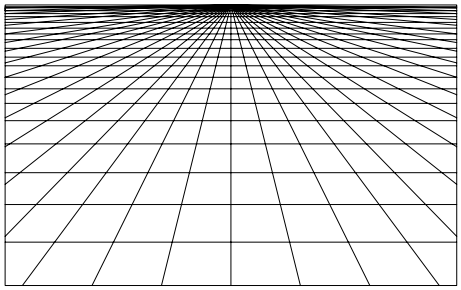
University of Oslo
Faculty of Social Sciences
Centre for technology, innovation and culture

Istanbul Technical University
Institute of Social Sciences
http://atlas.cc.itu.edu.tr/~sosbil



ESST

The European Inter-University Association on Society, Science and Technology
http://www.esst.uio.no

The ESST MA

Network Interactions in a Developing Country: a Turkish Case Study

Thomas Engedahl Brunsnes
University of Oslo / Istanbul Technical University
Building and Maintaining Life in the Development Process
Supervisor: Hacer Ansal
2004

Word count: 18 639

Key words:
national systems of innovation (NSI),
networks,
technological capabilities,
foreign direct investment (FDI),
Turkey

"People of the same trade seldom meet together, even for merriment and diversion, but the conception ends in a conspiracy against the public or in some contrivance to raise prices."

Adam Smith, "The Wealth of Nations"

Acknowledgments

First and foremost I wish to thank my supervisor, Prof. Dr. Hacer Ansal at Istanbul Technical University for the help and guidance provided throughout the work. Secondly, I wish to thank the contact persons and the interviewees from the researched company, although they most go unnamed. Thirdly, I thank the administrative ESST personnel at both the universities of Oslo and Istanbul for helping with the practical problems that arose. I also wish to thank my friends and flatmates in Istanbul for fruitful comments and discussions and for providing a good working environment. Finally, I wish to thank my friends back home in Norway for easing the transition from a city with millions of people to a city with millions of cows.

Thomas Engedahl Brunsnes (sign.)

Lund, Sweden, 21.09.2004

By using a case study approach this thesis wishes to study the interactions of a foreign company with a developing system of innovation and the possible affects on the technical capabilities in this system.

This research question springs out of combining two strands of theory, namely the National Systems of Innovation approach and the technology gap approach to technological and economic development. Both these approaches focus on the importance of learning in order to maintain growth (in the system approach to increase innovativeness, in the gap approach to technologically catch up with developed countries). Combining these two strands lead to one main assumption in this thesis: Foreign companies (being results of foreign direct investments) will often hold a central position in the innovation system of a developing country. Due to the links with the global company and the naturally higher resources for knowledge creation (in the conglomerate as aggregate) such companies are more likely than not to obtain favourable knowledge position compared to their surroundings. It is thus important to see how such companies interact with the domestic surroundings. Foreign direct investments do of course present financial gains to the host country, but more important is the potential for knowledge spillovers which in turn may increase the technological capabilities of the domestic system of innovation.

The empirical findings in this paper suggest that this particular company has virtually no direct connections with the Turkish system of innovation. There was no cooperation with either competitors or knowledge producers in order to improve product and technology development. There is little knowledge spillovers resulting from company employees' changing of jobs. No consolatory services are offered to Turkish universities, and the main proportion of further education is performed abroad. The company employs no

Turkish suppliers, and the linkage to its customers is mostly done on a financial reporting and paying basis. The analysis of this paper thus concludes that the company due to its size is a rather central actor in the Turkish economy, but due to its network linkages a rather weak actor in the Turkish system of innovation.

The discussion part of this thesis discusses potential policy measures that could amend the weaknesses discovered in the analysis. The measures are grouped in enabling and motivating measures; but without giving a full answer to what group fits most closely to the researched company.

III LIST OF FIGURES

IV LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 Purpose of the Study

The justification for this thesis is a combination of two strands of theory. Firstly, the National Systems of Innovation approach states that innovation is a major force behind economic growth, that innovation occurs as a result of the interplay of several different actors, and that (interactive) learning is a prerequisite for innovation. Secondly, development studies concern, among other things, the impact of the presence of foreign companies (foreign direct investment) on a host country's development and introduces the gap in technological capabilities as an explanation for diverging rates of development. Both strands of theory include considerations on how government policies can influence the rate and direction of technological and economic growth.

Consequently this thesis studies the Turkish subsidiary of a foreign company. Interviews with company representatives explore how the company relate to other agents such as customers, suppliers, national universities, and domestic competitors. The purpose of these investigations (and the theoretical foundations laid out) is to analyse the effects this foreign company has on the Turkish system of innovation. I seek to discuss to what extent and in what quality national technical capabilities are affected by the company's interaction with its surroundings.

1.2 Limitations of the Study

Firstly, the discussions in this thesis are implicitly based on the assumption that a developing country should strive for economic growth, and that innovation is the main driver behind this growth. Even though it is not discussed further in the remainder of this paper, I wish to emphasize that economic growth is not a sufficient precondition for development (Johnson & Lundvall, 2003). Economic growth is part of the "development process"[1], but only part[2].

Secondly, the thesis is built around the National Systems of Innovation theoretical framework. This approach was originally developed as a consequence of studies of predominantly developed countries. It is thus not necessarily correct to assume it to be a viable approach when studying a developing country (Katz, 1993; Arocena & Sutz, 1999). However, recent literature focuses on the need for diversified development strategies, depending on national particularities (e.g. Lall, 1998; UNCTAD, 2003); particularities that very well might be connected to the theoretical constructs of the National Systems of Innovation approach. I thus find no need to disagree with Shulin Gu who states that the system approach to innovation studies may in fact be even more viable and important for studies of developing countries, even though it should involve some methodological amendments (Gu, 1999).

Thirdly, the level of analysis was chosen to be the company. This is not the most usual level of study in the national system of innovation approach (which often focuses on the macro level). I have chosen this level in accordance with for instance CIRCLE at Lund University who states that the firm is a very central learning agent in the system of innovation

[1] Using the term "development process" presents pitfalls of its own. See (Göle, 2000).
[2] For instance, the World Bank uses 50 development indicators, of which eleven are related to economic growth (central government debt, commercial service exports, current revenue, exports of goods and services, foreign direct investment, gross domestic product, gross net income, GNI/capita, inflation consumer prices, manufactures exports, and market capitalization of listed companies). Others include education level (ten indicators) and employment structure (twelve indicators). Source: http://publications.worldbank.org/subscriptions/WDI/

(CIRCLE, 2004) and Shulin Gu that emphasizes the need to study the sub-components in order to really understand a complex system (Gu, 1999).

Finally, the scale and scope of this thesis is such that a full discussion of possible implications of the empirical findings is not viable. I will briefly mention some possible policy actions, but I will refrain from giving more tangible recommendations as this would be both overly ambitious and very superfluous.

1.3 Structure of the Study

This document consists of three main parts; one theoretical, one descriptive, and one normative. Chapter 2 ("Theoretical Foundations") deals with the theoretical constructs this thesis is built on and motivated by; namely the national system of innovation and technology gap approaches to technological and economic growth. The first has a focus on interactions within a given system, often a nation, while the latter focuses on the importance of international cooperation (in order to enable the technological catching-up of developing countries). However, these two theoretical constructs build on common assumptions and chapter 2.7 tries to unite them into one theoretical basis.

Chapter 3 gives a brief presentation of the Turkish system of innovation, in order to contextualize the forthcoming discussions and analysis. Chapter 4 introduces the company that was chosen as the case study and presents the information on network interactions that was obtained from the interviews (and it thus constitutes the descriptive part of the thesis). Chapters 5 and 6 make out the normative part of the study. Chapter 5 discusses the findings presented in chapter 4 and draws some conclusions on what affect the company's network conduct may have on the development of Turkey's domestic technical capabilities (and implicitly the ability to catch-up technologically). Chapter 6 concludes the paper and draws

up some possible policy implications of this study's findings and analysis and suggests some areas for future research interest.

CHAPTER 2

THEORETICAL FOUNDATIONS

This chapter introduces the theoretical material studied as background for this thesis. The constructs presented here will develop the basis for forthcoming discussions and analysis. Chapter 2.1 introduces the concept of a national system of innovation, while chapters 2.2, 2.3, and 2.4 discuss two of the most important components of such a system, namely network structures and interactive learning. Chapter 2.5 introduces the second main strand of theory this thesis rests on; the technology gap approach to economic and technological development. Chapter 2.5.1 takes a closer look on foreign direct investments; a mode of technologically catching up that, in addition to being very relevant for this thesis due to the chosen case company, is viewed as being particularly important to developing countries. Chapter 2.6 describes some policy implications and justifications, with a particular focus on policies for network formation, learning, and foreign direct investments. Chapter 2.7 unites the two theoretical constructs to create an analytic foundation for later discussions, and chapter 2.8 deals with the methodological issues behind this study.

2.1 Defining a National System of Innovation

The National System of Innovation (henceforth NSI) approach is among concepts that have emerged as critic reactions to four pillars in classical economics thinking (evolutionary economics and neuro economics[3] being other examples). Firstly, the classical line focuses on the single profit maximising company. Secondly, technology and knowledge are seen as a publicly available exogenous variable. Thirdly, economic agents act on rationality alone and based on perfect information. And finally, the relationship between science, technology and market is seen as strictly linear and causal (as depicted in the linear model of innovation shown in Figure 1.1). Empirical evidence on innovation clearly contradicts these views, with abundant examples of firm collaboration, tacit knowledge elements embedded in technology, high failure rates in product development and launching, and interactive processes of innovation with extensive use of feedback and return loops.

