CHAPTER TWO

REVIEW OF LITERATURE

2.0. Introduction

Based on the background and objectives of the study mentioned in the previous chapter, the related literature were collected and compiled. The collected literature are summarised in this chapter. They are classified into four parts and presented in the following sections of this chapter. The first section summarises the literature on multinational investment by the corporate sector. The second section presents studies available on MNCs and exports. Section three furnishes the summary of literature on MNCs and Technology transfer. Section four summarise studies on the performance of MNCs.

2.1. Studies on Investment Behaviour of MNCs

The theory of multinational firm lies at the intersection of theory of the firm and theory of international trade. Several theoretical developments are evident when one undertakes the survey of the existing theory of firm behaviour. They were found explaining various aspects of the corporate behaviour. They especially centered around such of the corporations large enough to exercise some power in the markets to which they sell and independent enough of their shareholders to deviate from profit...
maximising behaviour. Since large size and investing abroad are likely to be complementary to each other, newer theories of the firm appear tailor-made for the analysis of multinational firm behaviour. Instead of treating the available literature chronologically, an attempt has been made to classify them under different distinct categories.

Grabowski and Mueller (1972)\(^{(1)}\) made one of the earliest attempts to derive and test an investment function. The empirical results obtained make them to accept the growth maximisation investment function and reject neoclassical profit maximising one. In their test of a managerial variant of the investment function, the significant variables explaining investment were a series of sales change and cash flow terms.

Another pioneering work was done by Jorgenson (1965)\(^{(2)}\). He linked the theory of profit maximisation to investment function. In his model investment occurs when the firm attempts to adjust its capital stock to its desired level. In Jorgenson's model desired capital stock, \( K_t^* \), is equal to

\[
K_t^* = \frac{aP_t Q_t}{C_t}
\]

where \( P_t \) is the product price at time \( t \), \( Q_t \) is the expected output, \( C_t \) is the rental price of capital and 'a' is
constant. the elasticity of output with respect to capital 
$C_t$, in turn, is a function of rate of interest, the 
depreciation rate and various tax rates. Chenery (1979)\(^{(3)}\) 
in his modified version, introduced flexible accelerator as 
one of the variables. In his model investment is viewed as a 
gradual adjustment of actual capital stock to the desired 
capital stock. Another source of progress has been 
development of more sophisticated procedures for estimating 
the adjustment process especially by Jorgenson (1967)\(^{(4)}\) who 
adopted the polynomial and rational distributed lag 
estimation procedures. These theoretical and empirical 
developments have improved the explanatory and forecasting 
ability of investment functions. Bischoff (1971)\(^{(5)}\), and 
Jorgenson and Siebert (1968)\(^{(6)}\) have compared the 
eoclassical investment functions in various ways with 
existing alternatives and have concluded that the 
eoclassical investment function is better than its 
competitors. In particular, the neo-classical model has been 
tested against the simple accelerator model, liquidity and 
cash flow models and securities valuation models. The 
desired capital is assumed to be proportional to the market 
value of the firm and combination of three mentioned above. 
Many types of tests have been performed: comparison of 
standard errors of residuals and multiple correlation 
coefficient within sample period; comparison of sign and
significance of estimated coefficient with those predicted; the relative ability to predict turning points etc.,

A major reason why the profit-differential theory may fail is that the observed profit rates need not equal required or expected rates. This is particularly likely for international investment. Hymer (1960)\(^7\) and Vernon (1971)\(^8\) have argued persuasively that many investors possess technological or other monopolistic advantages which make their expected returns quite different from any observed average.

Another set of theories explain the investment of firms in terms of business behaviour of the corporate firms. Aharoni (1966)\(^9\) argues against profit maximisation model and maintains that the cause of the failure of profit maximisation is closely related to the internationalisation of the firm. Weigel (1966)\(^10\), Miller and Wiegel (1971)\(^11\) have developed and tested a related model, linking it more closely to the behavioural theory of Cyert and March (1963)\(^12\). Later, Prachowny (1972)\(^13\) and Stevens (1969)\(^14\) have attempted to make the theory of direct investment more realistic by adopting a model which explicitly incorporates uncertainty. They assumed that multinational firm chooses investments so as to maximise a utility function positively related to the expected return and negatively related to the variance of the firm's portfolio investments. Both the
authors attempted to test the theory empirically. The results were decidedly mixed. Prachowny claimed vindication for his model. But the significance of crucial risk terms as explanatory variables of direct investment was questionable when appearing alone. The risk variables were always insignificant. When appearing in the combination with other variables, the risk variables were occasionally part of significant products; but, here, it is unclear whether the risk factors contributed to this significance. In his study on FDI (Foreign Direct Investment) in Latin America, Stevens found aggregate investment to Latin America significantly (negatively) related to the variance of past profits. However, when regressions were disaggregated by country, the simple flexible accelerator model emerges significant.

