MODEL EXAMINATION FOR SELECTING SUBSIDIARIES BY U.S. TEXTILE MULTINATIONAL CORPORATIONS

BY

SIVASANKARI V

(Under the Direction of Jan Hathcote)

Abstract

U.S. multinational companies are the most important source of foreign direct investment in the textile global market. In this study, the market expansion strategies of these multinational companies are examined in detail. I have applied two models for these companies to select their subsidiaries in different countries. The paradigm is formed by using Porter’s diamond model and Austin’s Environmental Analysis Framework. The models are applied to evaluate the environmental factors of Canada, China, Germany, and Mexico. According to the results, Porter’s model is applicable for developed countries, while Austin’s framework is more suitable for developing countries. For the U.S. textile industry, this study will be an important tool for location decisions.

INDEX WORDS: Multinational, Porter, Austin, subsidiary, textile
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I am dedicating this work to all the students and professionals who are working around the globe to build textile and apparel industry.
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Chapter 1

Introduction

Textiles are one of the most important commodities to influence trade practices since the Stone Age. In particular, textile trade has a long history of influencing culture, economy, and political motivations. The Silk Road (silk fabric trade) in the 1st century is evidence of the transmission of culture between European and Asian civilizations. During the 18th century, mass production of textiles led to the industrial revolution which resulted in economic expansion and global economic influence. In addition, the Multi-Fibre Arrangement (MFA) for textile goods during the 20th century had the political influence to protect and oppose free trade in the later years.

According to the Central Intelligence Agency (2011), most of the fastest growing countries participate in textile production. Textiles, as nondurable products with short life spans, create perpetual demand in the global marketplace. Research and developments in the field have expanded the end uses of textiles into a variety of industrial sectors. Because textiles have played a dynamic role in the shaping of world history, textiles provide valuable opportunities to analyze recent international trade.

History of US textile industry

Different Phases of textile industry

Textiles were the first commodity to have adopted large-scale production. Thus, textile mills were the first industrial factories. Further developments in textile production instigated the Industrial Revolution in the eighteenth century. During the 1800s, the Industrial
Revolution improved the functionality of spinning and weaving in textile complexes, which resulted in mass production. On the other hand, large scale apparel production began as a result of the introduction of the sewing machine and demand for ready-made garments. Although apparel consumption increased the demand for textile production, the apparel industry divided into separate segments due to labor conflicts in 1910 (Dickerson, 1999). The textile industry was led by capital and technological developments that resulted in what is commonly referred to as a capital intensive industry. The textile industry has undergone changes in each phase of its history and is a relevant point of analysis for the study of present-day business trends and international trade.

**U.S textile industry and International trade**

In 2008, the U.S. textile industry was one of the major components of the U.S. economy contributing around $34 billion to Gross Domestic Product (NCTO, 2011). As the third largest producer of cotton, the United States exported around $10 billion worth of textile goods in 2009 and positioned itself as the world’s third largest exporter of textile products (NCTO, 2011). The U.S. textile industry is one of the most important sectors in the U.S. economy. The United States, with a population of 310 million people, participates in international trade both as a consumer and producer. The U.S. textile industry plays a significant role in trade at the international level. Mass production during the 19th century led to the depletion of raw materials in Great Britain and the U.S. which created a need for investment outside of their respective countries. Great Britain and major European countries invested in colonies and introduced international trade. From 1830 to 1850, international trade increased two, three, or even four times over the following 30 years. Through labor force migration, economic expansion, increase
in per capita income, introduction of the power loom, and trans-Atlantic transportation, the U.S. textile industry grew steadily during the 19\textsuperscript{th} century (Dickerson, 1999).

During the 20\textsuperscript{th} century, international trade boomed as the result of an international monetary system that integrated the global market. Economic growth of developing countries encouraged textile consumption while communication and other technological inventions nurtured the growth of the textile industry. Later, protectionism policies initiated tariffs and other non-tariff restrictions. In 1947, General Agreement on Tariffs and Trade (for the promotion of unrestricted trade) eliminated tariffs, so international trade increased rapidly (Dickerson, 1999). As a result of economic expansion, developing countries began to participate in textile production. Thus, the U.S. textile industry’s practices became the precursor for other textile industries for the negotiation of trade-related problems.

In the present world, the textile industry is a dynamic and significant factor that can be readily studied for examples of excellence in business. Multinational corporations, especially, in the textile industry are a part of global trade dynamics. The posture of the United States, with the world’s largest economy, creates an opportunity to study multinational corporations in the textile sector of the U.S economy.

**Globalised World**

Friedman (2006) noted that “When the world is flat, whatever can be done will be done. The only question is, will it be done by you or to you?” This quotation in his famous book *The World is Flat* encourages acceptance of globalization by the masses as it spreads rapidly throughout today’s flattened world.

Friedman illustrates the time frame of globalization in terms of three eras of globalization. The first era of globalization (1492-1800 A.D) quantifies the comparative
advantage of each country in terms of labor, energy, and capital. The second era of globalization (1800-2000 A.D) describes the participation of multinational companies with regard to those advantages. The last era of globalization (2000-present) integrates the world driven by individuals from different parts of world. In the present world, multinational companies achieve their power as individual players empowered by the flat-world platform. Thus the concept of globalization participates in the present day world and integrates the world as a single platform.

The globalization phenomenon has been defined by a number of economists in a variety of ways. According to economists Bordo, Taylor, and Williamson (2001), globalization is the integration of commodity, labor, and capital markets between countries. Globalization has also been defined as the process of integration of world civilization (Kogut, 1997). One can conclude that globalization is an integration process in which multiple factors around the world yield a single platform.

The roots and effects of globalization have been argued by a number of researchers in the past. Some researchers feel that globalization began after the first navigation around the earth; during the mid-nineteenth century; or after World War II (Moore & Lewis, 1999). On the other hand, other researchers have claimed that globalization resulted from developments in technology, expansion of the world economy as well as population migrations that followed World Wars I and II (Dickerson, 1999). Thus, Globalization influenced the world economy both positively and negatively.

**Globalization and multinational corporations**

The effects of globalization can be studied through the multinational corporations, which function as its driving force (Friedman, 2006). International trade increased during the nineteenth century to around 3.5 percent per annum due to the Industrial Revolution and colonizing efforts
of the industrialized countries (Jones, 2005). For example, Britain as the pioneer acquired raw materials from India and China and replaced them as the largest manufacturing country (Rivoli, 2009). The Industrial Revolution in conjunction with transatlantic transport enhanced trade between the European and American continents. Later, the global economy resulted from protectionism, the International Monetary Fund (IMF), and labor migration encouraged by international trade (Dickerson, 1999). Imperialism on the other hand acted as an integrating factor of capital, labor and technology during the nineteenth century and the early twentieth century. The above changes increased manufacturing production to a large scale, and companies made major contributions to the global economy.

In the 1820s, family business enterprises gradually started investing in colonies which lead to the establishment of multinational companies. From 1870 to 1914, the number of such transnational companies increased rapidly. These companies were referred to as free-standing companies, and they were later recognized as multinational companies (Wilkins, 1988). These companies guided the flow of raw materials and labor from colonized countries to their home countries, but with less capital investments in these colonies. Some of the countries, such as Switzerland and the United States also invested in their respective neighboring countries during the early twentieth century (Schroter, 1993; Wilkins, 1988). These multinational companies unified working culture, labor and technology and integrated company headquarters with their regional branches. The increase in the number of such companies encouraged the multi-regional flow of resources which in turn accelerated globalization.

After World Wars I and II, globalization resumed and lead to an increase in foreign investment during the 1950s and 1960s. In the 1980s, the developed countries including Japan, the United States and some European countries started to focus on foreign investment as a form
of market expansion which supported the formation of the global economy. These countries developed the global pattern of sharing common technologies and trading governance. Thus multinational companies led to the cause of globalization during the late twentieth century. Globalization and multinational companies supported each other’s presence in the evolution of the world economy. Greater understanding of the performance of multinational companies could lead to an improved understanding of globalization and its causes.

**Multinational Corporations and the inside story**

The streams of capital, labor, and trade were always observed across the political boundaries in the past. According to Moore and Lewis (1999), the world’s earlier multinational companies existed during the Assyrian kingdom around 2000 B.C. Historical data have shown certain territories shared trade interests, and trade routes were evident during 500 B.C. and 500 A.D. Modern politics along with colonization during the subsequent centuries prepared the world for accepting multinational companies. The Industrial Revolution during the 1800s led to mass production and hence the expansion of consumer and labor markets around the world. Later transatlantic trade nourished the flow of goods and, in turn, the common civilization. The above reasons formed the right platform for the multinational companies to trade around the world.

Because of the unifying factors around the world, companies from Britain, France, and other European countries started expanding between 1870 and 1914. These companies are referred to as free-standing companies. Such free-standing companies usually traded a single commodity in a particular country. The capital-flow and management of these companies were controlled from the headquarters in the home country.

Some countries practiced foreign investment in their neighboring countries which initiated multi-regional companies. Many U.S. companies invested in Canada, and a few Swiss
companies built chemical factories in Germany close to their political border (Schroter, 1993; Wilkins, 1988). According to Jenks (1927), there were 20 British textile factories in France until 1840. During the early nineteenth century, the majority of the companies traded with colonized countries; For example Dutch companies mostly invested in Indonesia as the Dutch East Indies company was formed in 1914 (Jones, 2005). These companies were not acknowledged or scrutinized by political authorities until the 1960s.

The economist Maurice Bye in France first coined the term ‘multi-territorial firm’ (Dunning 1993). Later in 1960 David E. Lilienthal, head of the Tennessee Valley Authority used the term ‘multinational corporation’ in an official meeting in reference to corporations that operated outside the U.S. (Fieldhouse 1986). John H. Dunning was the first author to mention the term “Multinational enterprise” in his 1980 work “Eclectic approach: International production.” According to Dunning, a multinational corporation or enterprise (MNC or MNE) is a corporation that uses foreign investments in two or more countries to support any of its activities.

Various theories have accompanied the activities of multinational companies since the 1960s. According to an eclectic paradigm of international production (otherwise known as OLI model), ownership-specific, location-specific and internalization advantages led to the success of multinational corporations. Multinational companies compete with local firms in every trading country. Multinational companies can be superior to local firms in areas, such as technology, intellectual property, management, capital, market power, and raw materials. Multinational companies can also possess advantages with respect to geography. Location of the company can benefit a multinational corporation in the areas of tariff reduction, market size, political assistance, and resources. The firm-specific advantages also contribute to the activity of the
multinational companies within a country. The eclectic paradigm is mainly used for analyzing the efficiency of multinational corporations.