The term 'national system of innovation' was first widely introduced in modern time by Christopher Freeman in a description of the Japanese production system (Freeman, 1987) (the term was used in a more narrowly published booklet by Bengt-Åke Lundvall two years earlier (Lundvall, 1985)). The concept has since then rapidly gained ground, with an extensive adoption among academicians as well as among practitioners (the OECD adopted the concept as early as 1991 (Edquist, 1997)). This rapid growth has, naturally, lead to an overwhelming number of publications and it is, consequently, impossible within the scale and scope of this paper to give a full account of the development[4].

[3] Neuro economics challenges classic economics on the level of individual behaviour, studying behaviour classic economics would deem as irrational economical behaviour in particular. The research led to Daniel Kahneman and Vernon L. Smith receiving the Nobel Price in Economy in 2002. Source: The Nobel Foundation, http://www.nobel.se.

[4] Interested readers are referred to (Edquist, 1997) and (Lundvall et al, 2002).

Although it would be appropriate to provide an exact definition of an NSI, this proves as hard as one could expect. Numerous attempts have been made, starting with Freeman's "The network of institutions in the public- and private-sectors whose activities and interactions initiate, import, modify and diffuse new technologies" (Freeman, 1987, p. 1). Lundvall defines it as "The elements and relationships which interact in the production, diffusion and use of new, and economically useful knowledge […] and are either located within or rooted inside the borders of a nation state"[5] (Niosi, 2002, p. 292). I will try to summarize these definitions by discussing the three terms 'national', 'system', and 'innovation' individually.

Lundvall's definition uses "[…] the borders of a nation state" to limit the system of interest, in accordance with the empirical findings of Nelson and Rosenberg (1993) and Patel and Pavitt (1994). Other theorists suggests that 'regional systems of innovation' (Maskell & Malmberg, 1999; Cooke & Shcienstock, 2000), 'technological systems' (Carlsson & Jacobsson, 1997), or 'sectoral systems of innovation' (Breschi & Malerba, 1997) would be more fitting limits. These suggestions should however be viewed as complementary rather than opposing approaches; practitioners will most likely have to consider a number of levels of innovation systems. Central contributors to the field of NSI such as Bengt-Åke Lundvall, Björn Johnson, Esben Sloth Andersen, Bent Dalum (Lundvall, 1992; Lundvall et al, 2002), and Charles Edquist (1997) all emphasize the need for a flexible and pragmatic definition of the limits of the system. Rather than agreeing upon one single definition, a given study should include in and limit the concept in accordance with the interest of that study. This paper intends to study network interactions in a system of innovation and the consequences for technological capabilities and innovation policies in a developing country. Hence, using

[5] Other suggestions include Nelson and Rosenberg (1993), Edquist and Lundvall (1993), Niosi and colleagues (1993), Patel and Pavitt (1994), Metcalfe (1995), and Edquist (2003).

the national borders of Turkey as a spatial limit for the system would be the most fitting choice.

Using the term 'system' indicates that the concept of an NSI assumes a number of components. Among the components included in the various definitions are institutions (Freeman, 1987; Nelson & Rosenberg, 1993), elements and relationships (Lundvall, 2002), and formal institutions and organisations (Niosi, 2002). The pragmatic approach is truly being followed, and it seems that definitions have been made in accordance with the purpose of the study in question. Synthesising the various definitions, it seems plausible to borrow terms from a chemical reaction in order to describe the components of the innovation system. A definition would thus include agents, interactions, catalysts and outcomes. Firstly, agents include profit and non-profit, governmental and private, and individual and organisational entities (e.g. firms, universities and non-governmental interest organisations). Secondly, interactions imply the flow of financial and non-financial resources, tacit and codified knowledge, quantitative and qualitative information, and policies between the agents. Thirdly, catalysts are the culturally dependent "set of habits, routines, rules, norms and laws, which regulate the relations between people, and shape social interaction" (Johnson, 1992, p. 26)[6]. Finally, the possible outcomes would encompass individual and organisational learning, technological and organisational innovation, and the acceptance and diffusion of these innovations.

[6] The use of 'catalyst' may be a little misleading, as institutions in a national system of innovation may both facilitate and prohibit change to occur (cf. Bower & Christensen, 1995; Edquist, 1997; Sull, 1999).

'Innovation' points to the purpose of the concept: describing processes of innovation. If the definitions of NSI are numerous, it pales in comparison with the number of definitions of innovation[7]. Faced with this dazzling multiplicity, I choose to follow the originator of the term, Joseph Schumpeter, and say that an innovation is (Schumpeter, 1939, pp. 87-8)

> […] The setting up of a new production function. This covers the case of a new commodity as well as those of a new form of organisation such as a merger, of the opening up of new markets, and so on […] innovation combines factors in a new way, or that it consists in the carrying out of New Combinations.

This definition encompasses product ("a new commodity") and organisational ("a new form of organisation") innovations[8].

2.2 Network Interaction Arrangements

As mentioned earlier, the NSI approach was conceived as a more sophisticated alternative to the view on innovation processes in classical economic thinking. The concept of a firm innovating in isolation and the causal model of the relationship between science, technology and market were among the thoughts criticized. The simplicity (innovation is just a change in the input/output ratio, and the more money in science, the more products available in the market place) of these two models are of course appealing, as it enables the analysis of technological development strictly in terms of financial models.

---

[7] E.g. Ansoff (1957), Mintzberg (1979), Souder (1983), Page (1991), Lundvall (1992), Cooper (1993), and Nelson and Rosenberg (1993).

[8] Some critic has been directed towards Schumpeter's definition, saying that it doesn't include the diffusion of the innovation. I choose to use his definition despite this critic, as empirical findings have shown that a new product may have learning effects without being adopted on a large scale; in fact the lack of adoption might be what facilitates learning from the innovation (Kogut & Kulatilaka, 1994; McGrath, 1999).

The linear model of innovation is depicted in Figure 2.1. Basic research discovers scientific facts, which in turn are applied in applied research to solve a given problem. Based on applied research, a product is developed and produced, and finally sold to the user society. No returns to prior development stages are allowed, and each stage functions as a single source input/output transforming function. This is clearly a much too simplistic and technologically deterministic view on how innovation processes work in reality. Such strict causality rarely takes place in real life, and the chain-linked model of innovation developed by Kline and Rosenberg (1986) is accepted as a more realistic view on how innovation processes may occur.

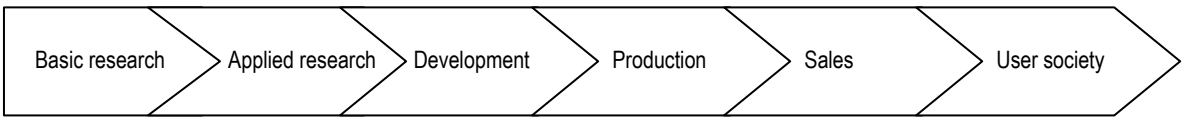


Figure 2.1: The Linear Model of Innovation (Adapted from Bush, 1945)

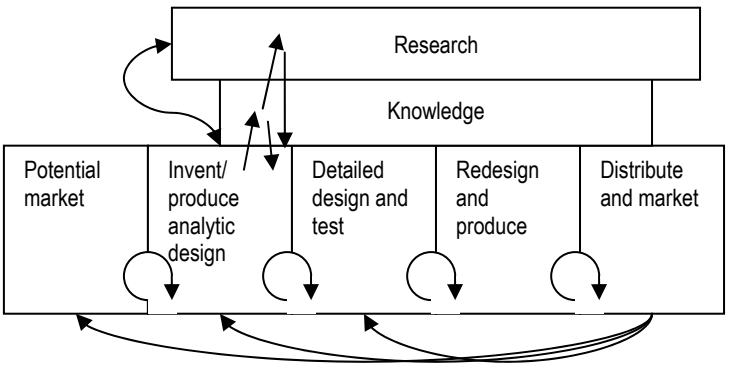


Figure 2.2: The Chain-Linked Model of Innovation (Kline & Rosenberg, 1986)

In the chain-linked model, innovation might be initiated by the market (potential market) as well as motivated by technology (analytic design), and it thus allows for both push and pull innovations. The process is allowed to start in a number of phases, as well as being able to retrace its step and revisit former phases (thus eliminating the strong causality in the linear model). The role of research and scientific knowledge is radically different from the linear model, depicting three possible routes for the development of an innovation.

- The innovation might be based on existing knowledge, with no need for research being performed.
- A search in the base of knowledge might reveal that research is necessary before resuming development.
- Research might be initiated without conferring the knowledge base.

As well as being a more viable alternative to the linear model of innovation, the chain-linked model also shows the interactive nature of innovation; a nature that has been stressed in a number of additional publications[9]. However, there is no unanimous agreement in the literature on what form these interactions may take. The origin of the term was a study of user-producer interaction (Lundvall, 1985)[10], implying that using a chained user-producer approach would be viable (a user served by multiple producers and in turn being a producer to multiple users). Another plausible approach would be using theories on strategic alliances between complementary firms where companies interact based on a scarcity of crucial resources (Jarillo, 1988; Teece, 1988; Chesbrough & Teece, 2002). A third approach would be using Michael Porter's (1985) model of competitive forces, which include five generic classes of possible interaction agents (Figure 2.3), as the starting ground. Fourthly, it would be possible to use the chain-linked model of innovation, which inherently allows firm-government, and firm-market interaction. All the models mentioned allows for innovation and product development to be seen as a process influenced by a number of sources.