Barlow and Wender (1955)\(^{15}\), Penrose (1956)\(^{16}\) tried to analyse the international operations of the firm and its impact on the objective function of the firm. They tried to assess the smoothness with which finance move within a multinational firm. In other words they attempted to study whether certain locations are given preference over others because of real costs such as taxes. They found that the real costs have influenced the location decisions of the firms.
Stobaugh (1970)\(^{17}\) has suggested that the type of thesis advanced by Barlow and Wender, Penrose and others may not be entirely wrong; it may hold for small subsidiaries where it is presumably quite costly to have co-ordination of parent and subsidiary activities.

Severn (1972)\(^{18}\) came to closest to testing the Behrman idea that foreign investment opportunities are supposedly accepted only if there are sufficient funds for these and all attractive domestic projects. He included the value of output, domestic investment in some of his foreign plant and equipment equations; the sign of the variable was positive and significant - contrary to that hypothesised by Behrman. Stevens (1967)\(^{19}\) did not test the hypothesis directly, but rejected other 'partial' maximisation models concluding that, at the micro level, a supply constraint did exist, but that no location was given precedence.

The great majority of the studies that have empirically tested foreign investment models have attempted to apply directly Jorgenson's neo-classical model or simpler models related to early versions of the flexible accelerator. The studies by Bandera and White (1968)\(^{20}\) Billsborrow (1968)\(^{21}\) Scaperlanda and Mauer (1969)\(^{22}\) Severn (1972)\(^{23}\) and Stevens (1969)\(^{24}\) all fall under this category.
Kopits (1972)\(^{(25)}\) attempted to incorporate a series of contemporaneous and lagged output or sales terms. He further tried to include the rental price of capital goods and its rate of change, the cost of capital, the rate of depreciation of capital stock and various tax rates as explanatory variables in the MNC investment models. But they have not given any test that conclusively established that these price terms significantly contribute to the explanation of the dependent variable. Kopits in his study explained subsidiary dividend behaviour. He, based on the neo-classical investment model, has added U.S. and foreign corporate tax rates and found them significant explanatory variables in the dividend behaviour of MNC subsidiaries.

Locational choice problem in any of the empirical models is meant to explain aggregative investment. Much theoretical and interview work has been done on the various determinants of this locational choice. Especially Caves (1971)\(^{(26)}\), Horst, (1972)\(^{(27)}\) have made their contributions in this field. A small amount of cross-sectional work by Horst (1972)\(^{(28)}\) and Wolf (1971)\(^{(29)}\) and time series work by Miller and Weigel (1971)\(^{(30)}\) have attempted to empirically verify some of the theoretical hypotheses. On the statistical side both Horst and Wolf found that the choice between foreign production and exporting in an industry was affected by firm size; the
larger the firm the more likely it is to produce abroad. This is probably the result of the large set up costs necessary to start foreign subsidiary. Horst examined the relationship between US exports to the Canadian market and the sales of US affiliates in Canada. He concluded that the height of Canadian tariffs was the most important factor influencing the decision whether or not to invest in Canada. The ratio of US exports to total US sales in Canada (exports plus foreign manufacture) was also negatively related to the size of Canadian market.