A Multinational Corporation (MNC) by common definition integrates the operation of the firm in different countries. Thus MNCs integrate the same operation in different countries, which result in the maximum efficiency for raw materials and the consumer demand. MNCs with the choice of location and resources hold a comparative advantage over the local firm. MNCs face problems related to non-native ownership as they may lack knowledge with respect to language, religion, and bureaucratic procedures (Gupta, 1978). MNCs with the mentioned advantage and disadvantage play a major role in a country’s economy. Capital, labor, raw materials, and demand are the four major factors that control the activity of an industry. MNCs, which drive these factors, direct the functioning of an industry.

Evidences from previous research shows that MNCs negatively impact domestic production; however its presence and activities tend to improve the global competition and its acquisition beyond the political border contributes to the outward foreign direct investment (FDI). The global outward FDI reached 36.5 percent between 1996 and 2000 (Dunning & Lundan, 2008). The intra-firm trade value doubled from 1970 to 2000 causing the multinational firm as the driving force for the present day economy (Jones, 2005). Hence MNCs contribute to the domestic industry in the home country as well as economy of the host country.

Importance of Multinational Corporations

In general, Multinational Corporations build trade relation between two countries. The country in which the corporation originated is called as home country and the country with which the corporation trades and owns the subsidiary is called as host country. Multinational corporations like other enterprises possess certain advantages and disadvantages. In the case of
the home country, the corporation yields a new platform for resources and also helps to spread their culture. As a supplier of raw materials, it also helps the production cycle in the home country and its economy. On the other hand, the corporation favors the host country with capital, employment, technology spills and hence social development. Thus the activities of the MNCs affect both the home and host country. For this reason, it is necessary to study MNCs for the welfare of a country’s economy.

Multinational corporations and the U.S textile Industry

The United States as the third major producer of cotton has been participating in the textile production since industrial revolution. Today, the U.S. textile industry contributes $34 billion of the U.S. gross domestic product (NCTO, 2010). The North American Industry Classification system (NAICS) divides the textile industry into textile mills (NAICS: 313) and textile product mills (NAICS: 314). In general, the U.S. textile industry involving skilled labor and high technology machines are categorized as capital intensive industry.

In the past, America was one of the most renowned lands for investment. Levi Strauss, founded in 1853, is an example of a German opening a denim factory in San Francisco, California. British firms were the pioneer for Foreign Direct Investment (FDI) in American textile firms but later Germany and Japan also invested in the United States (Singleton, 1997). Until the Second World War, American textile firms were not involved in multinational activities in other countries. According to Geoffrey Jones and Frances Bostock, there were five U.S. textile companies operating in the United Kingdom during 1930-1962 (Jones & Bostock, 1996).

Today, U.S. owned multinational companies operate in different industries including retailing, value addition products and specialty products in combination. Thus U.S. multinational companies that work with textile mill products also include automobile, medical and footwear
industries. In the United States, there are 29 textiles multinational companies operating in textile production (NAICS: 313, 314) (Uniworld, 2009). In 2010, three foreign multinational companies opened new textile plants (Zagis plant, Santana Denim plant and Parkdale plant) in Lousiana, Texas, and South Carolina (Roberson, Southeast Farm Press, 2011). The new textile plants are evidence for foreign interest in investing in the U.S. textile industry.

According to Dunning (2008), the MNCs seek resources, technology and market expansion. Thus multinational companies in the U.S. textile industry strengthen the field with its strategy of worldwide resources and market. Strategies of MNCs have been studied using Austin’s Environmental Analysis Framework (Karanasios, 2008; Jin, 2003) and Porter’s Diamond model (Wu, Lin & Chen, 2007; Curran, 2001; Liu, Zhang & Xu, 2010; Shafaei,2009; Watchravesringkan, Karpova,& Hodges, 2010) in a number of sectors including education, hospitals and apparel. The strategies of U.S. textile MNCs have not yet been studied in detail and hence it is important to discover a model which fits best with regards to the textile multinational companies.

**Purpose and Objective**

The U.S. textile industry has been one of the major sectors for foreign investment since 1930s. The Purpose of this study is to analyze and obtain a market entry strategy of U.S. textile multinational companies. The main objectives of the research are

1. To analyze the factors of Porter’s model for the subsidiaries’ countries.
2. To analyze the environmental framework of Austin’s model for the subsidiaries’ countries.
3. To find the best model for each of the selected countries.
Relevance of the study

The study projects a paradigm for selecting subsidiaries by U.S. textile multinational firms. With the help of research and development facilities, U.S. textile industries have vastly developed a wide range of markets such as medical-textiles, geo-textiles, industrial-textiles, and home-textiles. The U.S. textile products have a strong market potential to reach numerous countries because of its exceptional features and specialized end-products. In the future, the selected model could be applied to evaluate these emerging markets providing empirical market decisions for multinationals and improve decisions for policy maker in the home market.

Hypothesis 1

Null hypothesis: The factors of Porter’s model have no significance relationship between research and development expenditure for the each of the selected developed countries

1. Factor conditions (natural resources, human resources, infrastructure)
2. Demand conditions (buyer needs)
3. Related and supporting industries (upstream industries, technically associated industries)
4. Firm strategy, structure and rivalry (firm strategy for rivalry, corporate structure)
5. Government (type of government, international trade agreements)
6. Chances

Hypothesis 2

Null hypothesis: The environmental framework of Austin’s model has no significance relationship between research and development expenditure for the each of the selected developing countries

1. Economic factors (natural resources, human resources, infrastructure)
2. Political factors (type of government, international trade agreements)

3. Cultural factors (working hours, major language, religion)

4. Demographic factors (number of labors, tertiary education attainment).
Chapter-2

Literature Review

The activities of multinational companies (MNCs) are defined by a number of theories including internationalization theory, eclectic theory, and macroeconomic theory. These theories characterized the location factor of the MNCs’ subsidiaries. Porter’s diamond model (1985) is one of the benchmark theories that explained the microeconomic factor for selecting subsidiary countries. Porter’s model is applied for choosing subsidiaries among developed countries, while Austin’s Environmental Analysis Framework (1990) model is used for choosing subsidiaries among developing countries. Both of the theories have been studied by a number of scholars in the past (Curran, 2001; Haley, 2000; Jin, 2003; Karanasios, 2008; Liu et al., 2010; Ng & Gujar, 2009; Shafaei, 2009; Watchravesringkan et al., 2010; Wu et al., 2007), but those theories have not yet been used to study the strategy of U.S. textile MNCs. Therefore, this research will contribute to the literature in assisting textile scholars with studying the strategies of textile MNCs originating in the United States.

Porter’s Diamond Model

In 1985, Michael E. Porter proposed a theory on the competitive advantages of various nations with respect to specific industries. Porter explained industrial competition through four factors, namely the factor condition, the demand condition, related/supporting industries, and the context for firm strategy and rivalry. In addition, Porter included government and chance as external factors. These factors depicted the microeconomic environmental conditions of the industries. Porter’s diamond model has been used in studies to select a location for a Taiwan
hospital (Wu, 2007) and an Indian dry port (Ng, 2009), as well as to define the competitiveness of higher education (Curran, 2001), the Chinese medicine industry (Liu et al., July 2010), the Iranian textile industry (Shafaei, 2009), and the Thailand apparel industry (Watchravesringkan et al., 2010).

1. **Factor condition.** Among Porter’s six factors of competition, the factor condition refers to the production factors or resources required for functioning in a particular industry. The factor condition includes natural resources and other created production factors, i.e. capital and infrastructure. According to Rasoul Shafaei (2009), capital and labor factors, as a part of the factor condition, are the most important components of the Taiwan textile industry (Shafaei, 2009). The textile industry, including spinning, weaving, and knitting, is both capital and knowledge sensitive; hence, the textile industry is considered to be a capital intensive industry (Mytelka, 2010). Infrastructure, as a factor, is specific to a particular location and is governed locally through policies (Yeaple & Golub, 2007). Infrastructure and technology are critical factors of manufacturing industries like the textile sector. Textile machines with sophisticated instruments are handled by skilled labor. Hence, development in the sector involves knowledge resources and capital resources with the introduction of new technologies. According to Yasar and Paul (2008), the textile industry, as part of the manufacturing sector, depends highly on capital and skilled labor.

2. **Demand condition.** The second force in Porter’s model is the demand condition in the local market. According to Hoefter (2001), the demand condition includes local market components, quality of demand, market share export, related industries, and supporting industries (Hoefter, 2001). Porter (1990) noted that sophisticated and demanding buyers in a local market will result in the formation of a more enhanced market (Lau et al., 2009). The
development and characteristics of domestic demand are the major determinants of the demand condition (Shafaei, 2009). As customers become more specialized operations, they prefer to try new and innovative products introduced into the market (Porter, 1990). Sakakibara and Porter (2001) observed that requirements for new products in domestic markets enhance the international trade in the Japanese industry (Porter, 2000). Thus, the demand in the domestic market influences the respective industry by improving its perception about end consumers.

3. Related/supporting industries. The third important force in Porter’s model is the accessibility of related and supporting industries that are internationally active (Porter, 1990). For the textile industry, supporting industries include textile processing industries (downstream industries), machinery industries, chemical industries, cotton agriculture industries, and petrochemical industries in the case of synthetic fibers (Hirono, 2003). According to Porter (1998), the presence of internationally competitive supporting or related industries results in innovation, a well-coordinated supply chain, and technology development that is especially beneficial for downstream industries. A cluster of related and supporting industries is a group of supporting companies or institutions with the same or competing operations (Porter, 2000). Porter (2000) asserted that the cluster as a group of related businesses in a particular geographic location enhances the value of workers with creativity, high skills, and knowledge. With commonalities like geographic condition, culture, and institutional terms, the cluster has the advantages of better access to information and specialized relationships. In the Italian apparel industry, vertical integration of textile firms, along with their supporting industries, has proved to help in the firms’ stability (Guercini, 2004). In cases with closely located industries, vertical integration could be easier and would facilitate good supply chain management.
4. **Context for firm strategy and rivalry.** The fourth force of comparative advantage is the characteristic of rivalry and the firm’s context for operation. According to Porter (1990), the firm’s strategy includes creating, organizing, and managing its own activities to achieve the goals of the company or its owner. Companies of same operations act as domestic rivalry to each other. Hence, Clusters of companies are the companies performing the same operation forming rivalry partners. Rivalry is a promising factor of innovation, as the innovative ideas are easily adopted in a competitive atmosphere. According to Hoefter (2001), firm strategy and rivalry are studied to determine the stability of macroeconomics by analyzing variables including the level of interest rate, level of inflation rate, and stability of exchange rate. Hence, a prolonged rivalry cluster nearby the firm ensures an economically stable location.