[9] E.g. Teece (1988), von Hippel (1988), Lundvall and colleagues (2002), Edquist (2003), and Niosi (2003).
[10] This relationship has also been stressed by other publications, for instance Jorde and Teece (1998), Lundvall (1999), Edquist and colleagues (2000), and Gadde and Håkansson (2001).

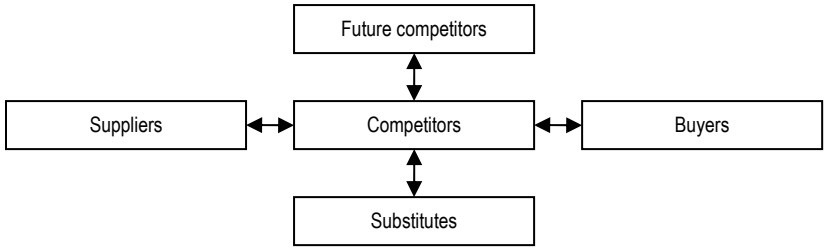


Figure 2.3: Porter's Five Forces of Competition (Porter, 1985)

However, none of the approaches subsumes all strong aspects of the others and none of them can be used in isolation. The chained user-producer approach and the chain-linked model of innovation do not explicitly include horizontal cooperation between competing firms. Strategic alliances and the competitive forces do not explicitly include cooperation between knowledge producing non-profit organisations and firms.

In their report on seven research projects in the Targeted Socio-Economic Research Programme (henceforth TSER) of the European Union, Bengt-Åke Lundvall and Susan Borrås state that interaction might take the form of horizontal cooperation or vertical linkage. Horizontal cooperation between competing firms or between firms and research centres is mainly done for R&D purposes, while vertical linkages between users and producers are mainly used as a means of improving process and product innovation capabilities (Lundvall & Borrås, 1997). This approach unites all the four previously mentioned models of interaction, and I will group the following discussion according to it.

2.2.1 Horizontal Cooperation

Horizontal cooperation can be seen in Figure 2.2 as the interaction with research and knowledge, as well as in the 'future competitors–competitors–substitutes' axis in Figure 2.3. In accordance with Lundvall and Borrås's understanding of the concept, this suggests two generic forms of horizontal cooperation arrangements. The existence and importance of collaboration have been thoroughly established in the literature[11].

2.2.1.1 Horizontal Firm-Firm Cooperation

Horizontal firm-firm cooperation most commonly takes place in the research and/or development phase of new products or technologies, while the commercialization of the results is left to the individual venture partners (Mowery & Rosenberg, 1989; Lundvall & Borrås, 1997). The rationale for such cooperation arrangements can be found in three trademarks of modern industries. Firstly, new products are increasingly multi-disciplinary (e.g. the merger of communication and information technologies). The fact that successful product development in a number of industries necessarily have to involve knowledge about a number of basic sciences, applied technologies, and market and organisations renders it virtually impossible for companies to undertake complex product development on their own[12]. Secondly, product development in a number of industries is so financially demanding that single companies don't want to undertake the capital risks themselves (Lundvall & Borrås, 1997). Thirdly, joint research efforts with other companies (as well as with

[11] See Cohen and Levinthal (1990), Cooke and Schienstock (1996), Lundvall (1999), or Edquist and colleagues (2000) for the firm-firm linkage. Edquist (1997), Jorde and Teece (1998), Sivadas and Dwyer (2000), Lundvall and colleagues (2002), and Niosi (2003) deal with the firm-knowledge producer linkages.

[12] See Lundvall (1999), Sivadas and Dwyer (2000), or Niosi (2003). Considering these propositions however, the findings of Link (1987) that joint research ventures is most common in industries involving mature technologies are quite surprising.

universities and research centres), are a means of expanding the presumably narrow technology base of individual firms, thus reducing the risk of technological lock-in (Lundvall et al, 2002). Cohen and Levinthal (Cohen & Levinthal, 1990) mentions that 'collaboration' also might take the form of interaction of the firm's absorptive capacity with competitor's involuntary knowledge spillovers. I will return to the concept of absorptive capacity when discussing learning mechanisms in an NSI.

2.2.1.2 Horizontal Firm-Knowledge Producer Cooperation

Universities and public research centres are expected to fill two functions crucial to economic growth and innovative capabilities. Firstly, they (especially universities) have a role in building general scientific and technological capabilities. This is specifically done by teaching students problem solving methods well suited for the complex situations faced in real life (Lundvall & Borrås, 1997). Secondly, as more and more technological developments rely on scientific advances, these public institutions should work as providers of more or less targeted basic research results (Cohen & Levin, 1989; Cohen & Levinthal, 1990; Lundvall & Borrås, 1997). Additionally, as firms usually follow established trajectories in order to achieve increasing returns state funded research should work as a means of challenging these established technological paths (Callon, 1993). This could be done in direct collaboration with firms, for instance through technoparks or university-located incubators, or merely filling the 'provider' function.

2.2.2 Vertical Linkages

As seen from the model in Figure 2.3, vertical (although horizontal in the model) linkages may be made upstream to buyers and users, as well as downstream to suppliers. The interaction with customers is also reflected in the chain-linked model in Figure 2.2, while supplier relationships are emphasized in theories on complementary assets and strategic alliances.

2.2.2.1 Vertical Customer Linkage[13]

A number of authors emphasize the importance of feedback from user markets as a means of developing innovative capabilities. These publications point to the customer as an important source of ideas for new products and suggest that close connections with users are necessary in order to embed customer reactions in subsequent incremental improvements of the launched product[14]. Lundvall (1987), in more detail, lists five important reasons for having relationships with company customers. Firstly, process innovations at the user level may represent a future threat. Secondly, product innovations other than the company's own developments may create a demand for new or improved complementary assets. Thirdly, context-dependent use of a product may lead to demand for improvements not projected in the initial development. Fourthly, problems or technological interdependencies may represent a possibility for new and/or interface products. And, fifthly, the competence level and learning rate of user communities will have an impact on the timing of future product releases. Government is a customer that deserves special attention. I will return to the aspect

[13] Depending on the company and industry in question, three categories may be identified; intermediate users (assemblers), distributors, and end users. The discussion is viable for all three groups.
[14] See von Hippel (1988), Jorde and Teece (1998), Lundvall (1999), Dodgson (2000), or Edquist and colleagues (2000).

of government procurement (the government acting as a demanding customer) in the section on policies.

Maintaining close customer contacts is, however, not without its obvious pitfalls. Donald Sull (1999) and Joseph Bower and Clayton Christensen (1995) show how an overly strong focus on the needs of current customers may lead to neglecting the importance of emerging technologies with initially inferior performance; in other words, being subject to a technological lock-in. This 'Dynamics of Failure' has led to the downfall of a surprisingly high number of incumbent firms faced with radical, as well as incremental innovations.

2.2.2.2 Vertical Supplier Linkage

The degree of vertically linking to suppliers has historically varied from the extreme vertical integration performed by Henry Ford, who bought forests to secure the supply of wood to his factories, to the emergence of online 'virtual companies' in recent years (Chesbrough & Teece, 2002). In the midway of these extremes, we find the traditional buyer-supplier relationship. Such relationships are established for two main reasons; firstly, an innovation is part of a system, and thus reliant on complementary assets for it to be profitable (Teece, 1988; Callon, 1993). Secondly, the fordistic extreme of vertically integrating into all these complementary assets would be unnecessarily costly and lead to organisational rigidity[15] (Teece, 1988; Lundvall & Borrås, 1997; Dodgson, 2000).

[15] According to David Teece (1988), the nature of the relationship will be dependent on the nature of the assets involved. Complementary assets may be generic, specialized or co-specialized. Generic assets are assumed to be in abundant supply where a choice among several possible suppliers is possible, and the relationship power is asymmetrically distributed favouring the buyer's side (an example being production facilities for clothing). Specialized assets tilts the relationship power to the supplier side, as the innovation relies on these assets being provided from a low number of suppliers (an example being distribution channels). Co-specialized assets distribute the relationship power symmetrically, as there is a bi-lateral dependence between the innovation and the complementary asset (an example being shock absorbers produced for a certain car model). Although these examples above are all of a technological nature, I wish to emphasize that providers of more 'soft' forms of resources (e.g. consulting agencies, advertising agencies, and marketing research institutes) also are included in the term 'suppliers'.

The importance of supplier relationships can be seen both in pull (buyer requesting) and push (supplier offering) relationships. Pull situations may arise where producers face new market demands or policy restrictions (especially in terms of environmental regulations) and consequently need new or improved functionality from technological sub-components. Relationships with providers of 'soft' resources will most often be of a pull nature, where the buyer requests information about or analysis of a particular field of interest (Lundvall, 1987).

The push relationships are more complex and sometimes quite troubling. A number of studies have shown that innovation in a supplier's product may induce innovation at the buyer's side[16]. This opening up of new design spaces is also recognized in theories of evolutionary economic growth (Perez, 1983; Freeman & Louçã 2001). However, as discussed by Rebecca Henderson and Kim Clark (1990), even a small incremental change in a product's component may lead to a reconfiguration of an established system to link together existing components in a new way (e.g. Just-in-Time production systems or Total Quality Management[17]). This phenomenon, which they label architectural innovation, has proven devastating for a number of incumbent companies. Close connections with suppliers are therefore important, not only for being aware of new design spaces, but also for architectural knowledge about the ways in which the components are integrated and linked together into a coherent whole (Henderson & Clark, 1990).

The discussion on network arrangements is summarized in Table 2.1.

[16] See Jorde and Teece (1998), Edquist and Hommen (1999), Dodgson (2000), and Gadde and Håkansson (2001).