Buckley and Pearce's (1979) work related to 156 world's largest enterprises in 1972. They used a measure namely sourcing ratio.

\[ \text{Sourcing ratio} = \frac{\text{Production of foreign affiliates}}{\text{Production of foreign affiliate + Parent company exports (Weighted by sales)}} \]

This measure was estimated for eleven countries including UK, Japan, France, Germany, Italy, US, Sweden and Canada. This study estimated sourcing ratio industry wise also. It was found that Swiss (94.4%) and joint and other firms (95.2) operate abroad almost wholly through foreign production. This study undertook regression analysis relating the sourcing ratio of companies to three independent variables viz. size of firm, dummy variable representing nationality of firm and industry type. Firm
size emerged as a very significant explanatory variable indicating that large companies are more likely to service an overseas market by affiliate production than are smaller firms.

Solomon and Ingham (1971)\(^{(32)}\) set out to compare MNC affiliates and indigenous companies in the mechanical engineering industry in UK. On analysing relative performance characteristics in the study sector, it was concluded that the apparent differences between MNC subsidiaries and indigenous companies were significantly biased by a failure to take into account the industrial and regional distribution of direct foreign investment. For the mechanical industry it was shown that when this bias was removed, indigenous firms had higher labour productivity and exported more than the American affiliates. The study also found the MNC affiliates did not earn significantly larger profits nor did they grow more quickly.

Recent research concentrate on the interaction between trade and foreign direct investment. They have been directed at four major issues. They are a) the mode of foreign involvement b) testing of a theory of international production c) does trade substitute or complement foreign direct investment and d) MNC trade and national comparative advantage.
Wolf (1977)\(^{(33)}\) in his study found that two ownership variables, viz., the size of the firm and the employment of technical manpower explained domestic diversification. They also found to be explaining exporting and foreign production by U.S firms. His analysis also indicated that average size of the firm was more strongly associated with the foreign propensity and domestic industrial diversification than with the export propensity.

Parry (1980)\(^{(34)}\), in his study pertaining to pharmaceutical industry in UK, attempted to identify the determinants of foreign production. For UK pharmaceutical firms located in 15 foreign countries, it was found that the most important variables influencing the ratio were the size of the local markets and the growth of that market: a tariff variable was statistically significant but explained only a small amount of the variability in this ratio. The study found that larger the market the greater the licensing commitment.

Hirsch (1975)\(^{(35)}\) used several ownership specific, location-specific and firm specific variables in order to explain the share of eight host country markets accounted for by: sales of US foreign affiliates, imports from countries other than US, and sales by domestic firms. The results were very mixed and except for the equation relating to US foreign affiliate sales, explain only a small
proportion of the variability in market shares. In the estimated equations the wage cost variable and knowledge variable are significant and positive. He inferred that US firms enjoy a competitive edge in Knowledge intensive industries and this advantage is more pronounced in subsidiary production than in exports.

Dunning (1973)\(^{36}\) studied the determinants of foreign investment by MNCs by making use of 1970 US Tariff Commission data. Using a series of variables suggested by neo factor and neo-technology trade theories and location theory, Dunning tested internalisation hypotheses for a group of five industrialised host countries (Canada, Benelux, France, West Germany and UK) over fourteen industry groups. He found that growth of sales in the host country and the average ratio of net income to sales of all firms emerged as significant explanatory variables. But there are severe problems in interpreting the results.

Various attempts have been made to apply the portfolio approach to the geographical distribution of foreign direct investment. Stevens (1969)\(^{37}\) used the portfolios model to explain the proportion of US direct investment directed to Latin America and Canada. Paxon (1973)\(^{38}\) used a stock adjustment version of the model to explain the geographical distribution of assets. It was found that asset growth was

31
not positively correlated with the difference between actual and optimal portfolios. When Paxon applied the same methodology to two companies - British American Tobacco and Unilever - it was found that regional differences between actual and optimal portfolios shares were uncorrelated with investment behaviour.

A related portfolios argument is that diversification reduces risk. Cohen (1972)\(^{39}\) and Rugman (1976)\(^{40}\) in their work, had shown that for US corporations an increase in the number of countries in which a firm operates and/or an increase in the ratio of foreign to total activities, reduces profit variances.

More recently, a few field studies specifically address the question of why firms engage in Foreign Direct Investment. Yet there is ample evidence to support a number of propositions that firms investment overseas to lower cross - border transactions costs. Studies by Archer (1986)\(^{41}\) and Ozawa (1989)\(^{42}\) found that many US and UK companies setting up resource based investments in the 19th century as well as their Japanese equivalents in the post 1945 era have indicated that they did so to protect themselves against supply disruptions and price hikes. Citing the examples of UK companies like Delta and Bridon, Archer suggested the foreign production had been preferred to other
modes because of the lack of suitable licensee or because it was feared that a licensee might become a competitor.