5. **Government.** Government plays a major role in trade through taxation, trade regulations, and licensing (Shafaei, 2009). Trade in a country is maintained by intellectual property, legislation, and trade policies. Trade agreements are approved by the country’s government and hence its regulation. Government policies influencing the factor condition, the local market demand, related industries, and rivalry are the major forces for a nation’s competitive advantage. Bureaucracy is regulated by the government of the particular nation with local officials. Recently, developed countries have adopted development plans to attract foreign investments through MNCs. The respective governments of developing countries are working to develop industrial cities through economic reforms to improve infrastructure facilities. Additionally, local governments upgrade the urban industrial agglomeration through industrial policies (Humphrey & Schmitz, 2000).

6. **Chance.** Chance includes climatic, economic, and unpredictable changes that affect the market conditions. Chance mostly has negative effects on trade; hence, it is considered an
immeasurable variable in Porter’s model. Chances like tsunamis, economic depressions, and the Gulf War are some examples. Those countries which are affected by the chance event take a long time to recover. Famine in China, floods in Pakistan, earthquakes in Chile, and export restrictions in India are chances that resulted in the increase of cotton prices around the world and, indirectly, in textile production (Clifford, November 10, 2010).

**Austin’s Environmental Analysis Framework**

In 1990, Austin developed the Environmental Analysis Framework (EAF) using the factors that affects the presence of industries in developing nations. According to Austin (1990), the EAF model adapts Porter’s diamond model by studying four environmental factors. Austin (1990) presented the environmental factors at international, national, and firm levels to describe the barriers or advantages a firm endures across developing nations. The environmental factors are economic, political, cultural, and demographic. Each of the factors is depicted with a number of variables as components to analyze them. Each factor, together with its variables, formed an environmental framework that a firm experienced in a developing nation.

1. **Economic factor.** The first determinant of the EAF is the economic factor, which includes natural resources, labor, capital, foreign exchange, infrastructure, and technology. The economic factor is the most critical factor for both developing and developed countries.

   In the case of the textile industry, natural resources include natural fibers and fuel for yarn manufacturing and fabric manufacturing processes. According to UNCTAD, United States is one of the largest cotton exporter and hence it has had competitive advantage for cotton (UNCTAD, 2003). Because cotton is a natural fiber, cotton fiber production is dependent on natural factors like climate conditions and land. For example, in a 2010 article in the *New York Times*, the United States Department of Agriculture (USDA) predicted that cotton production in
2010 could significantly affect both cotton prices and the textile industry (Clifford, November 10, 2010). The availability of arable land is another advantage that must be considered in the case of cotton production.

The textile industry is capital-intensive, as most of the procedures are automated (Nordås, 2004). Therefore, the textile industry operates with skilled, knowledgeable laborers handling sophisticated textile machineries. According to Rasoul Shafaei (2009), human resources with insufficient training could be a disadvantage that limits a nation in global markets (Shafaei, 2009).

According to Austin (1990), along with foreign exchange, domestic capital contributes to the economic factor of a nation. Domestic capital is the determinant that describes the economic stability of the country. Domestic capital includes profit before interest and taxes, loans from local institutions, and bank equity dividends (Filatotchev & Toms, 2003). Inward Foreign Direct Investment (FDI) is also major source of investment for an industry (Xu & Wang, 2007).

Infrastructure includes the facilities available for communication, the means of transport, and the regulations for environmental safety. A developing country could be easily distinguished from a developed country by the infrastructure. The means of transport influence the supply chain; hence, transport is a major economic determinant of the nation’s advantage. The infrastructure of the country is generally controlled by the government through policies (Yeaple & Golub, 2007). In general, developing countries attract the inward foreign investment by improving the infrastructure of the country.

2. Political factor. In describing the EAF, Austin explained that the political factor deals with variables including political stability, ideology, institutions, and geopolitical links (Austin, 1990). Austin (1990) stated that political institutions including parties, bureaucracies, and other
political organizations are the factors for political stability. According to Busse and Hefeker (2007), political stability means the ability of the government to carry out the policies and the ability of the politicians to stay in office for longer periods of time. The major determinants for MNCs to choose a country for their operation include political risks in the form of government stability, internal and external conflict, corruption, ethnic tensions, law and order, democratic accountability of government, and quality of bureaucracy (Busse & Hoefer, 2007). Political ideology that influences trade policy is mostly left-wing in developing countries and encourages pro-trade policies (Dutt, 2005).

In developing countries, geopolitical links are generally signed by the government as bilateral or multilateral agreements. These political agreements have economic and political implications (Austin, 1990). The U.S.–Mexico agreement during World War II was a famous economically based political agreement to protect cotton production. Another such agreement is the U.S.–Pakistan political link restricting nuclear weapons and terrorism while protecting democratization and human rights (Kronstadt, March 2006). Even religion and cultural reasons generate interest in shaping the geopolitical links in developing countries (Austin, 1990).

The General Agreement on Tariff and Trade (GATT), introduced in 1948, was the first agreement signed to liberalize international trade. Tariff regulations, along with quotas, regularized trade between member countries. Later, the multilateral agreements named the Short Term Agreement (STA) and the Long Term Agreement (LTA) were signed to reduce the textile imports of the United States. The Multi-Fiber Arrangement (MFA), instituted in 1974, was a quota-based system intended to protect markets in developed countries (Glasmeier, Thompson & Kays, 1993). The MFA lasted until 1995 and was completely phased out in 2005. Multilateral agreements that included the GATT, the STA, the LTA, the MFA, the North-American Free
Trade Agreement (NAFTA), and the Agreement on Textile and Clothing (ATC) influenced the trade of textile goods to the United States (Jin, 2003). Through these examples, it is clear that trade policies as a part of government decisions contribute to the trade activity within a nation.

3. Cultural factor. The cultural factor consists of some sub-factors, including social structure and dynamics, human nature, time and space orientation, religion, gender roles, and language (Austin, 1990). According to Austin (1990), religion molds the morality, attitudes, and values of a person, and hence it is the major cultural factor that controls trade. Even though many of the nations have common religions, the languages for communication differ. The European Union, as a single trade body, used German, French, Italian, English, and 19 other languages for documentation. Official languages of the nations involved in documentation are the major factors of communication in trade. Another cultural factor is the treatment of gender roles. The designation of gender roles is a particular aspect of culture that determines various other factors like wages, working hours, and job practices.

4. Demographic factor. Population growth rate, age structure, urbanization, migration, and health status together form the demographic factor of a developing nation’s advantage. A developing country with a pyramidal form of population growth promises a young and energetic workforce. Populations with higher education attainment are the major workforce for capital-intensive industries like the textile industry. Urbanization as a factor for improved infrastructure could be an advantage for a developing nation. The poor infrastructure in Africa acts as a disadvantage for the textile industry (Asiedu, 2006). Demographic factors help us find the appropriate human resources to act as both a labor force and consumers of textile products in the domestic market.
Research and Development

Research and development (R&D) refers to the activity of a manufacturer to invent or develop new products or to enhance current products through value addition (System of National Accounts 1993 Glossary). According to Jones (2005), research and development is an important factor for multinational companies involved in technology-driven industries. The textile multinational companies in the U.S. which are publicly traded participate majorly in the production of industrial textiles. By definition, industrial textiles are the textile products which are used by customers in agriculture, automotive, building and construction, medicine and hygiene, packaging, protective clothing, sportswear, transport, defense, leisure, and safety (Wei et al., 2003). The SEC filings (1990-2009) of these public limited companies show that product innovation is the most important strategy, and they achieve it by investing in R&D. According to World Bank (Navaretti & Carraro, 1996), the R&D of the multinational enterprises is shared by the subsidiaries and local companies in the subsidiary countries. Hence, R&D expenditure is an important factor for investment by industrial textile-based MNCs.

The R&D investment of MNCs plays a vital role in the development of high technology-based industries (Almeida, 1996). Further, the location decisions of R&D investment are studied by scholars in an effort to understand the market expansion of MNCs (Athukorala & Kohpaiboon, 2010; Bas & Sierra, 2002; Demirbag & Glaister, 2010; Kuemmerle, 1999). In particular, R&D expenditures of the MNCs are explained using the economy and infrastructure of the host country (Athukorala et al., 2010). Thus, the knowledge-based market expansions of the MNCs are studied using the R&D expenditures of the host nation.
Chapter 3
Methodology

In this study, Porter’s diamond model and Austin’s Environmental Analysis Framework are applied to analyze the comparative advantage of the MNC locations. Porter’s diamond model explains the location decision for a developed country using six factors, namely, factor condition; demand condition; related and supporting industries; firm strategy, structure, and rivalry; government; and chance. On the other hand, Austin’s framework illustrates the location decision for a developing country according to economic, political, cultural, and demographic factors. The conceptual definitions are listed below for each factor in Porter’s and Austin’s theories.

Conceptual Definition

Porter’s Model

Factor condition: The factor conditions are the positions of a country in terms of factors for textile production including human resources, physical resources, knowledge resources, capital resources, and infrastructure (Porter, 1998).

Demand condition: The three important characteristics of the demand condition are the character of the buyers’ needs, the size and growth of demand, and the internationalization of the domestic market (Porter, 1998).

Related and supporting industries: The internationally competitive upstream industries and technically-associated industries act as related and supporting industries, respectively (Porter, 1998).
Firm strategy, structure, and rivalry: This factor involves the context in which a firm’s goal, strategy, and organizational pattern are formed with respect to domestic rivalry (Porter, 1998).

Government: The role of government, such as in the creation of policies and laws, influences the factor conditions, demand conditions, and related and supporting industries in current international competition (Porter, 1998).

Chances: Chances are undetermined natural occurrences or discontinuities of the competitive positions that result in the shift of competitive advantage from one particular nation to another nation (Porter, 1990).

**Austin’s Framework**

Economic factors: Economic factors are the determinants that are used to categorize the countries with respect to economic development spectrum. Natural resources, labor, capital, infrastructure, and technology are these determinants (Austin, 1990).

Political factors: The factors including instability, ideology, institutions, and international contacts are the variables that depict the characteristics of political development in a country (Austin, 1990).

Cultural factors: Shared values, attitudes, and behaviors contribute to the culture of a particular community. Social structure, religious influence, gender roles, and language are the factors that determine the characteristics of culture in a country (Austin, 1990).
Demographic factors: The structure of a country is determined by demographic factors including population growth rates, urbanization, age structure, migration, and health status (Austin, 1990).

Each of the above factors will be evaluated by a number of variables. The variables act as components of each factor, helping to quantify them indirectly in the respective models. The operational definitions below briefly explain the variables used in this study.

**Operational Definitions**

**Porter’s Model**

Factor conditions: Factor conditions of a country in this study are measured by evaluating natural, human, and infrastructure resources that are associated with the progress of textile manufacturing sectors. Cotton production (Lb. bales) and wool production (tones) are categorized as natural resources. The number of laborers is taken as a human resources factor. Infrastructure features are studied by analyzing the electricity, water, seaports, airports, and Internet usage percentage.