[17] Just-in-Time production will for instance require completely new interactions between logistic and productive functions in the company, as the primary goal of the production philosophy is to eliminate unnecessary stocks. Total Quality Management will require new interaction modes between departments, as quality controls is supposed to be performed in every part of the production chain.

Table 2.1: Actors in a National System of Innovation

Linkage	Agent	Arrangements
Horizontal	Competitor	Partner for joint research ventures Voluntary and involuntary knowledge spillovers
	Universities and research centre	Provider of work force with problem solving capabilities Provider of basic scientific knowledge
Vertical	Customer	Source of product development ideas Indications of emerging markets
	Supplier	Fulfilling of buyer requests Enabling new design spaces

2.3 The Emergence and Sustainability of Networks

I have mentioned earlier in this paper that the NSI approach emerged as a reaction to classical economic thinking. The validity of the criticism is clearly evident when discussing how industry networks emerge and how they are sustained. Seeing network interactions in the light of classical game theory provides the first example. 'The Prisoner's Dilemma' is a classical game theory problem which, translated to network cooperation, is modelled with two agents. If both choose to cooperate both receive a reward. This reward is higher than what would be received if both choose not to cooperate, but less than a non-cooperating agent would get if the other chooses to cooperate. The least reward is received by a co-operator with a non-cooperating partner. In this quite realistic set-up, a perfectly rational agent would choose not to co-operate in any case[18]. If we translate this to an actual joint innovation venture, every rational partner would send their worst people, hoping that the others would send their best. But, as all actors act rationally, they all send their worst, and the risk of the venture failing would be tremendously high (Jarillo & Ricart; 1987).

[18] Given that an agent B cooperates, A will not cooperate, as the reward for (not cooperate, cooperate) is higher than (cooperate, cooperate). If B does not cooperate, A will not cooperate, as the reward for (not cooperate, not cooperate) is higher than (cooperate, not cooperate). Hence, agent A has (not cooperate) as her dominant strategy, which will lead to the highest outcome regardless of agent B's actions.

The second example is provided with respect to profit maximising agents. Given this, an innovator would always overstate the value of the innovation in order to get more favourable contractual conditions. On the other hand, their partner would, in the case of a successful innovation, always 'run away' with the technology (Teece, 1988; Sivadas & Dwyer, 2000). The third failure of classical economic thought when it comes to explaining networks is with respect to the notion of pure markets. In these pure markets, the only transmitted information is quantitative data on prices and quantities. This clearly fails to cover the need for qualitative information in order for innovations targeted at user needs to occur[19]. These three short examples, contrasted with the abundance of successful industrial relationships actually taking form, clearly show that there has to be another element involved when industry networks emerge and which helps to sustain them.

One element from the classical reasoning on networks may however be kept in consideration. Networks emerge partly as a way of reducing financial and non-financial transaction costs, and are sustained partly as a means of avoiding financial and non-financial switching costs, which will increase with the duration of the relationship (Jarillo, 1988). The 'novelty' introduced by the NSI approach is institutions guiding social conduct, where trust in particular is essential for sustained networks[20]; trust being when "one party has confidence in an exchange partner's reliability and integrity" (Morgan & Hunt, 1994, p. 23). This notion is not entirely new though, and it may have been inspired by the works of Aldrich and Wetten (1981) and Emerson and Cook (1984) which focused on the importance of confidence and social ties in networks.

[19] Given this assumption, producers will have no information about user needs, and users will have no information on the use-value of products. Successful innovation would, under such conditions, be extremely rare (Edquist & Hommen, 1999; Lundvall et al, 2002).
[20] Among these are Edquist (1997), Lundvall (1999), Sivadas and Dwyer (2000), Gadde and Håkansson (2001), and Holmen and colleagues (2003).

Another important social value that enables the emergence and sustainability of networks is shared symbolic and oral languages and explanatory schemes[21]. This feature, which beyond doubt is culturally and geographically dependent, would explain why some research show that the strength of networks are positively correlated with geographical co-location (Håkansson & Wootz, 1975; Lundvall & Borrås, 1997).

Other important features of a network are an asymmetry of power or knowledge (Polyani, 1958; Lundvall, 1998) and reciprocal exchange of complementary assets (Håkansson & Snoheta, 1995; Lundvall & Borrås, 1997; Sivadas & Dwyer, 2000). The probability of fruitful interactive learning occurring is high, given that the network relationship shows sign of trust (in order to believe the involved information), involves a shared language (in order to communicate properly and on shared grounds), has an asymmetry of power or knowledge (in order to create a master-apprentice relationship), and reciprocal exchange (in order to avoid freeloading members who would undermine the trust).

2.4 Interactive Learning

This far it has been established that the NSI approach views interactions as essential to agents' learning of innovative capabilities. Consequently, this part of the paper will focus on mechanisms of interactive learning in greater detail[22].

Arocena and Sutz (2003, pp. 309-310) coin the concept of interactive learning spaces, which they define as "[…] situations in which different actors are able to strengthen their capacities to learn while interacting in the search for the solution to a given problem". I have previously discussed who these actors may be, and which interactive situations they

[21] Cohen and Levinthal (1990) and Lundvall and Borrås (1997).
[22] This section deals exclusively with learning on an organisational level. It should however be emphasized, in accordance with Mahoney (1995) and Nonaka and Takeuchi (1995), that organisations learn through their individual members. Furthermore, learning is fairly well debated as a psychological topic, e.g. Skinner (1969) or Argyris (1993).

may mutually construct. What will be discussed here is thus the actual activity of learning. From Arocena and Sutz's definition it seems proper to distinguish between two forms of learning; learning aimed at increasing problem solving capacity and learning aimed at increasing learning capacity. Edquist and Johnson (1997), in accordance, mentions the ability to utilize knowledge and absorption of externally created knowledge among the competencies required from innovative firms. Discussing the impact of primary education, Fagerberg (1995) states that education is associated with learning to learn and should be backed up with more practically guided on-the-job training. Lundvall (1998) refers to know-what, know-why, know-how, and know-who; the three former being equivalent with Edquist and Johnson's ability to utilize knowledge and the latter to the absorption of knowledge.

This taxonomy of learning activities is well in accordance with the classical writing of Argyris and Schön (1978) who, studying organisational learning, found learning to be either single or double looped. Single looped learning involves obtaining and creating knowledge in order to solve specific problems within the current belief paradigm. Double looped learning involves upsetting current or creating new paradigms (schemata or mental models). Although not as frequently mentioned, Argyris and Schön also used the concept of deutero learning; increasing learning capabilities by learning.

A separation between tacit and codified elements of knowledge can be deduced from the five examples given above[23]. This separation, originally made by Polyani (1966), also stands central in Nonaka and Takeuchi's (1995) theory on knowledge creation in organisations[24]. They claim that innovating organisations do not simply process external information (outside in) in order to solve problems, but in fact also create new knowledge (inside out) to redefine problems and re-create their environment. This dynamic leads to the

[23] Tacit knowledge is personal, context-specific, and therefore hard to formalize and communicate. Codified knowledge, on the other hand, refers to knowledge that is transmittable in formal language.
[24] This framework is particularly interesting in the context of this paper, due to (1) the theory being a result of studies of Japanese companies, and (2) network interactions frequently being mentioned as one of the prime sources of Japanese competitive advantage.

identification of four different learning typologies, which interact in a knowledge creating spiral. These are (1) socialization (tacit to tacit)[25], (2) externalization (tacit to codified), (3) combination (codified to codified), and (4) internalization (codified to tacit). The authors themselves hold externalization to be the key of organisational knowledge creation; a process that is facilitated with the use of metaphors, analogies and models. Nonaka and Takeuchi's theory is thus similar to the thoughts of the NSI approach, in that these metaphors and models are similar to institutions, and in the emphasis on interaction (learning mode 1 and 2) as a source of knowledge crucial to innovation.

Wesley Cohen and Daniel Levinthal's theory on the absorptive capacity of firms (Cohen & Levinthal, 1990) should also be mentioned in this context. Cohen and Levinthal agree with the path dependency notion in the NSI approach, as they define absorptive capacity with[26]

> We argue that the ability to evaluate and utilize outside knowledge is largely a function of the level of prior related knowledge […] prior related knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends. These abilities collectively constitute what we call a firm's 'absorptive capacity'[27].

This would suggest that the common notion of knowledge spill-overs as a virtually costless vehicle for knowledge transfer is, to some extent, false. Knowledge spill-overs and their possible absorption should in this sense also be viewed as a part of the interactive learning complex.

---

[25] Nonaka and Takeuchi (1995, p. 64) claim that "[…] interactions with customers before product development [...] are, in fact, a never-ending process of sharing tacit knowledge and creating ideas for development". These ideas must however to some extent be externalized in order to be a useful source of innovation.

[26] [article read in HTML format; accurate page numbering not available]

[27] Absorptive capacity is thus an important pro to consider research in a firm and in a nation as an investment rather than a cost, both in relation to own future research and to external research.

2.5 The Particular Case of Developing Countries: The Catching-Up Problem

Although there is disagreement concerning what 'development' constitutes and what strategies are better in order to achieve it, most people will agree that some countries are less developed than others. This thesis concerns the case of Turkey, a country which, according to the frequently used definition of gross net income per capita[28], is developing[29]. This section of the document will consequently treat some of the particular issues faced by developing countries.

Classical economics focuses on input prices, leading to low labour costs, as the main focus for developing countries. 'Getting the prices right' will lead to the country increasing its income level, and thus developmental stage. However, the struggle of sub-Saharan countries[30] (which have significantly lower wage levels than the rapidly developing East Asian countries) clearly indicates that the picture is more complex. The technology gap approach offers a more feasible answer to the development divergence of the countries of the world.