Anderson and Gatignon (1986)\(^{(43)}\) Hennart (1986)\(^{(44)}\) showed that economies of common governance as the reason for foreign direct investment. This is to maintain control over the types of products produced, exports markets served and the sourcing of intermediate products. Buckley and Mathew (1979)\(^{(45)}\) indicated that cross border market failure might influence MNC activity. Similarly Dunning and Norman (1987)\(^{(46)}\) found that the need to capture the benefits of integrating their activities in the UK with the rest of their foreign operations, the difficulty in controlling the product quality of the licensee and the fear of under performance by the licensee are the major reasons listed by them.

Most of the recent scholarly research seeking to evaluate different theories of MNC activity has used existing published data and has sought by using a variety of econometric techniques to identify the more significant explanatory variables. These studies fall into two broad categories. The first is cross-sectional or latitudinal studies. Clegg (1987)\(^{(67)}\) made a comparative analysis of US, UK, Swedish, German and Japanese investments. Pearce (1989)\(^{(48)}\) analysed a multi-country sample of the worlds' largest enterprises. The main purpose of these studies is to
identify and evaluate the kinds of competitive or ownership-specific advantages possessed by firms that engage in foreign production. They considered ownership specific advantages are important in explaining the foreign activities of MNCs.

Petrochilas (1989)\(^{(49)}\) analysed time series data to explain inward investment in Greece for the period 1955 to 1978. He used mainly L-specific variables. He found that market size (GDP lagged by one year) was positive and invariably significant explanatory variable. Market growth measure was never significant. Tariff protection was found to be a significantly positive influence on inward investment. The Greek discount rate, lagged by one year, was found to be negatively and significantly related to FDI. He interprets this as demonstrating the relevance of a source of complementary local capital as a to specific advantage to foreign MNC.

Hultman and McGee (1988)\(^{(50)}\) studied the foreign direct investment (FDI) in the US between 1970 and 1986. CNP and US exchange rates were found to be significant determinants of inward investment. In a related analysis on the determinants of European direct investment in the US between 1961 and 1987.
Reidel (1975)\(^{(51)}\) in his study on foreign direct investment in Taiwan between 1955 and 1971 considered inward investment approvals in Taiwan from Hong Kong, Japan and US. He found that relative wage rates are inversely related to foreign direct investment and policy changes had significant positive effects on FDI in Taiwan from Hong Kong and Japan.

Reuber et al., (1973)\(^{(52)}\) found that financial incentives are largely the major reason for foreign direct investment followed by protection of markets. Corporate tax concessions were found to be an effective source of attraction for FDI in non-extractive FDI over the period 1966 to 1970. Tax concessions were found to be insignificant explanatory variables in both simple and multiple regression estimates by Agado (1978)\(^{(53)}\).

Contractor (1990)\(^{(54)}\) drawing on data published by US Department of Commerce on the changing attitudes of Govts. towards inbound direct investment over the period 1977 to 1982, found a positive and significant relationship between liberalised policies towards foreign investors and FDI inflows over the period.

Extensive analyses by United Nations Center for Transnational Corporations (UNCTC) (1988)\(^{(55)}\) have suggested that the Govt. intervention in the establishment and operation of
foreign-owned companies is the main reason for the lower degree of internalisation of production.

Negandhi and Baliga (1981)\(^{(56)}\) found that US MNCs exercised more influence on the decision taking of their subsidiaries and relied on more bureaucratic control procedures than their European (or) Japanese counterparts. Subsidiaries operating in competitive markets in competitive environment were likely to be granted more autonomy than those operating in monopolistic markets. Clinical studies show that informal and more subtle control and co-ordination procedures have increased over the past decade. Especially the studies by Doz and Prahlad (1984)\(^{(57)}\) point to a more pluralistic and multi-dimensional approach in contemporary MNCs.