Demand conditions: Demand conditions of a country in this study are measured by analyzing the upstream market, that is, where the product reaches after textile production units. The total number of establishments in manufacturing sector (units) and the export value of the countries ($100,000) are observed as demand conditions. These values ensure the local demand and international demand for the products in this study.

Supporting and related industries: Supporting and related industries are categorized as upstream and downstream industries. Upstream industries (units) including number of manufacturing industries are examined.
Firm strategy, structure and rivalry: Firm’s strategy, structure and rivalry of each firm are analyzed using the SEC filings of the respective firm from 1990-2009.

Government: The government of a country contributes to the development of an industry through rules and regulations. Hence, type of government and trade agreements are analyzed as factor of government.

Chances: Chances are studied using the news article from Factiva.com

**Austin’s Framework**

Economic factor: Economic factors of a country in this study are measured by evaluating natural, human and infrastructure resources that are associated with the progress of textile manufacturing sectors. Cotton production (Lb. bales) and wool production (tonnes) are categorized as natural resources. The number of laborers is taken as the human resources factor. Infrastructure features are studied by analyzing the electricity, water, seaports, airports, and percentage of Internet users.

Political factors: The type of government and any trade agreements are analyzed as factors of government. Trade policies are further analyzed as a part of political factors. The number of trade agreements or trade blocks in which the country is involved are calculated as political factors.

Cultural factors: In this study, cultural factors are measured with respect to language, religion, and social practices. The variables including the major languages, religions, and working hours are analyzed as cultural factors for textile industries.

Demographic factors: The availability of the labor force is examined by the demographic factors. In this study, the number of laborers (units) and the number of
students with tertiary education attainment (units) contribute to the demographic factors of a particular country.

Data Collection

In this research study, various secondary sources including the records of the government and international organizations as well as trade statistics will be used. The data will further be applied to respective factors in Porter’s model and Austin’s framework as per the operational definitions. The dataset in this study contains both quantitative and qualitative variables. The quantitative variables will be selected from the time period 1990-2009. On the other hand, the qualitative variables including languages, religions, type of government, and trade agreements will be recorded for 2011. SEC filings are also referenced for the firm strategy, structure, and rivalry of the selected companies. Sources of each of the variables are listed on page 27 (see Table 1).

Applying the top preference of public limited U.S. MNCs using Uniworld data, Canada, China, Germany and Mexico were selected for further study (Uniworld, 2011). The Porter and Austin models were segregated with respect to the economic status of the countries. Hence, the data of the countries will be applied to the respective model according to the economic status of each country, i.e. developing country, industrialized country, or developed country. The models will be evaluated by studying each of their component factors qualitatively. The dataset will be evaluated to fit the model as per the economic status of the selected countries.
Table 1
*Sources of the Data*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Canada</th>
<th>Germany</th>
<th>Mexico</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Porter’s Model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Factor conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton production</td>
<td>National Cotton Council of America (1990-20009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wool production</td>
<td>Food and Agriculture Organization of the United Nations (1990-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>United States Energy information Administration (1990-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Food and Agriculture Organization of the United Nations (1990-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seaport</td>
<td>Central Intelligence Agency (2005-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airport</td>
<td>Central Intelligence Agency (2005-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roadways</td>
<td>Central Intelligence Agency (2005-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>International telecommunication union, United Nations (1990-2009)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Demand conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and textile products</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Supporting and related industries


### Firm strategy, structure, and rivalry

| Government Type of government | Central Intelligence Agency (2005-2009) |
| Trade agreements | World Trade Organization (1990-2009) |

### Austin’s Framework

<p>| Cotton production | National Cotton Council of America (1990-20009) |
| Wool production | Food and Agriculture Organization of the United Nations (1990-2009) |
| Electricity | United States Energy information Administration (1990-2009) |
| Water | Food and Agriculture Organization of the United Nations (1990-2009) |
| Seaport | Central Intelligence Agency (2005-2009) |
| Airport | Central Intelligence Agency (2005-2009) |
| Roadways | Central Intelligence Agency (2005-2009) |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>International telecommunication union, United Nations (1990-2009)</td>
</tr>
<tr>
<td><strong>Political factors</strong></td>
<td></td>
</tr>
<tr>
<td>Type of government</td>
<td>Central Intelligence Agency (2005-2009)</td>
</tr>
<tr>
<td>Trade agreements</td>
<td>World Trade Organization (1990-2009)</td>
</tr>
<tr>
<td><strong>Cultural factors</strong></td>
<td></td>
</tr>
<tr>
<td>No. of major languages</td>
<td>Central Intelligence Agency (2005-2009)</td>
</tr>
<tr>
<td>No. of working hours</td>
<td>International Labor Organization</td>
</tr>
<tr>
<td>No. of major religions</td>
<td>Central Intelligence Agency (2005-2009)</td>
</tr>
<tr>
<td><strong>Demographic factors</strong></td>
<td></td>
</tr>
<tr>
<td>Tertiary education attainment</td>
<td>United Nations Educational Scientific and Cultural Organization (1990-2009)</td>
</tr>
</tbody>
</table>
Chapter 4

Results

The U.S. textile industry has been one of the major sectors for outward foreign investment since the 1930s. The purpose of this study is to analyze and obtain a market entry strategy of textile multinational companies especially in the United States. The statistics of U.S. textile multinational companies are collected from Uniworld Business Publications Inc., the only publisher of multinational companies’ business information. According to Uniworld, there are 29 U.S. multinational companies which are involved in textile manufacturing along with other product production. From the list of 29 multinational companies, seven public limited companies were selected for this study because of the availability of SEC filings from the public limited companies.

The selected U.S. multinational companies operate in 59 foreign countries for manufacturing and other facilities. From Table 2 below, Canada, China, Germany, and Mexico are the countries with the highest number of U.S. subsidiary companies. Hence, these countries are examined in this study. In general, these foreign subsidiaries are selected by the companies based on different criteria. The scholars, Michael E. Porter and James E. Austin, studied the factors affecting the selection of a country for market expansion. In this study, I have examined a model for the selected countries to study their environmental factors. Porter’s model is used for studying developed countries, while Austin’s framework is used for studying developing countries. This study will be useful to evaluate the emerging markets to provide empirical market decisions for multinationals as well as improve decisions for policymakers in the home market.
Table 2

*Distribution of subsidiaries of U.S. textile multinational companies (Uniworld, 2009)*

<table>
<thead>
<tr>
<th>Countries</th>
<th>Number of subsidiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>14</td>
</tr>
<tr>
<td>Germany</td>
<td>14</td>
</tr>
<tr>
<td>Canada</td>
<td>11</td>
</tr>
<tr>
<td>Mexico</td>
<td>10</td>
</tr>
<tr>
<td>Brazil</td>
<td>7</td>
</tr>
<tr>
<td>France</td>
<td>7</td>
</tr>
<tr>
<td>Australia</td>
<td>6</td>
</tr>
<tr>
<td>Italy</td>
<td>6</td>
</tr>
<tr>
<td>England</td>
<td>5</td>
</tr>
<tr>
<td>Japan</td>
<td>5</td>
</tr>
<tr>
<td>Sweden</td>
<td>5</td>
</tr>
</tbody>
</table>

The selected MNCs entered the countries under study to expand their manufacturing facilities. The chart below shows the entry of each of the listed MNCs in the top four countries of Canada, Germany, China, and Mexico as shown in Table 2. The market expansions of the companies are described below for the countries under study.

**Company 1: Unifi Inc.**

Unifi Inc. is the leading producer of polyester and nylon fibers. The company was established in 1971 in Greensboro, North Carolina. Later, Unifi acquired textile plants in Ireland and England to expand its market. Unifi reached the German market through the acquisition of

Figure 1. Bar chart representing the year of entry by selected multinational companies to four countries for market expansion.
Company 2: Polymer Group Inc.

Polymer Group Inc. (PGI) is the leading producer of nonwoven materials used as technical textiles. PGI was established on June 24, 1994, when the company acquired 100% share from InterTech Group, Inc. along with manufacturing and marketing units. PGI started to expand its market in 1996 by acquiring manufacturing units in Germany, Canada, and Mexico. In 2000, PGI entered the Asian market by acquiring a manufacturing unit in China. Now PGI operates as a major supplier of engineered materials in North American and multinational industrial markets. (United States Security Exchange Commission (1997-2009))

Company 3: Xerium Technologies Inc.

Xerium Technologies Inc. was established in 1999 as a successor of BTR, a UK-based company that was sold to another investment company in United States. Xerium is the leading machine clothing and roll cover manufacturing company. Their products are used in paper-making and other industrial sectors. Along with the previous subsidiaries, in 2005 Xerium acquired manufacturing units in Canada, Germany, and Mexico. In 2007, Xerium also purchased a manufacturing unit in China. Thus, Xerium expanded its market and now acts as a major player in the global market (United States Security Exchange Commission (2005-2009)).

Company 4: Albany International Corp.

Albany International Corp. was founded in 1895. In 1972, Albany International Corp. became a public limited company by offering its stock to the public. Albany is involved in machine clothing, especially for industries. Even though Albany had subsidiaries in Canada, the United States, and various European countries before its public offering, the company acquired more subsidiaries in Canada, Germany, and Mexico in 1976. In 1994, it also acquired a manufacturing unit in China, reaching the Asian market. Albany International Corp. is now
operating as a leading company for industrial textiles in the global market (United States Security Exchange Commission (1993-2009)).

**Company 5: Berkshire Hathaway Inc.**

Johns Manville Corp., a Berkshire Hathaway company has been producing textile products since 1858. Johns Manville Corp., a public limited company, was purchased by Berkshire Hathaway Inc. in 2001. Johns Manville produces textile products that are used for roofing, insulation, and other industrial purposes. Johns Manville established its subsidiaries worldwide, acquiring manufacturing units in Canada in 1955, Mexico in 1962, Germany in 1971, and China in 1995. Thus, Johns Manville was the pioneer among the selected textile companies in establishing its root in foreign countries (United States Security Exchange Commission (1993-2009)).

**Company 6: International Textile Group**

International Textile Group (ITG) is a major textile-based company in the United States serving diverse customers. ITG was founded in 2004 in Greensboro, North Carolina to combine Burlington industries and Cone mills. In 2005, it acquired Safety Components along with its subsidiaries. Safety Components Inc. had been a public limited company since 1996. By 2005, Safety Components had acquired manufacturing units in different countries. It acquired units in Mexico in 1993, China in 1995, and Germany in 1996. ITG serves customers in Canada, but the company does not own any physical industrial plants there (United States Security Exchange Commission (1996-2009)).

