviser of TISCO.[36] The plant was designed to produce 28,000 tons a year and a wood distillation plant was set up to recover valuable by-products, such as wood-tar, methyl alcohol and calcium acetate, while converting the wood into charcoal for use in the blast furnace.[37] Thus, the construction of a blast furnace at Bhadravati was started in May 1918[38] and was completed by December 1922.[39] The blast furnace was put into work on 18th January 1923.[40] Thus, the plant started its journey as the Mysore Iron Works and began to produce pig iron by January 1923.[41] It may be noted that the construction of the Mysore Iron Works took almost five years, but originally the construction of the works had to be completed within 18 months. Sir M. Visvesvaraya had stated:

> "After my retirement in December 1918, the Works seem to have suffered neglect. The understanding with the suppliers of machinery and Messrs. Tata Sons Ltd., who were helping in the construction, was that the Works should be completed and brought into operation in 18 months, that is, before the end of 1919. The actual construction, however, was spread over five years, extending to as late as 1923."[42]

So, the years from 1918 to 1922 may be considered as the construction period of the Mysore Iron Works at Bhadravati. The works originally started its journey from 1923.

5. Development of the Mysore Iron Works: 1923-47

The Mysore Iron Works was owned by the Government of Mysore. The plant was situated at Bhadravati, in Mysore State, south India, comprised a modern charcoal blast furnace of rated capacity 60 tons per day.[43] A wood distillation plant was also set up for the production of charcoal with the capacity of 200 tons per day.[44] The construction of the works was started in 1918 and operation began in 1923. Sir M. Visvesvaraya had played an important role in the development of the Mysore Iron Works. Sir M. Visvesvaraya had stated:

> "When the work was approaching completion some high Government officers as well as Mr. Marshall of Messrs. Perin and Marshall, Consulting Engineers, proposed that the Works should be closed down until the prices of iron, which had gone down to less than half of what they were when the scheme was sanctioned, had appreciably risen. At this stage His Highness the Maharaja sent the then Dewan, Mr. (afterwards Sir Albion) Banerji, to Bombay, where I was residing temporarily, to induce me to take over control and help Government to put things right. I had to undertake the task, but did so on the understanding that I should be given a free hand, subject to all reasonable financial audit. A Board of Management, with myself as Chairman, was set up to control the Works. In this manner I supervised the Works for six and a half years."[45] [46]

From the above statement of Sir M. Visvesvaraya, it can be easily understood the efforts which he put in the development of the Mysore Iron Works. It has been mentioned earlier that the Mysore Iron Works was set up with the technical assistance of TISCO. In 1924, the agreement with TISCO was terminated by mutual consent. In the same year, i.e., in 1924, an effective sales organisation was created. Thus, agencies were established in Madras, Ahmedabad and Karachi and a branch sales office was also opened in Bombay.[47] The Mysore Iron Works was developing in a significant way during the mid-1920s by the improvement of its charcoal blast furnace and wood distillation plant. The use of charcoal in the production of pig iron lowered the content of impurities like sulphur and phosphorus. The phosphorus in the pig iron varied between 0.11 and 0.13 per cent, and the sulphur was usually below 0.02 per cent.[48] The Mysore Iron Works had produced 16,000 tons of pig iron in 1924 and 17,000 tons in 1925.[49] During the calendar year of 1926 the plant had produced 20,000 tons of pig iron, out of which over 8,000 tons of the pig iron were exported.[50]

Not only the production of pig iron was gradually stepped up, but it was also converted into finished products that could be readily sold in the market. Thus, a pipe-foundry for casting 15,000 tons of vertically cast iron pipes per annum was installed in 1926 with the help of a German firm.[51] The capacity of the blast furnace was also increased in the late 1920s. By 1929, the capacity of the charcoal blast furnace was raised to 80 tons per day (earlier it was 60 tons per day).[52] With the increase in production, the Mysore Iron