[28] GNI/capita is defined as "the gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad.". Source: http://publications.worldbank.org/subscriptions/WDI/

[29] The World Bank classifies countries in four categories; low income (for 2003 less than 735 USD), lower middle income (736-2935 USD), upper middle income (2936-9075 USD), and high income (more than 9075 USD). The three former categories are defined to be emerging economies, or developing countries. Turkey's GNI/capita was in 2001 estimated to 2500 USD. Source: http://publications.worldbank.org/subscriptions/WDI/

[30] In 2002, of the world's 24 least developed countries (GNI/capita less than 280 USD), 21 were sub-Saharan (Burkina Faso, Burundi, Central African Republic, Chad, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ghana, Guinea-Bissau, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Tanzania, Togo and Uganda). The only exceptions were Cambodia, Nepal and Tajikistan. Source: http://publications.worldbank.org/subscriptions/WDI/

The technology gap approach can be said to rest upon four main hypothesises, all of which are empirically investigated and to a satisfactory extent proven (Fagerberg, 1987):

- A country's economic and technological development levels are closely co-related.
- The rate of economic growth is positively co-related to the rate of growth in technological level.
- Countries at the lower end of the gap can increase its economic growth through technological imitation ('catching-up').
- The rate of catching-up depends on the mobilization of resources for transforming social, institutional and economic structures.

Hypothesises one, two and four offers a theoretical connection between the technology gap approach and the NSI approach; there is a focus on technological growth as an important force of economic growth, and the scope of mechanisms behind technological growth are concerned to be very wide. It thus remains in this part of the document to further explore the concept of imitation or transfer of technology, which predominantly is seen as the initiator of technological progress in developing countries (Shin, 1996).

Given the classical assumption of technology as a commodity resembling a public good would render discussions on the catching up process unnecessary. In this case, technology is freely available to everyone and catching up would merely be a matter of time. However, it has long been established that international technology transfer in fact is associated with considerable costs. The cost structure depends on the type of technology transferred and the mode in which it is transferred, but regarding technology to have zero social and economic cost is utterly false (Teece, 1977). There are numerous possibilities for how technology may be transferred, but the most important and comprehensive is foreign

direct investment (it is also the most relevant for this thesis). Other modes include contractual agreements (licensing and franchising), exporting and more informal modes such as published scientific material (Tatoglu et al, 2003).

Foreign direct investment (henceforth FDI) comprises wholly owned subsidiaries or joint ventures with foreign involvement. It is thus a more stable form of capital inflows than portfolio investments and loans, with a longer time horizon and placing larger proportions of risk on the foreign investor (Dutz et al, 2003).The choice of equity from the multinational firm is said to rest on four considerations (Tatoglu et al, 2003):

- Transaction cost – The ownership percentage is optimized to minimize transaction costs.
- Locational and internationalization advantages – Minimizing negotiation costs, ensuring adequate quality control, avoiding the risk of dissipation of knowledge, and avoiding property right enforcement costs.
- Bargaining power – Relative bargaining power between the multinational and the host government.
- Organisational capabilities – Contributions and demands placed on capabilities in the host country division.

Tatoglu and colleagues (2003) found that foreign ownership in Turkish manufacturing industry was positively co-related to very high (or very low) industry concentration, operational similarity with the mother company, cultural proximity, and use-intensity of natural resources. Traditionally, FDI inflows to African countries have rested on the size of the domestic market and the presence of important natural resources. Jacques Morisset claims, however, that African countries that employ policies to improve their business climate are increasingly viewed as more attractive recipient of foreign capital (Morisset,

2000). This clearly indicates that the level of foreign equity a country would receive largely depends on its perceived system of innovation. Particularly aspects two and four mentioned above rely on the level of capabilities in domestic firms and knowledge producers in the host country. I will shortly return more closely to this when discussing technological capabilities.

2.5.1 Foreign Direct Investments (FDI)

Global FDI amounted in 2002 to 651 billion USD31, the grand share flowing between developed countries (16 of the top 25 recipient countries are developed, see Table 2.2 with developing countries in italics, and developing countries received only 29% of total investments) (AT Kearney, 2003; UNCTAD, 2004a). However, FDI accounted for the largest share of capital inflows to developing countries in the 1990s, and it is expected to increase both its relative and absolute importance further in coming decades (AT Kearney, 2003; UNCTAD, 2004a). As it includes the actual establishment of a transnational corporation in the host country, FDI is frequently regarded to be the technology transfer mode with the strongest effects on the host country's economic development. Such effects may include technology spillovers, human capital formation, increased productivity in domestic industry, and increased demand for products of local suppliers (in turn leading to increased employment) (UNCTAD, 1994; UNCTAD 2002; Lall, 1995; McKinsey, 2002; Dutz et al, 2003). These effects are however not automatic, and the positive importance of FDI relies heavily on the technological capabilities in a national system of innovation.

Table 2.2: Top 25 Receivers of FDI in 1998, million $

United States	193 375
United Kingdom	63 124
China	*45 460*
Netherlands	31 859
Brazil	*28 718*
France	28 039
Belgium/Luxembourg	20 889
Germany	19 877
Sweden	19 358
Canada	16 500
Spain	11 307
Finland	11 115
Mexico	*10 238*
Singapore	7 218
Thailand	*6 960*
Ireland	6 820
Denmark	6 623
Australia	6 568
Austria	5 915
Argentina	*5 697*
Republic of Korea	5 143
Poland	*5 129*
Chile	*4 792*
Venezuela	*3 737*
Malaysia	*3 727*

(UNCTAD, 2004a)

[31] The total amount of FDI has been declining since its peak at USD 1.4 trillion in 2000, mostly due to global instability (fear of deflation, SARS, 11th of September 2001 and so on). It is, however, expected to regain its former strength and increase further as the global macroeconomic environment stabilizes once again (AT Kearney, 2003).

Abramowitz (1986) introduced the concept of 'social capabilities' to explain why the rate of catching-up differed between developing countries. This concept is similar to the absorptive capacity which I introduced earlier in this paper, and more recent literature in fact uses this name for the phenomena (Kim, 2001; UNCTAD, 2002). Lall (1993) specifies three distinct groups of technological capabilities, namely (1) investment capabilities, (2) production capabilities, and (3) linkage capabilities. Shin (1996), on the other hand, separates between technological and non-technological components of technological capabilities, as well as between specific and general parts. However, they both agree that technological capability is a path-dependent parameter which relies on previous learning and search efforts (much like absorptive capacity). Finally, technological capabilities might be seen as either an individual-, institutional- or national-level parameter, where externalities and linkages render the total more than the mere sum of its parts (Lall, 1993).

In order to benefit from imported technology and inflows of FDI, a country and its institutions and corporations must display a certain level of technological capabilities. Without the necessary prior knowledge, the forward and backward linkages will be severely limited (Mowery & Oxley, 1995; UNCTAD, 2002; UNCTAD, 2003). This is also observed by Lall (1998), who states that countries with weak capabilities most frequently receive relatively simple technologies, while more advanced countries receive complex ones and in turn generate new technologies themselves. This mechanism can explain the development divergence, interpreting development of technological capabilities as a self-fuelling spiral. Maintaining the development of national technological capabilities is thus essential in order not to be caught in a situation where closing the technology gap approaches an insurmountable task[32].

[32] This also implies that, in order to achieve rapid technological development, it is important to maintain a certain level of social cohesion *within* a country (Lall, 1993; Conceição et al, 2003).

Kvinge (2004, pp. 9-12) identifies four types of possible spillovers from the presence of foreign companies;

- Type I spillovers where knowledge is assumed to spread through personal contact (often called the 'contagion effect'). Sources for Type I spillovers include employees changing companies, cooperation projects, demonstration effects, and reverse engineering.
- Type II spillovers where the economy experience an increase in social return due to lowered prices.
- Type III spillovers where local firms are pushed to a higher level of achievement due to the foreign competition.
- Type IV spillovers that can create virtuous circles of growth.

Clearly, in the context of this thesis, type I spillovers are the most interesting as they encompass the development of national technological capabilities.

Dunning and Narula (1996) developed the investment development path (henceforth IDP) theory; a five stage classification scheme to distinguish between the rationales and effects of FDI. Stage 1 attracts FDI through possession of natural assets. Stage 2 resembles import substitution where the domestic market is financially attractive to FDI. However, stages 1 and 2 presents no obvious rationale for initiating local research and development, and the R&D effort of a multinational will be limited to adaptation of globally produced technologies. The development of the country's absorptive capacity (and type I spillovers) will thus be lower-than-optimal. In Stage 3 FDI is rationalized by efficiency seeking and some local basic R&D may be initiated due to efficiency gains for the multinational, while stages 4 and 5 encompass developed countries that are net investors rather than investees. Connecting the four types of spillovers with the IDP theory of gives Table 2.3 (Kvinge, 2004,

p. 24), which also includes the concept of absorptive capacity (technological capabilities) discussed earlier.