Chakaravarthy and Perlmutter (1985)\(^{(58)}\) identified four orientations an MNC can take in decision making viz., ethnocentric, polycentric, geocentric and regiocentric orientations. Martinez and Jarillo (1989)\(^{(59)}\) found that the overall degree of centralisation (or) autonomy is seen to vary with functional areas of decision making.

Studies by Severn - Lawrence (1974)\(^{(60)}\) and Daniels and Bracker (1989)\(^{(61)}\) linked FDI and profits in their ex post analysis. These studies have suggested that atleast part of
the higher observed profit may be the result of conditions prior to or at the time of FDI activity.

Siddharthan (1981) studied about the investment behaviour of multinationals and conglomerates in India. He found that the rate of growth of capital stock was determined by the growth rate of output, the capacity of the firm to increase their sales and non-production expenditure in the long run. In medium term, profitability and growth rate of sales are the main determinants for monopoly firm and neither sales nor profitability could explain the growth of capital stock of the oligopoly firms since the accelerator coefficient and output did not prove to be the consistent determinants of investment. He tried to explain the investment of the firms in terms of the market's growth. It was found that the growth of market was an important determinant of the growth of the capital stock of the firms.

Singh (1974) studied the investment policy and the performance of US subsidiaries in India for the period 1963-67. By adjusting the financial statements for the prevailing inflation, Singh compared investment policy of US firms with that of their parent corporations and found that US corporations do not adopt their domestic investment policy for their foreign subsidiaries.
Subramaniam (1972)\(^{(64)}\) in his most comprehensive work provided a detailed assessment with respect to private foreign investment and technical collaboration in India. He found that private foreign investment has been concentrated mostly in technology-intensive product lines like chemicals and engineering. The actual foreign investment forms very small share in the total investment. He concluded that despite substantial growth, private foreign investment helped only marginally in bridging the savings investment gap (or) in reducing foreign exchange constraint.

Kurien (1966)\(^{(65)}\) attempted to provide a timeseries analysis of the share of multinationals in private corporate sector for the period 1948-60 and found it to be increasing from 35.8 in 1948 to 40.4 per cent in 1960. He divided the net worth of foreign companies by total paid-up capital of the corporate sector. This resulted in overestimation.

2.2. Studies on the Exports of Multinational Corporations

Several studies were conducted on the export performance of MNCs in different countries with diverse economic settings.

Cohen (1975)\(^{(66)}\) studied the contribution made by multinationals to the Asian exports. He analysed the export contribution of MNCs in South Korea, Taiwan and Singapore.
and found that foreign firms tend to import more and buy less from local firms than their counterparts.

Chen (1983)\(^7\) in his study could not find any empirical support for the hypothesis that foreign firms export a higher proportion of their sales than local firms in South Asian countries. In their study on the electrical industry in Brazil, New farmer and Marsh (1981b)\(^8\) found that Brazilian foreign owned firms import markedly more than the local firms. By analysing a sample of over 500 local and foreign firms they concluded that US MNCs do not appear to have different export propensities from local Brazilian firms while other MNCs have significantly higher export propensities.

Horst (1974)\(^9\) studied the determinants of MNC exports by considering 1966 data relating to 23 manufacturing industries in 8 countries. This study indicated that as long as foreign subsidiary net sales (as a percentage of domestic shipment) were small, an increase in sales was accompanied by a fall off in exports.

Lipsey and Weiss (1981)\(^10\) examined the interrelation-\(\text{s}\)hips between the exports and direct foreign investment of the US and 13 other major exporting countries. The results of the regression analysis showed that the level of activity of US manufacturing affiliates was positively
related to US exports, Interestingly US manufacturing affiliate activity was negatively related to exports by 13 other countries and, in a certain cases at least, foreign affiliate operations were negatively related to US exports.

Kojima (1973)(71) in his study distinguished between trade and anti-trade oriented foreign direct investment. The resource oriented investment will obviously generate exports from the affiliates and labour oriented investment aims at establishing an export base for exporting back to the investing country. This study did not see that Japanese investment in textiles, clothing etc. probably substantially replace Japanese exports. But in aggregate terms trade may be increased with the transfer of production to lower cost manufacturers in Taiwan, Korea, Singapore and Hong Kong.