Works made good profit during the late 1920s. In 1928, the works earned a standard profit of Rs. 1.10 lakhs and in 1929 the profit stood at Rs. 1.15 lakhs.[53] But the great depression which began at the end of 1929 led to a contraction of both the home market and the export market for all major Indian iron and steel producing companies such as TISCO, IISCO, Mysore Iron Works and the Bengal Iron Company. Thus, the Mysore Iron Works joined the pig-iron combine of eastern India.[54] As Amiya Kumar Bagchi (1972) has shown, the sale of pig iron by Indian producers was effected under an agreement by which all sales of pig iron in the Bombay Presidency (excluding Sind), Hyderabad State, Madras Presidency (up to Bezwada) and in the Indian States enclosed thereby, were diverted to the Mysore Iron Works, up to a maximum of 7,000 tons a year. All sales in other parts of India and in the southern area above 7,000 tons were allotted to the producers in eastern India.[55] The Mysore Iron Works had also entered into an agreement with the Bengal Iron Company of Kulti, by which it secured a market for about 8,000 tons of pipes a year.[56] Due to the impact of the great depression, when most of the major companies were forced to discontinue operation but somehow the Mysore Iron Works survived because of the willingness of the government to pour more money into it as a defensive investment. Up to 1935, the works had cost the state over Rs. 40 million.[57] But on the other hand, between 1923 and 1935, the production of pig iron was also gradually increased from 4,817 tons to 20,321 tons.[58] Gradually the output was increased and prior to the Second World War, the works had increased the capacity of its charcoal blast furnace up to 80 tons per day.[59]

The Mysore Iron Works went through several modifications during the time period between 1936 and 1947. The year 1936 was very significant in the history of the development of the Mysore Iron Works. The works undertook steel production in 1936.[60] Thus, the Mysore Iron Works was modified and renamed as the Mysore Iron and Steel Works (MISW) and became country´s second integrated steel plant.[61] A steel plant with an open-hearth furnace and a light section mill were added in 1936.[62] The government sanctioned the installation of steel plant at a cost of Rs. 2,100,000.[63] The year 1938 saw the establishment of a cement plant with a kiln of 60 tons capacity per day and to produce 20,000 tons of Portland cement per annum.[64] This enabled MISW to make use of the blast furnace slag. Now, it was the time for making improvement in the iron smelting section. The amount of wood available for charcoal manufacture each year had limited the output of pig iron, but electro-smelting was preferable in the context of smelting. Thus, in 1941, a steel foundry with 3½ tons electric furnace was installed.[65] MISW had realised the great demand for ferro-silicon in the market and the concern was set up in 1943 with two more electric furnaces with the capacity of 1,500 KVA each.[66] Another furnace of 9,000 KVA was added on during the same year. It has been mentioned earlier that, an open-hearth furnace in the steel section was added in 1936. Another open-hearth furnace was also added in 1943.[67] The two open-hearth furnaces could produce 41,000 tons of mild steel and the light section mill could roll 30,000 tons of steel ingot.[68] So, it can be understood that MISW was modified and developed in a progressive way during the Second World War (1939-45). MISW was further modified in the post-war phase. A strip-and-rod mill for producing 6 to 10 mm rounds in coils was installed in 1946. As The works undertook steel production in 1936 and added appreciably to the country´s production, therefore, it would be interesting to know the nature of production of saleable steel of MISW. In 1936-37, MISW had produced only 3,000 tons of saleable steel.[69] The quantity was very low, but it should be remembered that the steel section was started in 1936 and went through several experimental phase, therefore, these issues had affected the production of saleable steel. In this context, it would be interesting to know the production of saleable steel of MISW. The production of saleable steel of MISW during the years of 1936-37, 1937-38, 1938-39, 1945-46 and 1946-47 is given in the below table.

Table No. 1- Production of saleable steel of the Mysore Iron and Steel Works (MISW)

Years	Production (long tons)
1936-37	3,000
1937-38	15,000
1938-39	23,000
1945-46	29,000
1946-47	25,000

[Source- Cited in Morris D. Morris, "The Growth of Large-Scale Industry to 1947" in Dharma Kumar (ed.), *The Cambridge Economic History of India*, *Vol. II*, *1757- 2003*, Orient BlackSwan impression, 2010, p. 626. See- W. A. Johnson, *The Steel Industry of India*, Cambridge, Mass., pp. 14-15.]