**Company 7: Ruddick Corp.**

Ruddick Corp., is a Harris Teeter public limited company with diverse operations. American and Efird Inc. (A&E) is a part of the company that produces yarn and thread. In 1968,

**Market Expansion of the Selected Companies**

The trends of the companies’ market expansion are presented in the Figure 1 chart (see page 32). The trend line shows each company’s entry into each country. According to the chart, the U.S. textile multinational companies entered the selected countries in the order of Canada, Mexico, Germany, and China. Each of these companies started their market expansion during different time periods. These companies started subsidiary branches in Canada and Mexico from 1950-2005, whereas they reached Germany from 1970-2005. China is the country with the most recent market expansion, i.e. from 1990-2005. The foreign subsidiaries of these companies are analyzed further in this study. Hypothesis 1 and Hypothesis 2 are studied further with the help of the collected data.

**Hypothesis#1**

**H0: The factors of Porter’s model have no significant relationship with research and development expenditure for each of the selected countries.**

Today, U.S. textile multinational companies are operating in foreign markets in addition to the home market. According to the scholars, Michael E. Porter and James E. Austin, a foreign market and a home market differ with respect to environmental conditions including economic; demand; related and supporting industries; firm strategy, structure, and rivalry; political; cultural; and demographic factors. Each of the environmental conditions will be studied and scrutinized below for the selected countries.
Porter’s Model

In 1985, Michael E. Porter proposed a model for the competitive advantage of different countries using six factors, namely the factor condition; the demand condition; related and supporting industries; context for firm strategy and rivalry; government and chance. In this study, Porter’s model is analyzed by estimating the relationship with the R&D expenditure of each country. The stepwise regression analysis is used for finding the factors affecting the selection of a country for market expansion. The diagram below explains Porter’s model.

Figure 2. Porter’s Diamond model (1985).

Factor Conditions

According to Porter’s model, the factor condition of a sample country is measured by human resources, physical resources, knowledge resources, capital resources, and infrastructure. In this study, the R&D expenditure of each country is assigned to be a dependent variable. Factor conditions including cotton production, wool production, number of laborers, electricity, water supply, seaports, airports, paved roadways, and Internet usage are assigned as independent
variables. Stepwise multiple regression analysis is used for measuring the relationship between R&D and factor conditions for each of the countries. The findings from the stepwise regression analysis are tabulated below in Table 3.

1. **Canada.** The result of the stepwise multiple regression analysis shows that 69.0% (Model 1) and 78.6% (Model 2) of the variability in the percentage of R&D expenditure of Canada from 1990-2009 was explained by factor conditions. Thus, the result showed a strong relationship between R&D expenditure and factor conditions.

   In Model 1, the $p$-value shows that the model is significant ($F(1,10)=25.43$, $p<0.005$). Water availability is the significant variable ($\beta=0.847$, $p<0.005$) from Model 1 of Canada (Canada 1). Hence, the change in the Water availability results in the change of R&D expenditure.

Table 3

*Stepwise Regression Analysis for Factor Condition in Porter’s Model*

<table>
<thead>
<tr>
<th>Country</th>
<th>$R^2$</th>
<th>$F$</th>
<th>Degree of freedom</th>
<th>$p$-value</th>
<th>$\beta$</th>
<th>Variable included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada 1</td>
<td>0.69</td>
<td>25.43</td>
<td>1,10</td>
<td>0.0010</td>
<td>0.847</td>
<td>Water availability</td>
</tr>
<tr>
<td>Canada 2</td>
<td>0.786</td>
<td>21.197</td>
<td>2,9</td>
<td>&lt;0.0001</td>
<td>0.927</td>
<td>Water availability, airport</td>
</tr>
<tr>
<td>China</td>
<td>0.827</td>
<td>43.88</td>
<td>1,8</td>
<td>&lt;0.0001</td>
<td>0.92</td>
<td>Electricity production</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.886</td>
<td>86.168</td>
<td>1,10</td>
<td>&lt;0.0001</td>
<td>0.947</td>
<td>Internet users</td>
</tr>
<tr>
<td>Germany</td>
<td>0.604</td>
<td>17.785</td>
<td>1,10</td>
<td>0.00200</td>
<td>-0.8</td>
<td>Wool production</td>
</tr>
</tbody>
</table>
In Model 2, the $p$-value shows its significance ($F (2, 9) = 21.197, p<0.0001$). Water availability ($\beta=0.927, p<0.0001$) and the availability of airports ($\beta=0.337, p<0.05$) in Canada are the significant variables. The result shows that change in Water availability and the number of airports causes the change in the R&D expenditure value.

2. **China.** In the case of China, the result of the stepwise multiple regression analysis indicates that the variability in the percentage of R&D expenditure from 1990-2009 was explained by the factor conditions. Thus, the result showed a strong relationship between the R&D expenditure and factor conditions.

    In this model, 82.7% of variability in the R&D expenditure was explained by factor conditions. The $p$-value of the China model shows that it is significant ($F (1, 8) =43.88, p<0.0001$). Electricity production is the significant variable ($\beta=0.92, p<0.0001$) from the model of China. Hence, the change in the electricity production results in the change of R&D expenditure.

3. **Mexico.** In the case of Mexico, the multiple regression analysis showed a strong relationship between expenditure on R&D and factor conditions. According to the analysis, 88.6% of the variability in the percentage of R&D expenditure from 1990-2009 was explained by the factor conditions. The result indicates the model is significant ($F (1, 10) =86.168, p<0.0005$). The % of Internet users ($\beta=0.947, p<0.005$) is the significant variable in the model. Hence, a change in the percentage of Internet users results in a change in R&D expenditure.
4. **Germany.** The stepwise multiple regression analysis signifies a strong relationship between expenditure on R&D and factor conditions. In the Germany model, 60.4% of the variability in the percentage of R&D expenditure from 1990-2009 was explained by the factor conditions. The result shows that the model is significant ($F(1, 10) = 17.785, p < 0.0005$). Wool production is the significant variable in this model ($\beta = -0.800, p < 0.0005$). According to the result, a change in the value of wool production causes a change in the value of R&D expenditure.

According to Table 3, R&D expenditure by business sector depends on one of the variables of economic factor. The $\rho$-value of the best fit models shows that there is significant evidence for the R&D expenditure to depend on economic factor. Hence, the economic factors have significant relationship with research and development expenditure for each of the selected countries. As the result, the null hypothesis can be rejected.

**Demand Conditions**

As per the definition, demand conditions are analyzed by characteristics of the buyers’ needs. Most of the products are used for industrial purposes. The total number of establishments in the manufacturing sectors of each country will assure the market for the companies. On the other hand, the export value of each of the countries shown below will describe the increase in the need of the product from foreign markets.
The above graph represents the number of manufacturing companies in the respective countries from 1990-2009. China and Canada are the countries with increasing trend lines, which implies an increase in demand for industrial textiles in the local markets. In contrast, the trend line of Germany shows a decrease in the number of establishments from 2002, which indicates a decrease in local demand. Among the selected countries, Mexico is the only country with a steady trend line, implying consistent demand. According to the graph, the countries are ranked based on the number of manufacturing establishments in the respective order: China, Germany, Canada, and Mexico. In conclusion, China is the leading country with the greatest increasing local demand.

The local demand is controlled by an individual country, whereas the global demand is the main reason for market expansion. The export value of each of the countries will describe the trend of global demand for the specific country’s product.
The above graph presents the trend lines of export values of the industrial textiles in each of the countries. In the early 1990s (1990-1995), Germany was the leading exporter of industrial textiles goods whereas other countries shared lower rankings in export values. From 2000, the export value of China began increasing, and by 2006, China became the leading exporter of industrial textiles.

Among the four countries, the export values of Mexico and Canada have shown consistent trend lines without any vast changes in the graph. This reveals that there is constant demand for products from Canada, Mexico, and Germany whereas there has been an increase in demand for products from China since 2000.

The demand conditions are studied using the number of manufacturing companies and export value in each of the selected countries. As the trend line graph shows, China ranks first among the countries with the highest local and foreign demand for industrial textiles.

*Figure 4. Export values of technical textile goods (HS 59) from 1990-2009.*
From figure 5, the constant demand conditions of Canada and Germany have shown significant effect on R&D expenditure. On the other hand, the constant demand condition of Mexico shows an increase in effect for R&D expenditure. In case of China, the trend of demand condition indicates the increase in R&D expenditure.

For Canada and Germany, the demand condition of the product has a significant relationship with research and development expenditure for both the selected countries. Therefore, the null hypothesis can be rejected for Canada and Germany.

**Related and Supporting Industries**

The related and supporting industries of each of the companies differ as per the end-use of the product. U.S. textile industries have developed a wide range of markets such as medical-textiles, geo-textiles, industrial-textiles, and home-textiles. These selected companies are producing products to reach industrial customers. Thus, all the manufacturing companies are
considered to be supporting industries. The trend lines of the number of manufacturing companies in each of the countries are presented in Figure 3 (see page 39).

The graph from Figure 3 represents the number of manufacturing companies in the respective countries from 1990-2009. The trend line of the manufacturing companies directly implies the increase or decrease in related or supporting industries. Thus, related and supporting industries in Canada and China have been increasing from 2000 as compared to Mexico and Germany. The decreasing trend line of Germany indicates the fall of related or supporting industries.

According to Figure 3 and Figure 5, the related and supporting industries of Canada and Germany are directly related to the R&D expenditure by business sector. In case of China and Mexico, there is no significant relation between the R&D expenditure and the supporting industries. Therefore, the null hypothesis can be rejected only for Canada and Germany.

Firm Strategy, Structure, and Rivalry

A firm chooses its goal, strategy, and organizational pattern according to its domestic rivalry (Porter, 1998). Each of the selected companies operates in a specific location and serves a specific business segment. Hence, the competition for each of the firms is decided by the regional firm and international firm serving the business operation. The strategy and rivalry of each of the selected firms are examined more thoroughly below.

Company 1: Unifi Inc. Unifi Inc. is involved in the manufacturing of polyester and nylon textured yarns. Unifi Inc. generally operates in the U.S. and a few foreign nations. Hence, Unifi Inc. competes with U.S. manufacturers, U.S. importers, and international yarn manufacturers. According to Unifi Inc., the company competes with its rivals in price, product quality, and customer service. Unifi Inc. has adopted a corporate business structure that is
governed by the Chairman of the Board of Directors, the President, Vice Presidents, and Chief Executive Officers. The company follows its strategy to improve operation efficiency and price reduction. The business strategy is chosen to target its competitors in the U.S., the NAFTA (North-American Free Trade Agreement) region, and the CAFTA (United States-Dominican Republic-Central America Free Trade Agreement) region (United States Security Exchange Commission (1994-2009)).