Table 2.3: The IDP Path and Spillovers to the Host Economy

Stage	R&D	Absorptive capacity	Spillovers to the host	Type I spillovers
1	Adaptation of product and process	Low	Type I Type III Type IV	Small
2	Adaptation of product and process	Medium	Type I Type II Type III Type IV	Growing
3	Adaptation of product and process Basic research	Medium	Type I Type II Type III	Maximum
4	Basic research / technical sourcing	High	Type I (positive and negative)	Declining
5	Basic research / technical sourcing	High	Type I (positive and negative)	Small

Adapted from Kvinge (2004, p. 24)

A presence of multinationals in a developing country through FDI might be seen as a good opportunity to increase domestic technological capabilities, as the multinational often act as a demanding customer for local suppliers[33]. Revisiting the discussion on network interaction arrangements in Chapter 2.2, we see that this is not the only benign position technologically advanced companies can hold. They are also potentially influential partners in technology development joint ventures (with companies or knowledge producers), a demanding customer to the educational system, and possibly an influentially enabling supplier. However, there are also important negative aspects regarding the conduct of multinationals in relation to FDI.

[33] The domestic presence of advanced users has been established as positively co-related to the competitiveness of a country and its corporations (Porter, 1990; Fagerberg, 1995).

Multinationals may of course crowd out domestic firms (UNCTAD, 2002; UNCTAD 2003) and Rath (1993) explores a number of negative effects of FDI, among them tied input purchases, profit reallocation, and restricted exports. Bartlett and Ghoshal (1990) suggested four types of international innovation management, namely (1) central-for-global, (2) local-for-local, (3) locally-linked, and (4) globally-linked. However, Lundvall and Borrås (1997) claims that the most pertinent form of globalisation is the exploitation abroad of technologies explored in the home country (central-for-global), and multinationals often prefer to maintain existing linkages with companies in their home country (Lall, 1995; Ögütçü, 2002)[34]. It should be safe to state that centralized home country research and dependency on home country suppliers may be strengthened as a consequence of a low level of technological capabilities in the host country (Kim, 2001).

2.6 Policy Considerations and Justifications

There is substantial disagreement whether or not governments should intervene in a country's economic process with the use of certain policies. Liberalists tend to put strong confidence in 'natural' market mechanisms as the only intervention needed, while interventionists believe that certain market failures justify and, indeed, necessitate government intervention in order to achieve the development desired. The most basic form of market failure is the risk of underinvestment, most likely to occur in an industry with a large number of small actors involving high R&D costs (Stiglitz, 1997). Other basic market failures include network externalities and increasing returns.

[34] It should be noted that this trend might be changing to some extent. Recent development in offshore investments shows that companies move a wider scope of activities to new countries. Whereas manufacturing used to be the main activity outsourced, companies now have moved or say they plan to move activities like R&D, call centers, distribution, logistics, and treasury operations abroad (AT Kearney, 2003).

The TSER projects have resulted in two more comprehensive typologies of failures justifying government intervention, namely those of Keith Smith and Frank Malerba (Lundvall & Borrås, 1997). These typologies focus on market failures that are solely connected to financial mechanisms (as those previously mentioned). The typologies presented in Tables 2.4 and 2.5 result in the 'new policy paradigm' that will be discussed shortly.

Table 2.4: Keith Smith's Four Types of Market Failures

Failure	**Trademarks**	**Possible intervention**
Infrastructure and investment	Underinvestment in physical (communication and transport) or science-technology (universities, public laboratories) infrastructure	Incentives and subsidies for private and public provision of infrastructure
Transition	Firms are highly competent in one specific field, but not in complementary fields	
Lock-in	Firms get locked in to a particular technological paradigm	Nurture emerging technological systems
Institutional	Institutions and regulations having negative effects on the rate of innovation	Monitor and assess regulatory performance

Adapted from Lundvall and Borrås (1997, pp. 55-6)

Table 2.5: Franco Malerba's Types of Market Failures

Failure	Trademarks	Possible intervention
Learning	Firms not able to learn rapidly and efficiently	Human capital programmes, support for industrial R&D, public procurement
Exploitation – exploration	Skewed balance between exploration (radical innovation) and exploitation (incremental innovation)	Maintain technological rivalry, introduce industry diversity, develop common infrastructure
Variety – selection	Skewed balance between variety (niche products) and selection (common denominator products)	Antitrust and competition policies
Appropriability	Too strong appropriability regimes hamper the dissemination of knowledge	Patent legislation
Complementarities	Appropriate complementarities may not be present or the firm is not connected to an innovation system	Supporting formation of R&D networks, industry-university interfaces, bridging institutions

Adapted from Lundvall and Borrås (1997, pp. 56-7)

Lundvall and Borrås (1997) synthesize these failures in three trade-off dilemmas:

- The exploitation – exploration dilemma (lock-in, exploration, and selection failures).
- The integration – flexibility dilemma (transition, complementarity, and learning failures).
- The diversity – harmonising dilemma: In order to achieve economies of scale and efficient production there is a need for accepted technology and legislation standards. On the other hand, in order to achieve fruitful learning there is a need for a diversity and asymmetric distribution of knowledge.

These three dilemmas fund what Lundvall and Borrås (1997, p. 62) in the report on the TSER projects refers to as the new policy paradigm:

> The new policy paradigm focuses on creating adaptable innovation systems. This includes three interrelated issues: firstly, stimulating learning institutions and economic actors; secondly, developing integrative and coordinated policy visions and instruments for enhancing innovation; and thirdly, creating the conditions for a policy-making process which is also learning and adapting constantly to the new demands and conditions of the economy.[35]

Unfortunately, this paradigm is too comprehensive to be thoroughly discussed in this document. This next section will hence focus on policy considerations concerning network formations, learning and FDI.

Policies on network formations relates to Smith's 'transition failure', Malerba's 'complementarities failure', and the integration-flexibility dilemma of the TSER report. Creating industrial networks for innovative purposes is not easily achieved by direct policy measures as it requires an existing critical mass of corporations, research institutions, and skills that provide connection points for new entrants (Schmitz, 2003). The fact that networks often have strong elements of informality, individual connections, and require tacit catalysts in order to persevere implies that government policies predominantly will be limited to facilitating measures. One exception might be when government agencies act as customers, using government procurement as a policy action. In order for this policy to facilitate network creation, the government agency needs to procure technologies or goods that are not currently available in the market place (in order to stimulate innovative efforts) and that have a magnitude that can't be met by one single actor (Lundvall & Borrås, 1997; Arocena & Sutz,

[35] The policy actions implied by this new policy paradigm are almost exclusively directed towards the conduct of economic actors in a system of innovation. This is of course not covering the entire policy regime needed to achieve development. Other areas will include equality, health, environment, culture, and social well-being (Johnson & Lundvall, 2003).

2003). More indirect schemes for stimulating industry and innovation networks include (Lundvall & Borrås, 1997)

- Promoting awareness.
- Facilitating of informal contacts and thematic working groups.
- Helping to bring firms together by supporting brokerage.
- Supporting collaborative facilities and technical services.
- Providing financial support for networks and interfirm co-operation.

Malerba's possible interventions for complementary failures also include industry-university interfaces, confirming the importance of the previously mentioned horizontal firm-knowledge producer linkages. Policies for stimulating network formations may be the most important discussed in this paper, due to its fundamental importance for learning and innovation (UNCTAD, 2004b).

Rationale for policies for learning obviously include Malerba's 'learning failure', but also Smith's 'transition' and 'lock-in' failures, and the TSER report's exploitation-exploration and integration-flexibility dilemmas. Similar to the creation of industrial networks, learning is a policy area which is highly tacit and where direct policy measures are not easily found and employed. Learning is, by nature, a process which is hampered by detailed regulations and interventions (as a considerable part of the learning achieved is learning that was not aimed for in the first place) (Lundvall & Borrås, 1997). Hence, in order to promote learning a government's task will be - through functional interventions[36] - to provide stable macroeconomic environments where companies and organisations wish to invest in learning activities (Lall, 2000). As we have seen earlier, in the discussion on

[36] "Functional interventions are, for instance, the fostering of primary or secondary schooling, the provision of basic infrastructure, or the stimulation of export orientation. Selective interventions involve influencing the allocation of resources between activities, as by trade restrictions, credit allocation/subsidization, discrimination of technology or foreign investment inflows, and so on." (Lall, 1998) [article read in HTML format; accurate page numbering not available]

learning and technological capabilities, effective learning is based on prior learning. Indeed, Lall (1993, pp. 270-1) states that "[…] the ability of firms to produce new capabilities depends on […] organisational and managerial skills in the firm and its ability to change structures to absorb new methods and technologies". This implies that one main area of interest for public policies on learning is to provide a satisfactory basic education that later enables the work force to perform more specific learning activities (Nelson, 1993). Other measures include Malerba's suggestions of human capital programmes and support for industrial R&D, secure social security, and maintain social cohesion (Nelson & Soete, 1987).

Policies for FDI can be grouped in two categories; policies for attracting FDI and policies for exploiting FDI already present in the country. The former would obviously relate to Smith's 'infrastructure and investment failure', while the latter can be connected to Malerba's 'appropriability failure'. In order to attract FDI capital countries need to provide an attractive macroeconomic and infrastructural environment, display sufficient human talent, and offer a satisfactory network of suppliers of complementary assets (Ögütçü, 2002; AT Kearney, 2003). Policy measures to achieve this are thus closely related to the measures already mentioned when discussing the formation of industry networks and learning activities, as these areas have significant impact on the technological capabilities of a country. Policies for guiding the effect of FDI already in the country offer many more direct possibilities. It should however be mentioned that none of these measures are universal, and that the policy package must be tailored to a country's capacities and opportunities (UNCTAD, 2001). Lall (1995, pp. 526-7) offers a comprehensive list of possible policy measures regarding FDI that is presented in Table 2.6.