Katrak (1973)(72) by using trade data for 1962, 1964 and 1966, analysed comparative US / UK exports of major industries in terms of the human skills, technological gap and scale economy theories. The results of rank co-relation and regression analysis indicated that the scale economy explanation performed best but the results for the human skills theory were also favourable. He concluded that the labour skills and economies of scale exerted a separate influence on US / UK exports.
Willimore (1987)\(^{73}\) conducted a study on the 20107 firms in which 3903 were exporters. This study has established unambiguously that foreign ownership has a strong independent effect on both export performance and import propensities of individual firms when due weight is given for factors like size, skill and advertising intensity and vertical integration.

Blomstrom (1990)\(^{74}\) compared the impact of Transnational Corporations from three important home countries viz., Japan, Sweden and the US regarding their contribution to the exports of developing countries of Asia and Latin America. His study presents a quantitative assessment of the direct contribution of TNCs to changes in export competitiveness between 1966 to 1968. He found that the activities of TNCs from Japan and Sweden to a large extent exert a similar influence on the trade flows of developing countries as the activities of TNCs from US. He concluded that the contribution of transnational corporations to the exports of developing country was larger in the more technology and marketing intensive industries (machinery and transport equipment) than in other industries. Hone (1974)\(^{75}\) found most of exports of vertically integrated firms, in developing countries are intra-firm trade, but a great part of them are arm's length transaction between transnational Corporation and
indigenous developing country enterprises. Johanson and Vahlne (1977)\(^76\) stressed the expectation of a sufficient foreign market if FDI is to enter. The firm will first export sporadically, then regularly to it finally commencing full production. Bhagawati et al., (1992)\(^77\) found anecdotal evidence that Japanese firms with growing exports to US market sometimes made foreign direct investment in US as a means of diffusing protectionist sentiments.

Indian Institute of Foreign Trade (1981)\(^78\) conducted a study on the export intensity of MNCs. It compared the ratio of exports to sales of 28 MNCs and 18 local firms spreading over six different industries and concluded that in most cases the non MNCs performed better in export performance. Using R.B.I. data on the finances of medium and large private companies, Lall and Mohammed (1982)\(^79\) examined the impact of foreign ownership on export propensities. Using data on 24 manufacturing industries containing more than 1100 enterprises they sought to test whether foreign ownership has had a positive effect on export properties. They found that foreign presence in Indian industry has a positive and significant effect on export propensities. Export propensities in the large corporate sector are negatively related to management and capital intensities. Nayyar (1978)\(^80\) considered the role of U.S. MNCs in exports of manufactured products in general
by developing countries and found that MNCs do not contribute significantly for the growth of exports.

Wilimore (1976)\(^{81}\) and Jenkins (1979)\(^{82}\) in their studies, found MNCs to have relatively better export performance than local firms. But these studies do not really establish the point that MNCs in fact have different export propensities from those of local firms.

Newfarmer and Marsh (1981)\(^{83}\), by using simple comparison approach, tried to examine econometrically the export performance of MNCs in Brazil. Drawing on a sample of over 500 local and foreign firms, it used foreign ownership as part of a set of independent variables to explain firm level export propensities in a multiple regression analysis.

Dasgupta and Siddharthan (1985)\(^{84}\) found that India exports only goods with low technological content and skill. Subramaniam and Pillai (1979)\(^{85}\) compared the export performance across the four clusters of firms with varying degrees of foreign association in engineering pharmaceutical and dyestuff industries in India. Their finding suggest that export performance is inversely related to the level of foreign association. Many studies have been conducted on the role of MNCs in the export of manufacturing sector in India. Lall and Mohammed (1983)\(^{86}\) attempted to examine the impact of foreign ownership on export propensities using RBI data.
on 1100 companies belonging to 24 manufacturing industries. They found that foreign ownership and incentives are positively associated with export performance whereas managerial skill and capital output ratio are negatively associated with exports. This study found that foreign presence has a positive and significant effect on export propensities. Kumar (1990)(87) found no statistically significant differences in either export performance or industry characteristics of exports of MNCs and their local counter parts in Indian manufacturing.