**Company 2: Polymer Group Inc.** PGI is a manufacturer and supplier of nonwoven products that are used in different business segments. PGI owns 13 manufacturing units in nine countries serving customers around the globe. The company participates in different markets for different nations. Hence, the competitors of PGI include manufacturers of engineered materials in regional and international markets for specific applications. Various business strategies including global presence, innovation, operational excellence, and customer satisfaction have been chosen by PGI to compete in its business markets. PGI follows a corporate business structure that consists of the President, the Executive Vice President, Senior Vice Presidents (Global Supply Chain, Human Resources, Asia, Americas, Europe, Information Technology, General Counsel, and Secretary) and Directors. PGI participates in market expansion as a part of its business strategy (United States Security Exchange Commission (1997-2009)).

**Company 3: Xerium Technologies Inc.** Xerium Technologies Inc. is a multinational company that manufactures clothing and roll covers. The products are primarily used in paper-making machines. The company operates throughout the American continents and in Asia-Pacific regions. Hence, it competes with regional and global companies with similar operations. Business strategies including acquisition, product development, and workforce engagement are applied for competitiveness. Xerium Technologies Inc. functions in a corporate business
structure that is governed by the Chairman, Executive Vice Presidents, a President for each continent, and Directors. Xerium Technologies Inc. uses its business strategy and structure to compete with its rivals (United States Security Exchange Commission (2005-2009)).

**Company 4: Albany International Corp.** Albany International Corp. is a multinational company manufacturing advanced textile products for different applications. It operates in North America, Europe, South America, and Asia. Albany International Corp. competes with companies of similar operation from subsidiary markets and international markets. Albany International Corp. uses business strategies including reductions in price, technology services, and customer service to compete with its rivals. The company functions with a corporate business structure featuring executives including the Chairman, the Vice Chairman, Senior Vice Presidents, Presidents, Directors, an Associate General Counsel, and the Assistant Secretary. Albany International Corp. benefits from global marketing and stabilizes its presence through its strategy and business structure (United States Security Exchange Commission (1993-2009)).

**Company 5: Berkshire Hathaway Inc.** In 2000, Berkshire Hathaway Inc. purchased Johns Manville Corp. and hence adopted Johns Manville’s business segments. Johns Manville Corp. manufactures insulation and building products. Johns Manville operates in North America, Europe, and China and owns 40 manufacturing facilities. Johns Manville competes with other textile manufacturers in the respective regional markets of its subsidiaries as well as the global market. Various business strategies were introduced by the company to address product value, product diversification, customization, and the extent of the product line. The Chairman, Senior Vice President, Vice President, and Chief Executive Officers form the corporate business structure of Johns Manville (United States Security Exchange Commission (1993-2009)).
**Company 6: International Textile Group (ITG).** ITG manufactures and markets different textile products for diverse markets. ITG operates in North America, South America, Asia, and Europe. Price, product quality, reliability, and capability to produce high volume are the challenges faced by ITG in the global market. Business strategies were introduced at different time periods to overcome these challenges. Acquisition, geographical diversification, and vertical integration are considered to be important business strategies for ITG to compete in its market. The company operates in a corporate business structure with the help of executives including the Chairman, Managing Directors, and Chief Executive Officers. Thus, the business strategy and business structure help International Textile Group to compete with its rivals (United States Security Exchange Commission (1996-2009)).

**Company 7: Ruddick Corp.** Ruddick Corp. manufactures sewing thread, embroidery thread, and technical textiles after its acquisition of American & Efird Inc. Ruddick Corp. participates in the United States and the global market with the sale of textile goods to specific business segments. Hence, it competes within these markets with respect to the application of its product. Product development, distribution, marketing, and price of raw materials are critical for its competitiveness, and the company devises its business strategy to overcome these factors. The President, the Chairman, Executive Vice Presidents, the Vice President, the Secretary, the Assistant Treasurer, and the Chairman of its alliances form the corporate business structure. The business structure and strategy are important criteria for the administration of the firm as well as its competitiveness (United States Security Exchange Commission (1994-2009)).

According to the reports of the companies, the firm analyses its strategy for competing with its rivalry. As the R&D expenditure directly related to product innovation, the strategy of the selected companies contribute to the R&D expenditure of their firm. Hence, the firm strategy,
structure and rivalry have significant relationship with research and development expenditure for each of the selected countries. As the result, the null hypothesis can be rejected.

**Government**

The government factor of each of the countries is studied by examining the type of government and trade agreements. The type of government of each of the selected countries from 1990-2009 is presented in Table 4.

Table 4

*Type of Government of the Selected Countries 1990-2009*

<table>
<thead>
<tr>
<th>Country</th>
<th>Type of Government, 1990-2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Communist state</td>
</tr>
<tr>
<td>Germany</td>
<td>Federal republic</td>
</tr>
<tr>
<td>Mexico</td>
<td>Federal republic</td>
</tr>
<tr>
<td>Canada</td>
<td>A parliamentary democracy, a federation, and commonwealth realm</td>
</tr>
<tr>
<td>United States</td>
<td>Constitution-based federal republic</td>
</tr>
</tbody>
</table>

Source: World Factbook, Central Intelligence Agency (1990-2009)

By definition, a federal republic government has the power vested with voters, restricting power to the central government. On the other hand, a parliamentary democracy government is formed by members of the legislative body who in turn are selected by the voters. In a federation system of government, the power lies with the regional or state provinces for internal affairs. Commonwealth realms are those in which the nation or state is combined by law for the common good. A Communist state has a single-party government that emphasizes rules.

As shown in Table 4, Germany and Mexico are ruled by a federal republic form of government similar to the United States. Canada adopted the parliamentary democratic system of
government from the United Kingdom, hence differing from the government type of the United States. In contrast, China practices a Communist state of government, which is quite different from the governance of all the other selected countries.

Trade agreements are the second variable category chosen to analyze the political condition of the selected countries. The General Agreement on Trade and Tariff (GATT), the Multi-Fiber Arrangement (MFA), and the North American Free Trade Agreement (NAFTA) are the multilateral trade agreements signed by the selected countries with the United States.

NAFTA is the trade agreement signed by Canada and Mexico with the United States on December 22, 1995. According to NAFTA, the products of textile are qualified for duty-free trade between these countries. Hence, the industrial textiles from Canada and Mexico are traded without taxes.

GATT is the multilateral trading agreement signed in 1947 by eight countries. GATT was later replaced by WTO (World trade Organization) on 1995. MFA, which was signed by GATT members in 1974, remained operative until 1994. MFA reduced tariffs and removed quotas for the member countries on textile products. The United States, Canada, Mexico, and Germany were the members of GATT and WTO. Hence Canada, Mexico, and Germany exported textile goods with tariff reduction.

China is the only non-member of GATT and hence experienced trade restrictions and tariff as an unfavorable country until 1994. MFA was terminated in 1994, and the trade restrictions on textile goods were liberalized on WTO member countries. In 2001, China became a member of the World Trade Organization. After 1994, China continued to be a favorable country for tariff reduction until today.
In conclusion, since 2001, the selected countries have traded with the United States as favorable countries that enjoy tariff reductions. From 1990-1994, China was the only country to experience trade restriction while other countries traded with the United States as mutual beneficiaries.

According to the results, the type of government and trade agreement were favorable for Canada, Germany and Mexico until now. By comparing the trade agreement and the trend of R&D expenditure from Figure 5, the favorable trade agreements of the China and Mexico match with their increase in R&D expenditure. On the other hand, the trade agreement of Canada and Germany help them to maintain their leading position.

Even though the type of government has no significant effect on R&D expenditure; the trade agreements show significant effect on R&D expenditure for the selected countries. Hence, null hypothesis is rejected.

Chances

By definition, the chances of the respective country include climatic, economic, and unpredictable changes that affect market conditions. According to International Labor Organization, world recession started in 2007 for the reason of U.S. financial crisis, but the inflation reached the global market by mid 2008 (Verick & Islam, 2010). For the period of 1990-2009, global recession is not considered for evaluation. In total, a drastic climatic and economic changes were not recorded for the selected countries from 1990-2009. Hence, chance factors are excluded from the model for this study.

According to Porter’s Diamond model (1985), the selection criteria of a multinational company are studied using six factors namely, factor condition; demand condition; related and supporting industries; firm strategy, structure and rivalry; Government; and Chances. In this
study, Porter’s model is successfully applied for U.S. textile multinational companies using the above results. With the help of the results, Porter’s Diamond model is a good fit for Canada and Germany, the results show that there is significant effect between R&D expenditure and factors namely factor condition; demand condition, related industries; firm strategy and rivalry; and government type. Factor condition and trade agreement are also proved significant for China and Mexico. In conclusion, Porter’s Diamond model is the successful model for selecting subsidiaries in developed countries. Therefore, Null Hypothesis 1 is rejected.

Hypothesis #2

H0: The environmental framework of Austin’s model have no significant relationship between research and development expenditure for each of the selected developing countries.

Austin’s Environmental Analysis Framework

In 1990, James E. Austin introduced the Environmental Analysis Framework (EAF) for studying the market conditions in developing countries. The framework includes four factors, namely economic, political, cultural, and demographic factors. The diagram below represents Austin’s framework.
Economic Factors

According to Austin’s framework, economic factors are composed of natural resources, labor, capital, infrastructure, and technology. In this study, the R&D expenditure of each of the countries is assigned as a dependent variable. Factor conditions including cotton production, wool production, number of laborers, electricity, water supply, seaport, airport, paved roadways, and Internet usage are assigned as independent variables. Stepwise multiple regression analysis is used for measuring the relationship between R&D against factor conditions for each of the countries. The findings from the stepwise regression analysis are presented in Table 2.

The result are evaluated same as the factor conditions of Porter’s model. Hence, the economic condition is true for all the selected countries. The null hypothesis is rejected for economic factors of selected countries.
Political Factor

The political factor of each of the countries is studied by examining the type of government and trade agreements. The type of government of each of the countries from 1990-2009 is presented in Table 4. The result are evaluated same as the government factor of Porter’s model.

The government type is significant factor for R&D expenditure in Mexico. On the other hand, trade agreement is significant effect on R&D expenditure of China and Mexico. Therefore, the political factor of Austin’s framework has significant relationship between research and development expenditure for China and Mexico.

Cultural Factors

In this study, the cultural factors including language, religion, and working hours of a country are evaluated. The languages and religions of the selected countries are listed below in Table 5. The language and major religion of each country was accurate to date. Among the listed countries, Canada is the only country which shares an official language with the United States. In contrast, China, Germany, and Mexico use Mandarin, German, and Spanish as their respective official languages.