Table 2.6: FDI Policy Instruments and Their Effects

Instrument of policy	**Employment effects and policy requirements**
Quantity of FDI	Larger quantity of FDI will lead to higher employment, unless it crowds out substantial local investment. Essential to have stable, transparent and non-discriminatory FDI regime
Sectors/activities open to TNCs[37]	Initially, FDI in labour-intensive operations will create more employment, but over time TNCs will need to move into more complex technologies to promote higher quality employment. A targeted promotion strategy is called for
Mode of entry (greenfield/takeover)	Greenfield investments are likely to lead to more employment creation initially, but takeovers may be beneficial if new technologies, skills and exports result
Tax and other incentives	Tax incentives may increase FDI in the short term although long-term FDI depends more on economic fundamentals. Targeted incentives can be useful in guiding TNCs to particular incentives, technologies and skills, and achieving beneficial "deep" integration and alliances
Performance requirements	TNC performance requirements set by host countries can raise the quantity and quality of local employment, but could deter TNC entry if imposed rigidly; setting them by negotiation is preferable
Extent of local participation required	Insistence on local participation in FDI may increase diffusion of technology and skills, but may deter investment in technology and export-intensive activities. It may be preferable to build up local enterprises' competitive capabilities and to encourage strategic alliances with TNCs
International agreements	Tax and other agreements to promote FDI can help to increase employment in TNCs if they do not distort economic fundamentals

Adapted from Lall (Lall, 1995, pp. 526-7)

Performance requirements (row 5 in Table 2.6) on the foreign investor are among the most debated policy options available, and deserve some more attention. According to an UNCTAD study (2003), some of the most common rationales for imposing performance requirements are to strengthen the industrial base and increasing domestic value added, to generate employment opportunities, and to promote linkages and technology transfer. Such policy measures thus offer a powerful tool for governments that wish to enhance the affects

[37] Transnational corporations

of FDI presence. However, due to restrictions resulting from international trade agreements the use of a number of these requirements is prohibited. Table 2.7 lists some of the requirements that due to these agreements are not tolerated. The table presents them in two categories; those that are prohibited by the WTO agreement on Trade-Related Investment Measures (TRIMs) and those that are prohibited or discouraged in one or several regional trade agreements (e.g. EU, NAFTA, or among two countries or trade sectors). Breaching these agreements will very plausibly lead to formal or informal trade restrictions with the perpetrating country.

Table 2.7: Prohibited or Discouraged FDI Performance Requirements

Category	**Performance requirement**
Prohibited by the TRIMs Agreement[38]	Local content requirements
	Trade-balancing requirements
	Foreign exchange restrictions related to the foreign-exchange inflows attributable to an enterprise
	Export controls
Prohibited, conditioned or discouraged by IIAs[39] at bilateral or regional levels	Requirements to establish a joint venture with domestic participation
	Requirements for a minimum level of domestic equity participation
	Requirements to locate headquarters for a specific region
	Employment requirements
	Export requirements
	Restrictions on sales of goods or services in the territory where they are produced or provided
	Requirements to supply goods produced or services provided to a specific region exclusively from a given territory
	Requirements to act as the sole supplier of goods produced or services provided
	Requirements to transfer technology, production processes or other proprietary knowledge
	Research and development requirements

Adapted from UNCTAD (2003, p. 3)

[38] Prohibited by the WTO Agreement on Trade-Related Investment Measures (TRIMs) due to inconsistency with Articles III and XI of GATT/1994.
[39] International Investment Agreement

2.7 Summarizing the Theoretical Foundations

The theoretical constructs covered so far in this paper are of a quite wide scope. Before embarking on the empirical and analytical parts of the paper, I therefore wish to summarize what has been presented. This is done in order to give a rationale for performing the empirical investigations, and in order to build an analytical framework on which discussions will be based.

The National Systems of Innovation framework relies heavily on the concept of interactive learning, implying that effective innovation hardly ever takes places outside an interactive context. One of the main prerequisites for such learning to be fruitful, in fact even to occur is an asymmetry of tacit and/or codified information (which of course is fundamental to any form of learning between individuals). This seems to imply that there, in a given economic area, must be agents who possess more information and knowledge than their colleagues. This economic area may of course vary in size, ranging from asymmetric information on a particular production process to technological frontrunners in an entire industry. Although the most frequent level of analysis in NSI literature is macro rather than micro; in terms of the carrying out of innovations there appears to be little disagreement that the main agents are companies within the system of innovation (CIRCLE, 2004),. It thus seems safe to assume that the vitality and competitiveness of a system of innovation depends on the existence of companies with favourable knowledge positions; a system where all companies have an equal knowledge position would in fact have ended up in the neo-classical equilibrium.

Given that the national system of innovation in question is a developing country it seems likely that a large proportion of these leading companies will be results of foreign direct investments. Obviously, these companies benefit from being able to tap into an

international pool of research and development efforts confidential and unique to that company. Even though the research is usually not performed in the developing country per se, the knowledge obtained from these efforts will be embedded in the technological products and organisational processes of the company's subsidiary in the developing country, giving the company a knowledge advantage. This knowledge advantage could put the foreign company in a very central position when developing national technological capabilities; working as a demanding customer, an enabling supplier, major research partner, and influential employer. It is however quite problematic having foreign controlled companies hold such a central position in a developing system of innovation. Firstly, they may to a large extent rely on basic research and product development performed in the home country, and, secondly, they may also tend to prefer maintaining ties with foreign suppliers originally favoured by the mother company. This can be traced to the relatively lower level of technological capabilities in the host country's system of innovation and the lack of cultural proximity to suppliers in the host country, which will be detrimental to the communication with and trust of prospective domestic business partners. Such a practise, even though understandable and defendable, may in turn lead to less knowledge spillovers and consequently to less-than-optimal development of domestic technological capabilities.

This may leave a developing country's administration with quite a conundrum. Attracting qualitatively benign foreign direct investments requires having an attractive system of innovation with a satisfactory level of technological capabilities. On the other hand, the development of such a system of innovation may rely on the presence of qualitatively benign foreign direct investments. Given this, selective as well as universal policy measures may be desirable as well as necessary. However, choosing the right policy measures obviously relies on a good understanding of the current state of the domestic innovation system.

The empirical (descriptive) part of this paper describes how a foreign company situated in Turkey (de facto a developing country) act in relation with their network partners. This level of description is chosen due to the obvious, but often seemingly neglected, importance of companies in theories on national systems of innovation and economic development (Coriat & Weinstein, 1999 and Teece, 2000 respectively). I agree with Shulin Gu (Gu, 1999, p. 16) in saying that measuring a complex system at an aggregate level does not give enough information on the actual performance of the system

> […] There is a danger of down-playing the concept of national innovation systems approach. It comes from a mistaking of the notions of 'systems' as if piling-up national statistics of nearly every thing, from R&D, patent, to trade, represents a system, and it confuses the system's approach

The empirical descriptions will be categorized in the fashion laid out in chapter 1.2 (horizontal and vertical relationships). The analytical part of the thesis will discuss how the foreign company interact with, in particular, Turkish partners, and in turn which affect this may have on the development of Turkey's technological capabilities. Rounding up the paper, the concluding (normative) part of the paper will discuss what policy possibilities might be employed to amend any weaknesses discovered in the analysis. This thesis can of course not provide a full answer to these questions; due to its obvious methodological shortcomings (see chapter 2.3), it will merely act as an indication of possibilities for future research.

2.8 Methodological Issues

This chapter discusses the research model chosen for this study, and the rationale behind it. Chapter 2.8.1 deals with the ontology and epistomology of the thesis, chapter 2.8.2 describes the research model, and chapter 2.8.3 takes a critical look at the choices I made in this respect.

2.8.1 Science Philosophy

The methodology of a paper is doubtlessly based in the author's science philosophy; her/his stands on ontology and epistomology in particular. The term ontology is used to denote any assumptions a person holds about the world; the ontological view a person holds will thus influence basic views about the reality (Morgan, 1983). Epistomology concerns how knowledge is created and how a person can achieve such knowledge (Oliga, 1988). Pettersen (1993) summarizes possible combinations of ontologies and epistomologies as shown in Table 2.8.

Table 2.8: Ontologies and According Epistomologies

	Ontology	**Epistomology**
Subjective	Projection of consciousness (nominalism)	Situational logical knowledge
	Social construction	Understanding of social reality
	Real symbolic speech	Symbolic patterns
	Contextual field of information	Depiction of context
	Actual process	Systems, processes, changes
Objective	Actual structure (realism)	Positivistic science

(Pettersen, 1993)

As shown by earlier discussions, I agree that industrial relationships involve a large extent of tacit elements and connections on a personal level. This would imply that the ontology/epistomology of this paper is on the subjective side of the continuum in Table 2.8. The ontology contains elements of 'social construction' (as the perception of networks in my high mind is highly subjective) as well as 'contextual field of information' (as information must be seen in the context of certain given innovation system parameters). The epistomology leading to the choice of method would thus be the 'understanding of social reality' and 'depiction of context'.

2.8.2 Research Model

A schematic view on the research process, as seen by Ringdal (2001) is depicted in Figure 2.4. This section will focus on steps 3, 4 and 5, as the two first steps are outlined in the introduction of this paper (step 6 is this written report).