6. Conclusion

So, after the discussion it may be said that, after several attempts and failure, the establishment of the Mysore Iron and Steel Works was a major economic venture in south India during the colonial period. The establishment of the Mysore Iron and Steel Works

significantly inaugurated the onset of an economic structure and developed an industrial based economy in colonial south India. The early efforts (such as at Poro Novo, Beypore etc.) were mainly an initial phase of industrial development in south India which later culminated to the establishment of the Mysore Iron and Steel Works. But we need to understand why an iron and steel works namely the Mysore Iron and Steel Works was established in south India? while India´s other three major iron and steel producing companies, i.e., TISCO, IISCO and the Bengal Iron Company were active in the eastern region during the colonial period, then why the Mysore Iron and Steel Works was set up in south India? According to Amiya Kumar Bagchi, the Mysore Iron and Steel Works was set up to exploit the iron ore reserves of the Bababudan Hills, and to use the large forest resources in the north of Mysore.[70] Morris D. Morris has also shown that, the Mysore Iron and Steel Works was set up to exploit local iron deposits and state´s large forest as fuel.[71] If we talk about the geographical location of the Mysore Iron and Steel Works, then it may be said that, on the one hand, its location in the forest belt of western Mysore was another advantage (as wood was used as fuel), and on the other hand, Mysore Iron and Steel Works had good access to the southern regional market.[72] So the easy availability of raw materials such as iron ore led to large scale iron and steel production in colonial south India through the application of western technological import. This is one of the common features of a superimposed colonial scientific and technological structure which found a fine blend with easily available raw materials and significantly connected the local working of an indigenous economic structure with a global nexus. Herein lies the significance of the Mysore Iron and Steel Works.

Notes and References

1. For further details see- Chiranjit Gorai, "Factors Affecting the Emergence and Development of Iron and Steel Industry in Colonial India: A Historical Overview", *Historicity International Research Journal*, Vol. 6., Issue-12., August, 2020, pp. 1-6.
2. Lovat Fraser, *Iron and Steel in India: A Chapter from the Life of Jamshedji N. Tata*, The Times Press, Bombay, 1919, p. 4.
3. Porto Novo (Parangipettai), a small town located on the north bank of the Vellar River where the river meets the Bay of Bengal, was a one-time port used by European ships.
4. H. C. Bhardwaj, "Development of Iron and Steel Technology in India during 18th and 19th Centuries", *Indian Journal of History of Science*, 17 (2), 1982, pp. 223-233, (see p. 229.).
5. *Ibid*., p. 229.
6. *Ibid*.
7. Lovat Fraser, *op. cit*., p. 4.
8. H. C. Bhardwaj, *op. cit*., p. 229.
9. Lovat Fraser, *op. cit*., p. 4.
10. H. C. Bhardwaj, *op. cit*., p. 229.
11. Lovat Fraser, *op. cit*., p. 5.
12. Tirthankar Roy, *India in the World Economy: Form Antiquity to the Present*, Cambridge University Press, New Delhi, 2012, p. 152.
13. John E. Brush, "The Iron and Steel Industry in India", *Geographical Review*, Vol. 42, No. 1, January, 1952, pp. 37-55, (see p. 49.). Also see- H. C. Bhardwaj, *op. cit*., p. 230.
14. H. C. Bhardwaj, *op. cit*., p. 230.
15. Lovat Fraser, *op. cit*., p. 7.
16. H. C. Bhardwaj, *op. cit*., p. 230.
17. John E. Brush, *op. cit*., p. 49. (On the other hand, H. C. Bhardwaj has shown that, the East India Iron Company, which was established in 1853 was closed down in 1877. See- H. C. Bhardwaj, *op. cit*., p. 230.).
18. Richard Mather, "The Iron and Steel Industry in India", *Journal of the Royal Society of Arts*, Vol. 75, No. 3886, May 13th, 1927, pp. 599-624 (see p. 601.).
19. John E. Brush, *op. cit.*, p. 40.
20. *Ibid*., p. 51.
21. *Ibid*.
22. *Ibid*.
23. K. Abhishankar, *Karnataka State Gazetteer*, *Shimoga District*, Director of Printing, Stationery and Publications at the Government Press, Bangalore, 1975, p. 181.
24. Richard Mather, *op. cit*., p. 602.
25. *Ibid*., pp. 602-3.
26. John E. Brush, *op. cit*., p. 51.
27. *Ibid*.
28. *Ibid.*
29. *Ibid*.