Religion is the second variable for analyzing cultural factors. Table 5 reveals that Christianity is the major religion in Germany, Mexico, and Canada. Hence, these countries observe the same religion as the United States. China is a nonreligious country, so it differs from the rest of the countries.
Table 5

*Languages and Religions in the Countries 1990-2009*

<table>
<thead>
<tr>
<th>Country</th>
<th>Language</th>
<th>Religion</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Mandarin, others</td>
<td>Nonreligious</td>
</tr>
<tr>
<td>Germany</td>
<td>German</td>
<td>Christianity</td>
</tr>
<tr>
<td>Mexico</td>
<td>Spanish</td>
<td>Christianity</td>
</tr>
<tr>
<td>Canada</td>
<td>English, French</td>
<td>Christianity</td>
</tr>
</tbody>
</table>


*Figure 7.* Number of working hours in selected countries compared with the U.S. from 1990-2009.

Source: ILO (1990-2009)
The working hours in the countries are analyzed in Figure 7 above. The average number of working hours of manufacturing workers in the United States is 40-45 hours per week. The above graph shows that the average number of working hours for workers in Canada and Germany is 35-40 hours per week, whereas workers in Mexico and China average 45-50 hours per week.

In conclusion, Canada is the only country that shares both a common language and religion with the United States. Germany and Mexico share a major religion with the United States but differ in the primary language. China differs from the United States with respect to both language and religion. In general, the working hours of the countries differ from the United States by only 5 hours.

From the above results, the language and religion factor has no significant effect on their R&D expenditure whereas the number of working hours shows positive effect on their R&D expenditure. Thus, the cultural factor of Austin’s framework has significant relationship between research and development expenditure. According to above conclusion, the null hypothesis is rejected.

**Demographic Factors**

Demographic factors of the selected countries are studied using the number of laborers and the level of education. R&D expenditure is used as a dependent variable, while the number of laborers and the number of tertiary education graduates are included as independent variables. The results are tabulated in Table 6.
### Table 6

*Stepwise Regression Analysis of Demographic Factor in Austin’s Framework*

<table>
<thead>
<tr>
<th>Country</th>
<th>R²</th>
<th>F</th>
<th>Degree of Freedom</th>
<th>p-value</th>
<th>β</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>0.724</td>
<td>32.428</td>
<td>1,11</td>
<td>&lt;0.0001</td>
<td>-0.864</td>
<td>education</td>
</tr>
<tr>
<td>China 1</td>
<td>0.844</td>
<td>55.222</td>
<td>1,9</td>
<td>&lt;0.0001</td>
<td>0.927</td>
<td>education</td>
</tr>
<tr>
<td>China 2</td>
<td>0.896</td>
<td>44.145</td>
<td>2,8</td>
<td>&lt;0.050</td>
<td>-0.307</td>
<td>labor</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.883</td>
<td>91.908</td>
<td>1,11</td>
<td>&lt;0.0001</td>
<td>0.945</td>
<td>education</td>
</tr>
<tr>
<td>Germany 1</td>
<td>0.427</td>
<td>9.947</td>
<td>1,11</td>
<td>&lt;0.0001</td>
<td>-0.689</td>
<td>labor</td>
</tr>
<tr>
<td>Germany 2</td>
<td>0.663</td>
<td>12.818</td>
<td>2,10</td>
<td>&lt;0.050</td>
<td>-1.346</td>
<td>labor, education</td>
</tr>
</tbody>
</table>

**Canada.** According to the model, 72.4% of the variability in the percentage of R&D expenditure of Canada from 1990-2009 was explained by the demographic factors. The p-value of the model shows that it is significant (F (1, 11) =32.428, p<0.0001). Tertiary education attainment is the significant variable (β=-.864, p<0.0005) from the model of Canada. Hence, a change in the tertiary education attainment results in a change of R&D value.

**China.** In Model 1, 84.4% of the variability in the percentage of R&D expenditure of China from 1990-2009 was explained by the demographic factors. The p-value of the model shows that it is significant (F (1, 8) =55.222, p<0.0001). Tertiary education attainment is the significant variable (β=.927, p<0.0001) from Model 1 of
China. Hence, a change in the tertiary education attainment results in a change of R&D value.

In the case of Model 2, only 89.6% of the variability in the percentage of R&D expenditure of China from 1990-2009 was explained by the demographic factors. The $p$-value of the model shows that it is significant ($F (2, 8) = 44.145, p < 0.0001$). Tertiary education attainment ($\beta = -1.120, p < 0.0001$) and the number of laborers ($\beta = -0.307, p < 0.05$) are the significant variables from Model 2 of China. Hence, a change in the tertiary education attainment and labor availability result in a change of R&D value.

**Mexico.** In this model, 88.3% of the variability in the percentage of R&D expenditure of Mexico from 1990-2009 was explained by the demographic factors. The $p$-value of the model shows that it is significant ($F (1, 11) = 91.908, p < 0.0001$). Tertiary education attainment is the significant variable ($\beta = -0.689, p < 0.0001$) from the model of Mexico. Hence, a change in the tertiary education attainment results in a change of R&D value.

**Germany.** The stepwise regression analysis of demographic factors resulted in two models. According to stepwise regression analysis, 42.7% of the variability in the percentage of R&D expenditure of Germany from 1990-2009 was explained by the demographic factors. The $p$-value of the Model 1 shows that it is significant ($F (1, 11) = 9.947, p < 0.0005$). Number of labors is the significant variable ($\beta = -0.689, p < 0.0001$) from the model of Germany. Hence, a change in the number of labors results in a change of R&D value.

In the case of Model 2, only 66.3% of the variability in the percentage of R&D expenditure of Germany from 1990-2009 was explained by the demographic factors. The
$p$-value of the model shows that it is significant ($F (2, 9) = 12.818, p < 0.0005$). Tertiary education attainment ($\beta = -1.346, p < 0.005$) and the number of laborers ($C = -.822, p < 0.05$) are the significant variables from Model 2 of Germany. Hence, changes in tertiary education attainment and labor availability result in a change of R&D value.

Table 7

*Result of Austin’s Framework*

<table>
<thead>
<tr>
<th>Countries</th>
<th>Wool production</th>
<th>Number of labors</th>
<th>Electricity production</th>
<th>Water availability</th>
<th>Airport</th>
<th>Internet</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>-0.307**</td>
<td>0.92*</td>
<td></td>
<td>0.927*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td>0.947*</td>
<td>0.945*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>-0.8**</td>
<td>-0.689*</td>
<td></td>
<td>-0.822**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td>0.847**</td>
<td>0.337**</td>
<td>-0.864*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: * $p < .001$
** $p < .05$

From the Table 7, $\beta$- value of each of the variables can be compared for selected countries. The results from Table 7 prove R&D expenditure of selected countries depend on economic and demographic factors of their respective land. The political and cultural factors of the China and Mexico show significant effect on R&D expenditure of their respective country. Thus, the environmental framework of Austin’s model has significant relationship between research and development expenditure for China and Mexico. The Null Hypothesis 2 is rejected with the help of this study.
Model selection for countries

In this study, selected countries are analyzed using Porter’s model and Austin’s framework separately. Various factors are used to study each of the models. The data collected from different governmental sources are applied to these factors and studied quantitatively and qualitatively.

In the case of Porter’s model, each country is studied using factor conditions; demand conditions; related and supporting industries; firm strategy, structure, and rivalry; government; and chances. Factor conditions are analyzed by applying stepwise multiple regression analysis using SPSS while other factors are studied by trend lines and qualitative analysis. Porter’s model includes firm-specific factors in addition to country-specific factors. Developed countries function with better environmental conditions. Hence, these developed countries need to be analyzed with respect to the individual firm’s operation. In conclusion, Porter’s model explains the situation of developed countries and helps us understand the environmental factors of Germany and Canada.

In the case of Austin’s framework, each of the countries is studied using economic, political, cultural, and demographic factors. Stepwise regression analysis is applied to study economic and demographic factors. Cultural and political factors of Austin’s framework are studied by descriptive analysis. In this, China and Mexico are considered as developing countries. According to Austin’s model, the environment factors of the country are studied with the help of country-specific data excluding the firm-specific factors. Hence, these countries are studied using Austin’s framework.
The t-test result of R&D expenditure by business sector of the selected countries shows that the R&D expenditure of Germany is greater than Canada ($t(13)=-14.739, p<0.001$). China and Mexico also showed similar result to that of the other countries. There was a significant difference in R&D expenditure ($t(13)=23.746, p<0.001$) of China and Mexico. The t-test of R&D expenditure from China and Canada shows no significance ($t(13)=-1.023, p=.325$). Thus, the R&D expenditure of China and Canada are equal. In conclusion, the t-test result from Table 8 shows that there is significant difference in the R&D of China, Canada, Mexico and Germany. The difference in R&D expenditure of the selected countries signifies the countries are different from each other. Hence, for this study, the countries are categorized according to the status of their economies.
Chapter 5

Conclusion and Discussion

Multinational corporations have been important factors of foreign investment in the U.S. textile industry since 1930. In the present economy, market expansion to foreign nations is an essential strategy of multinational firms. Many scholars have attempted to study the behavior of these multinationals and proposed models for improving the market expansions strategy. Porter and Austin were two of the scholars who established models for choosing countries for market expansion. In this study, these models are applied to U.S. textile MNCs that were selected using Uniworld Business Publications Inc., the only publisher of multinational companies’ business information. According to Uniworld, there are 29 U.S. multinational companies which are involved in textile manufacturing along with other product production. Of them in a public limited companies, seven were selected for this study due to availability of data.

In this study, seven U.S. multinational companies are analyzed for the foreign subsidiaries specialized mainly in textile products with industrial end-use. These companies operate in 59 countries for manufacturing or other facilities. This study examines the firms’ criteria for selecting certain countries as subsidiaries. Canada, China, Germany, and Mexico are the countries with the highest number of U.S. subsidiary companies participating in textiles production. Hence, these countries are examined in this study.

Porter’s model and Austin’s framework are applied to these selected countries and selected firms in this study. The data of the firms are collected from the SEC filings from 1990-2009. The countries are analyzed by using data from the UN (United Nation), ILO (International
According to Porter’s model, the competitive advantages of different countries are analyzed using six factors, namely the factor condition; the demand condition; related/supporting industries; context for firm strategy and rivalry; government; and chances. In this study, factor condition is evaluated using stepwise regression analysis while other factors are evaluated by descriptive analysis.

In the case of Austin’s framework, the competitive advantages of the countries are analyzed using four factors, namely economic, political, cultural, and demographic factors. Economic and demographic factors are evaluated using stepwise regression analysis. Political and cultural factors are evaluated using descriptive analysis.