2.3. Studies on Technology Development and Multinational Corporations

Teece (1977)(88) gave the theoretical idea that the rate at which technology is diffused worldwide depends heavily on the resource cost of transfer—both transmittal and absorption cost—and on the magnitude of the economic rents obtained by the seller. The resource costs of transfer depend on the characteristics of the transmitter, the receiver, the technology being transferred and the institutional mode chosen for transfer. Mansfield et al., (1979)(89) found support for the observation that international transfer of technology stimulated R & D activities by multinational firms.

The major host country benefit due to Multinationals is considered to stem from the inflows of new technology to
affiliates of MNCs. It is because these flows create a potential for technology spill overs to the host country's local firms as per the studies made by Globerman (1979) and Kokko (1994). The question of mechanism by which host country influence MNCs to transfer more technology gained greater attention of economists in recent times. Wang and Blomstrom (1992) developed a theoretical model where the MNCs affiliates decision to import technology is explicitly related to profit maximisation i.e., the affiliates import technology until marginal revenue of further import is equal to the marginal cost. Technology imports raise revenue because demand for MNCs products is positively related to technological gap between the affiliate and competing host-country firms. However the empirical study by Blomstorm and Kokko (1993) which examined aggregate data on the technology imports of US affiliates in 33 host countries found weak support for the hypothesis proposed by Wang and Blomstorm.

Rosenberg (1982) has pointed out that the wider diffusion and application of an innovation significantly raises the pay off to the use of science. Rosenberg (1976) and Von Hippel (1977) again points out that significant improvements to the innovation to occur as diffusion further proceeds. These incremental developments
can be either more or less autonomous or induced by the diffusion process eg. through user feedback information.

Teece (1976)\(^97\) stated that the rate at which technology is diffused worldwide depends heavily on the resource costs of transfer - both transmitted and absorption costs - and on the magnitude of the economic rents obtained by the seller. The resource cost of transfer depends on the characteristics of the transmitter, the receiver, the technology being transferred, and the institutional mode chosen for transfer.

Lall (1985)\(^98\) analysed the relationship between technological change, employment generation and multinationals. Comparing the employment generation by an MNC and local firms he concluded that affiliates of MNCs tend to respond favourably to local conditions in activities which permit adaptations. Given the policy regime, there is no apparent difference in the adaptive responsiveness of foreign and local firms. Parker (1974)\(^99\) analysed the data for 170 European Companies. He classified the firms as MNC, TNC and National enterprises (NE) on the basis of number of foreign affiliates in different countries and on the basis of group sales. His study found about one half of all multinational firms were research intensive compared to other firms. Wolf (1975)\(^100\) studied the linkage between size of the firm and technological intensity. His analysis
of cross sectional data for 1963 relates to 95 US manufacturing industries. Wolf's results indicated a significant relationship between foreign production and technical capability.

Mansfield (1974)\(^{101}\) was of the view that there is no tendency for the ratio of R & D expenditures to sales to be higher among smaller competitors. They stressed that important feature of MNCs is their ability to control the rate at which new technologies are adopted.

Koizumi and kopecky (1980)\(^{102}\) investigated the relationship between foreign direct investment and domestic employment opportunities within a MNC that transfers Technology of host country firms. Their model predicted a positive domestic employment effect as a result of managerial expertise.

Subramaniam (1972)\(^{103}\) found that there is a wide gap between benefits expected and actually accrued from it. He suggested policy aim should be matching up the process of transfer of technology with adequate base support of indigenous in house R & D to assimilate the imported technology and to build further on it. He found multiple collaboration to a very large extent.

Alam (1988)\(^{104}\) argued that a technology importer should have a minimum amount of skills for successfully
exploiting the imported know-how in production. He concluded that the nature of competition in the Indian market is largely responsible for technological stagnation of Indian industry.

Studies conducted on the transfer of technology to India by NCAER (1971) and United Nations (1992) suggested that companies that did their own R & D got a better return on their technology imports in a number of ways, they unpackaged their technology requirements and imported only those components, that they could not generate economically or fast enough and they received greater benefits from technology imports in terms of their own product and process development.

Katz (1978) was of the view that the acquisition of know-how, even in the context of imported technologies is a real and significant source of technological progress in developing countries. This study established that foreign affiliate undertake minor innovation type of engineering first as successful as the local firms.