30. K. Abhishankar, *op. cit*., p. 185.
31. *Ibid*., p. 186.
32. *Ibid*., p. 185.
33. *Ibid*., p. 186.
34. *Ibid*.
35. Mr. Charles P. Perin was an American Consulting Engineer and Expert.
36. Amiya Kumar Bagchi, *Private Investment in India 1900–1939*, Cambridge University Press; 1st edition, 1972, p. 324.
37. *Ibid*.
38. Sir M. Visvesvaraya, *Memoirs of My Working Life*, Bangalore, April 1951, p. 92.
39. K. Abhishankar, *op. cit*., p. 187.
40. *Ibid*.
41. The Mysore Iron Works was renamed as Visvesvaraya Iron and Steel Limited (VISL) in 1975. In 1989, VISL was taken over by SAIL (Steel Authority of India Limited) as a subsidiary entity and in 1998, VISL was merged with SAIL.
42. Sir M. Visvesvaraya, *op. cit*., p. 92.
43. Richard Mather, *op. cit*., p. 605.
44. K. Abhishankar, *op. cit*., p. 187.
45. Sir M. Visvesvaraya, *op. cit.*, pp. 92-93.
46. The Maharaja mentioned here was the 24th Maharaja of the Kingdom of Mysore, Shri Krishnaraja Wodeyar IV.
47. K. Abhishankar, *op. cit*., p. 187.
48. Richard Mather, *op. cit*., p. 605.
49. *Ibid*., p. 603.
50. *Ibid*., pp. 603-5.
51. K. Abhishankar, *op. cit*., p. 187.
52. *Ibid*.
53. *Ibid*.
54. The Tata Iron and Steel Company (TISCO), IISCO and the Bengal Iron Company all three companies were situated in the eastern zones of India.
55. Amiya Kumar Bagchi, *op. cit*., p. 326.
56. The capacity for cast iron production of the Bengal Iron Company was 60,000 tons and that of the Mysore Iron Works was 15,000 tons, after the enlargement of the pipe foundry. Cited in Amiya Kumar Bagchi, *op. cit*., p. 327, See- ITB: Statutory enquiry 1933: steel, Vol. III (Delhi, 1935), pp. 349-60; ITB: Report on the iron and steel industry (Delhi, 1934), Chapter XII, pp. 136-8.
57. Cited in Amiya Kumar Bagchi, *op. cit*., p. 328. See C. Ranganatha Rao Sahib: "The Recent Industrial Progress of Mysore", *JRSA*, LXXXIII, NO. 4292, 8 March 1935, p. 384.
58. K. Abhishankar, *op. cit*., p. 187.
59. E. V. Parkinson, "The Development of the Iron and Steel Industry in India", *Journal of the Royal Society of Arts*, India, Pakistan and Burma Section, Vol. 98, No. 4824, 30th June 1950, pp. 668-85 (see p. 671.).
60. Morris D. Morris, "The Growth of Large-Scale Industry to 1947" in Dharma Kumar (ed.), *The Cambridge Economic History of India*, *Vol. II, 1757- 2003*, Orient BlackSwan impression, 2010, pp. 553-676 (see p. 627.).
61. The first integrated steel plant in India was the Tata Iron and Steel Company (TISCO), established in 1907.
62. K. Abhishankar, *op. cit*., p. 187.
63. Cited in Amiya Kumar Bagchi, *op. cit*., p. 328. See C. Ranganatha Rao Sahib, *op. cit*., p. 384.
64. K. Abhishankar, *op. cit*., p. 187.
65. *Ibid*.
66. *Ibid*.
67. *Ibid*.
68. *Ibid*.
69. Cited in Morris D. Morris, *op. cit*., p. 626. See- W. A. Johnson, *The Steel Industry of India*, Cambridge, Mass., pp. 14-15.
70. Amiya Kumar Bagchi, *op. cit*., p. 324.
71. Morris D. Morris, *op. cit*., p. 629.
72. John E. Brush, *op. cit*., pp. 51 & 53.