The selected companies participate mainly in manufacturing textiles which are specifically used for industrial purposes. The SEC filings of the selected companies from 1990-2009 also denote product innovation as one of the common strategies of the companies. The companies also specify R&D to be an important reason for acquisitions. According to Jones (2005), research and development of the subsidiaries of a parent company is a significant component of market expansion. The selected U.S. multinational companies are assumed to be participating fully in technology-driven industry. Thus, the R&D of business enterprises in selected countries is used as a dependent variable to study the choice of the country. Hypothesis
1 and Hypothesis 2 are proposed and studied for evaluating the R&D ventures of companies in different countries.

According to Hypothesis 1, 

*Null Hypothesis 1: The factors of Porter’s model have no significant relationship between research and development expenditure for each of the selected developed countries.*

In Porter’s model, factor conditions are evaluated quantitatively using stepwise regression analysis with R&D of business enterprise in selected countries. The number of laborers, cotton production, wool production, electricity consumption, water availability, number of seaports, number of airports, percentage of paved roads, and percentage of Internet users are considered as independent variables for the analysis. The demand conditions, related and supporting industries, and government are evaluated using descriptive analysis. The strategy, structure, and rivalry of the companies are consistent for the selected country, and there are no drastic natural or induced changes in the selected countries. Hence, the firm context and chances are excluded from Porter’s model in this study.

According to the results of Canada, changes in the water supply and the number of airports result in a change in R&D expenditure. Hence, the choice of multinational companies depends on water supply and the number of airports in the case of factor conditions. The descriptive analyses of demand conditions and supporting industries show that Canada has less advantage for industrial textiles than China and Germany. On the other hand, the demand condition and supporting industries of Canada are higher compared with the conditions of Mexico. The government and trade agreements provide privilege to Canada. In conclusion, Canada is an attractive location for R&D expenditure due to factors including water supply, airports and government.
From the results of China, the R&D expenditure of businesses depends on electricity consumption in the country. Hence, the electricity consumption is chosen as the factor condition for the choice of textile multinational companies. The descriptive analyses of demand conditions and supporting industries indicate that China has an advantage over the other three countries. The type of government has been functioning as a disadvantage for China until today. Trade agreements were unfavorable for China until 1994. In 1995, China became a member of WTO and attained favorable trade benefits. According to Porter’s model, the textile multinational companies choose China for R&D investment as the result of electricity consumption, demand conditions, and supporting industries, but China may not be the choice of a company due to government and trade agreements.

The result of the factor condition for Germany shows that R&D expenditure depends on the wool production of the country. The demand condition and supporting industries of Germany are more favorable than Canada and Mexico, but the conditions of Germany are less favorable than China. The type of government is similar to that of the United States, and trade agreements have privileged Germany as the most favorable country with tariff reductions to this day. Thus, Germany is a suitable location for R&D investment as a result of advantages in wool production, government, and trade agreements. Compared to China, the demand condition and supporting industries of Germany need to be improved to attract U.S. foreign investment.

Mexico is the fourth country in our study. According to the result of regression analysis for the factor condition, R&D expenditure depends on the percentage of Internet users in Mexico. The descriptive analysis of the demand condition and supporting industries indicate that Mexico is the least favorable location compared to the other selected countries. However, the type of government and trade agreements both support the market expansion of U.S.
multinational companies. In conclusion, Mexico has a comparative advantage over other countries due to Internet usage and government, but it is the least favorable location for R&D investment of U.S. multinational companies with respect to the other factors.

Porter’s model is a valuable concept for studying the market expansion for developed countries. The selected countries are evaluated using the factor condition, the demand condition, related and supporting industries, government, and chances. Even though Porter’s model helped us understand the market expansion to Germany and Canada, the result of the model neglected the social factors including language, religion, and working hours. The social factors play major role in developing countries compared to the firm-specific factors. To address this lack, the selected countries are studied using Austin’s framework for developing countries to include the social factors.

According to Hypothesis 2,

*Null Hypothesis 2*: The environmental framework of Austin’s model have no significant relationship between research and development expenditure for each of the selected developing countries.

Austin introduced the environmental analysis framework (EAF) for studying the market conditions in developing countries. In this study, Austin’s framework is primarily concerned with Mexico and China. The framework included four factors, namely economic, political, cultural, and demographic factors. Stepwise regression analysis is used to measure the economic and demographic factors, while descriptive analysis is used for studying the political and cultural factors of Austin’s framework. The economic and demographic factors are evaluated by using R&D expenditure by business enterprises in each country as a dependent variable. The variables including the number of laborers, cotton production, wool production, electricity consumption,
water availability, number of seaports, number of airports, percentage of paved roads, and percentage of Internet users are considered as independent variables for the economic factor. The number of laborers and number of individuals competing tertiary education are used as independent variables for the demographic factor. The result of countries’ analyses are evaluated and described below.

From the result of Canada’s economic factor, R&D expenditure of the companies depended mainly on water availability and the number of airports. The political factor of Canada provides the most favorable condition for U.S. multinational companies. Canada is the only selected country with a preferable cultural factor. The demographic variables are not a significant factor for R&D expenditure in Canada. Therefore, the R&D expenditure of Canada greatly depends on water availability, the number of airports, the political factor, and the cultural factor.

Next, China is studied by applying Austin’s framework. According to the result of the economic factor in this model, the R&D expenditure of China significantly depends on the electricity consumption of the country. The type of government was different from the other selected countries and the United States. The trade agreements of China were favorable as a result of its entry to WTO in 2001. The cultural factors of China including language, religion, and working hours are diverse from the other countries under study. the tertiary education level of the China also acts as the factor for R&D expenditure. According to Austin’s framework, China is a suitable location for R&D investment due to electricity consumption, trade agreements, and tertiary education level.

Germany is the third country under examination. The analysis for the economic factor indicates that the R&D expenditure of business enterprises in Germany depends on wool production. Hence, the seven selected companies based on wool production consider Germany as
one of important location to open its subsidiary. The descriptive analysis of the government type and trade agreements shows that Germany is favorable for R&D investment. Even though the main language is different from that of the United States, the religion and working hours are comparable with other selected countries and the United States. According to the result of the demographic factor analysis, the tertiary education attainment in Germany also affects the R&D expenditure. Hence, Germany is a suitable location for R&D investment because of its wool production, political factors, and tertiary education attainment.

In the case of Mexico, the analysis of the economic factor proves that R&D expenditure in the country depends on the percentage of Internet usage. The political factor is the same as that of Canada and the United States. The main language and working hours in Mexico differ from those of the United States. Therefore, the cultural factor is not favorable for R&D expenditure. The regression analysis of the demographic factor shows that R&D expenditure depends on tertiary education attainment in Mexico. In conclusion, Mexico is a suitable location for R&D investment based on Internet usage, political factors, and tertiary education attainment.

Austin’s framework assists researchers in studying the factors influencing market expansion. In this study, economic, political, cultural, and demographic factors are examined for each of the selected countries.

Porter’s model suggests that Canada (for water supply, airports, and government), China (for electricity consumption, demand condition, and supporting industries), and Germany (for wool production, government, and trade agreements) are suitable locations for research and development. Canada, China and Germany depend on the country specific factors and firm specific factors. Hence, Porter’s model clearly explains the developed countries in this study.
In the case of Austin’s framework, the countries are examined for economic, political, cultural, and demographic factors. According to the framework, China and Mexico are the least favorable countries for R&D investment due to cultural and demographic factors. Hence, the developing countries are studied effectively using Austin’s framework. China is considered an industrialized country due to its aspects of developed and developing country. Hence industrialized countries like China need to be studied by both Porter and Austin’s model for better clarification (see Table 6, page 53).

The location decisions of multinational companies have been studied by a number of scholars in the past (Cantwell, 2009; Enright, 2009). Porter’s diamond model and Austin’s Environmental Analysis Framework have been used by scholars for studying the location selection of multinational companies (Curran, 2001; Haley, 2000; Jin, 2003; Karanasios, 2008; Liu et al., 2010; Ng, 2009; Shafaei, 2009; Watchravesringkan et al, 2010; Wu, 2007). In this study, these theories are successfully implemented to evaluate the location decision of U.S. textile manufacturing companies.

According to the previous studies, Porter’s diamond model was studied for analyzing specific industries in particular country. Several of scholars applied Porter’s model to study the competitive advantage or to select locations for various industries such as Iranian textile industry (Shafaei, 2009), Chinese medicine industry (Liu, 2010), UK higher education (Curran, 2001), Indian dry ports (Ng, 2009), and Taiwan hospitals (Wu, 2007). Porter’s model was created for developed country and it is necessary to verify the model before applying for a specific industry. Thus, this study has confirmed the application of Porter’s model for the U.S. textile industry. In the case of Austin’s environmental framework, it has already been applied to study the cotton export from developing countries by Jin (2003) but the results were not compared with the
Porter’s model. Hence this study has verified two different models for developed and developing countries. Even though studies are performed on different industries, this work specializes in a technology based industry such as textile industry. Thus, this research work will be unique with respect to the location of subsidiaries, location of ownership, and the industry itself.

This study has also proven that Porter’s model and Austin’s framework are important tools for studying location selection in both developed and developing countries. Canada, China, Mexico, and Germany have been analyzed for multinational subsidiaries using these models. The results have shown that Porter’s model can be used for studying Canada and Germany while Austin’s framework can be used for China and Mexico. According to the findings of past studies, the location for research and development is an important strategy of multinational firms. The acquisitions for R&D are stated as knowledge-based market expansion (Jones, 1996). In this study, the effects of the environmental conditions of each country have been studied against research and development expenditure in these countries. According to the scholar Athukorala, the R&D expenditure of the country results in the location decision of the knowledge-based acquisition of multinational firms (Athukorala, 2010). Hence, the environmental factors of the countries proved to be important factors for selecting subsidiaries by high-technology U.S. textile companies who manufacture industrial textile goods.

In conclusion, the market expansions of multinational companies have been studied by a number of scholars in the past. This study adds to that body of literature and serves as an important analysis tool for the location decisions of U.S. textile multinational companies when selecting subsidiaries.
Limitations

The dataset of the study are assumed to be reliable and chosen from normally distributed population. In this study, the sample countries and sample companies are selected according to the availability of data. Hence the study has limitation with respect to sample size and population. The Chances factor of world recession (2009) did not affect the other variables or dataset of the study. Hence, the world recession of 2008 is not considered for the study due to the selected time series i.e. 1990-2009.

Recommendations and future research

In future, the textile companies can examine the models used in this study to evaluate their choice of country for launching their subsidiaries in foreign markets. U.S. textile multinational companies mainly manufacture industrial textile products for global market. Hence, this study can be applied for evaluating high-technology industries. Labor-intensive industries could be studied by selecting appropriate variables, and future studies could be performed using different models or different countries.
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