Fransman (1985) stated that imported technology creates opportunities to undertake incremental technical change. He feels that there seem to be many opportunities for modifications in final product design or specifications with the capabilities of less developed economies.
(1985)(109) pointed out that local raw materials or the need to test certain products locally induces local investigative R & D activity. This type of research is common in the field of pharmaceuticals and food products.

Bluementhal (1979)(110) argued that the technological capability of a country is a function of indigenous research and development (R & D), technology imports (TM) and the relationship between the two. This relation is a complex one; technology import may either substitute or complement indigenous research and development activities. His exercise for six countries namely Australia, France, W.Germany, Italy, Japan and Sweden leads to no firm conclusion.

Katrak (1985)(111) suggested a practical procedure for measuring the degree of technological self-reliance. He considered expenditures on R & D is a function of cost of technology import. If the coefficient of technology is greater than one it may be interpreted as an indication of technological self reliance and vice versa. He found that imports of technology to be stimulating to adaptive R & D in India. The magnitude of the effect, however, appears to be rather limited and weaker for complex technologies.

Ragachand (1981)(112) finds evidence that locally controlled firms were more R & D intensive than their
foreign controlled counterparts in Canada. Rugman (1981)\textsuperscript{113} finds some support for the hypothesis that innovations occur in the home country of MNC rather than in the country of its subsidiaries.

Caves et al. (1980)\textsuperscript{114} in his attempt to analyse systematically the determinants of industry R & D intensity in Canada finds that a high foreign subsidiary share indeed lowers R & D intensity in Canadian industry. Palda and Pazderka (1982)\textsuperscript{115} for Canadian Pharmaceutical industry, Nagesh Kumar (1985)\textsuperscript{116} for India also found similar evidence. Scherer (1965)\textsuperscript{117} found that more than 50 percent of variation in innovative activity in the US manufacturing industry depended upon broad advances of Science and technological knowledge. They are often referred to as Technological opportunities, Later studies by Rosenberg (1976)\textsuperscript{118}, Wilson (1977)\textsuperscript{119}, Kumar (1987)\textsuperscript{120} also found the technological opportunities to be important determinants of R & D intensity.

2.4. Studies on the Performance of Multinational Corporations

Many scholars conducted empirical studies on the relative differences in the performance of foreign affiliates of MNCs and of indigenous firms.

The study by Jenkins (1984)\textsuperscript{121} suggest that firm-specific variables, such as age and experience are important.
In this study pertaining to pharmaceutical industry in Latin America he showed that value added to sales ratio of foreign affiliates varied according to their age and the size of the local market.

More research has been done on the vertical integration of multinational affiliates as compared to their local counterparts. Dunning and Cantwell (1987)\(^{(122)}\) estimated that in Australia, the value added ratio of foreign controlled firms was 35.9 per cent of sales compared with 39.9 per cent for Australian controlled firms the early 1970s. In Korea, Koo (1985)\(^{(123)}\) calculated that although the value added ratio were significant in only 13 out of 29 cases. Cohen (1975)\(^{(124)}\) demonstrated that well established market-seeking foreign affiliates in Taiwan may be more vertically integrated than their local counterparts. He also found strong evidence that export-oriented subsidiaries are likely to be less integrated than their indigenous competitors.

Dunning (1985)\(^{(125)}\) in his study observed that productivity gap between US and other foreign firms and their UK counterparts had narrowed over the years - a result which the author suggested reflected some loss in the ownership-specific advantages of the former and some improvement in those of the latter group of firms.
This result was confirmed by the study made by Davies and Lyons (1991)\(^{(126)}\) who found that although, in 1987, foreign owned firms in UK manufacturing recorded 48.6 per cent productivity advantage over UK owned enterprises less than one half of its advantage could be traced to their nationality of ownership. A more detailed study by Solomon and Ingham (1977)\(^{(127)}\) of the performance of foreign firms in the UK mechanical engineering industry concluded that foreign firms did no better than domestic firms.

The survey of literature shows that most of studies on Multinational Corporations were macro level studies or inter-country studies. Empirical studies on the investment behaviour of MNC at the industry level are not found. Similarly studies on the MNC activity in the light of liberalisation are also very few. The contribution that MNCs could make for the local technological development at the sectoral level was not analysed in great detail. It was further gathered that comparative studies of MNCs and non-MNCs were also scanty.
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53


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