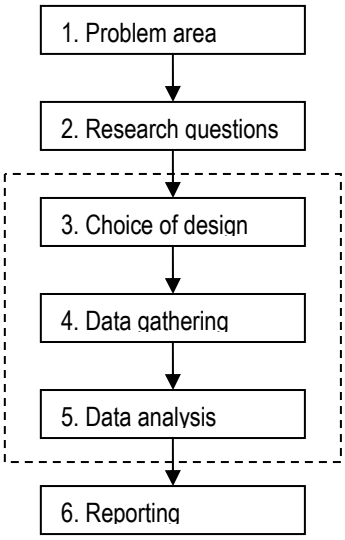


Figure 2.4: The Research Process (Ringdal, 2001)

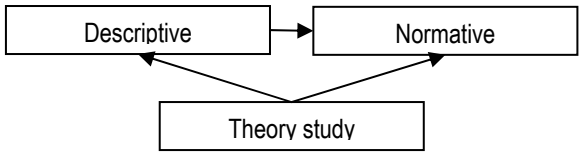


Figure 2.5: Structure of the Study

This dissertation consists of three main parts; one theoretic, one descriptive (of the case study's network conduct), and one normative[40] (analysis and recommendations based on the descriptive part) as seen in Figure 2.5.

As the descriptive part of the study concerns, I have already pointed out that this thesis is based on a rather subjective ontology and epistomology. Combined with the fact the number of studied cases is low, while the number of parameters researched is high, this clearly indicates that a qualitative research design should be chosen. According to Yin (1989) the possibilities would be observation, experiment, or interview. Observation is clearly non-feasible as the research interest often is non-observable and the fact that network interactions have a far longer time horizon than research within this paper would allow. Experiments would require a full control of all parameters, which is clearly not viable for the research topic. The instrument of data gathering was thus chosen to be qualitative interviews with representatives from the case object. The interviews have been performed as a midway between reflexive and structured interviews (Kvale, 1994), using an interview guide to assure that all relevant topics would be included during the interview. Thus, to return to the epistomology, interviews will serve as a means of 'understanding a social reality' while the 'depiction of context' is performed with Chapter 3 describing the Turkish system of innovation.

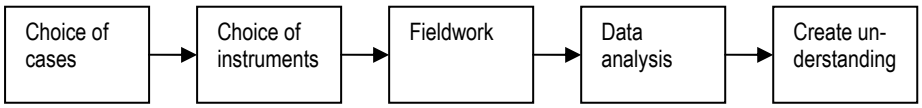


Figure 2.6: How to Build Theory from Case Studies (adapted (Eisenhardt, 1989))

[40] This implies that the cases studied are of intrinsic interest for the descriptive part, while being of instrumental interest for the normative part (Stake, 1994).

The normative part of the study is somehow dubious, as the scale and scope due to the time limit on the writing of the thesis and the empirical data is severely limited. However, in order to make recommendations in the end of this paper, the research design has been chosen in accordance with the framework of Kathleen Eisenhardt (1989) in Figure 2.6; a framework designed for building theory from case studies. The case study was chosen, in accordance with my supervisor Prof. Dr. Hacer Ansal, to be a Turkish subsidiary of a multinational company (1) The intention was originally to compare the findings from this company with a Turkish competitor. Unfortunately, none of the contacted Turkish companies agreed to participate in the study. As previously mentioned, interviews were chosen as instruments (2). The fieldwork was conducted (3) as interviews with representatives from the company's Human Resource (or equivalent), Logistics & Procurement (or equivalent), and Sales & Marketing (or equivalent) departments. It was also intended to perform interviews with the Research & Development department; however, the company has no research efforts in Turkey. The interviews were performed in the interviewee's office and durations ranged between 30 and 45 minutes. The interviews were recorded and transcripted immediately after finishing. The transcript was in turn sent to the interviewee for confirmation.

The data analysis (4) was performed by indexing the transcripts using category variables (Strauss & Corbin, 1990). These variables were created as a result of my understanding resulting from the theory study and where I was expecting to find relevant information. The category variables are thus strongly connected to the description of empirical findings as well as the interview guide used. In order to create understanding (5) I try, with this written report, to translate and connect the categories together in one coherent whole.

2.8.3 Critique of Methods and Sources

The main critique against the methods employed in this thesis is the lacking triangulation of empirical data. It was the intention to interview representatives from a Turkish company in order to provide such triangulation. Two Turkish companies (comparable to the foreign company interviewed) were contacted with this in mind. However, due to a number of factors, including language barriers, none of these companies were willing to participate in the study. The effects on the results and analysis of this paper is quite apparent; without a Turkish company as a comparative ground it looses some share of its significance. Turkish companies may act in the same fashion as the foreign company in this study, rendering some of the analysis obsolete. However, initial conversations with one of the Turkish companies revealed that this company's practises diverged from that of the researched company in a number of areas. Unfortunately, the information obtained from these conversations is not sufficiently explored for use as empirical data. It does, however, to some extent ease the problem of the lacking triangulation. Information from these initial conversations is included as footnotes in the presentation of the empiric material.

Using interviews for collecting data obviously presents methodological issues of its own. In this particular case there were some problems with languages, as the interviews were performed in English. This may have resulted in misunderstanding of both question and answer. However, I think that providing the interviewees with transcripts will eliminate any severe errors. The second problem with using interviews is of course the fact that the analysis of the data will be relatively subjective (as opposed to quantitative survey data). The analysis and discussions in this paper are, obviously, influenced by my personal beliefs.

CHAPTER 3

A BRIEF DESCRIPTION OF THE TURKISH SYSTEM OF INNOVATION

It is not the intention of this document to give a full account of the Turkish system of innovation; such a task would be far out of scale and scope. Rather, I wish to explore some of the aspects of the system of innovation in order to provide a background for the discussion to follow later. Hence, the aspects discussed here will be related to the theoretical ground that has been covered this far. It will thus be related to educational aspects (Chapter 3.1), industry structure (3.2), the macroeconomic climate (3.3), and foreign direct investments (3.4).

3.1 Education and Research

Dutz and colleagues (2003) claim that one of Turkey's main competitive advantages as a country compared to other Central European Emerging Economies (CEEEs) is the well educated and flexible workforce. It is of course hard to establish this using measurable data, but, as we have seen earlier, basic education may work as an intermediary measure. Table 3.1 shows that the gross enrolment rate is growing for all levels of education. This is also reflected in Figure 3.1, which shows how Turkey's workforce is composed according to education levels. However, it should be emphasized that increasing the aggregate level of education is not in any way causally related to positive economic growth. Its effect on economic development relies heavily on, for instance, an egalitarian access to education and a market-oriented macroeconomic climate (López et al, 1998).

Table 3.1: Gross Enrolment Ratios for Four Levels of Education				
	Primary	**Secondary**	**Tertiary**	**Higher**
1960	75 %	16 %	N/A	N/A
1965	101 %	N/A	4 %	N/A
1970	110 %	27 %	5%	6 %
1975	108 %	29 %	N/A	N/A
1980	96 %	35 %	5 %	6 %
1985	113 %	42 %	9 %	10 %
1990	99 %	47 %	13 %	16 %
1995	107 %	57 %	19 %	22 %

(Yoltar, 2002, p. 34)

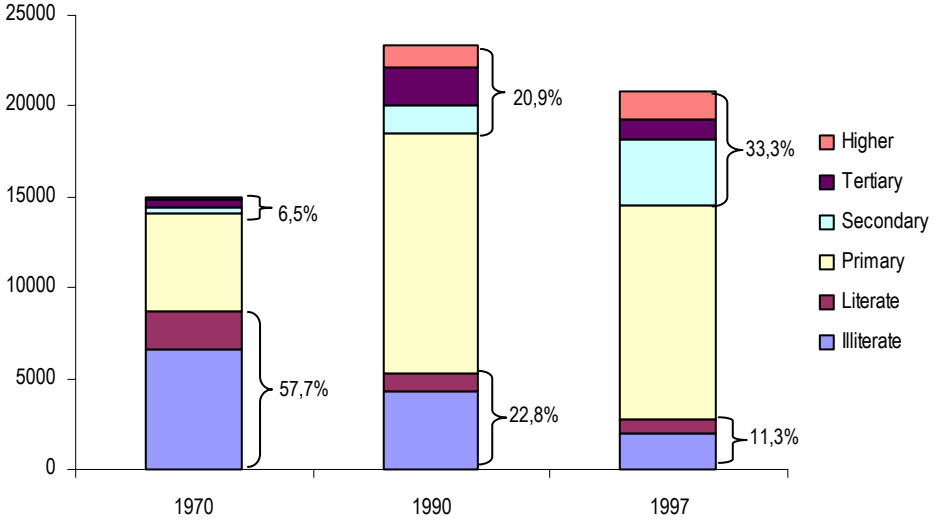


Figure 3.1: Composition of Turkey's Workforce According to Education (Adapted (Yoltar, 2002, p. 35)

Although the educational level of Turkey's workforce has improved (as shown in Figure 3.1) there is still unexploited potential, particularly related to the relatively low female workforce participation. The average female ratio of students in secondary and tertiary school has exceeded 40% for the last decade, without this leading to substantial improvement of female workforce participation (McKinsey, 2003). As Goldin (1994) has shown, high female workforce participation is positively correlated with high wages, high GDP and low share of agriculture in GDP; all trademarks of developed economies. The gap between female education enrolment and workforce participation indicates a substantial hidden

unemployment rate for highly qualified women, which, if exploited, could speeden the economical and technological development of Turkey.

As Table 3.2 displays, the majority of Turkish research is performed by universities, even though the ratio of private enterprises' research investments has increased since 1990. The strength of the university sector suggests that firm-university cooperation should be rather fruitful. However, according to Yoltar (2002), state initiatives for cooperation have yet to prove considerable yield. The initiatives include the 1996 TUBITAK "University-Industry Research Centers" programme, the setting up of techno-parks, and "Technology Development Centers"; a result of a July 2001 legislation (Yoltar, 2002).

Table 3.2: Gross Expenditure on R&D by Sector of Performance

	Business		**Government**	**University**
	SEE[41]	**Private**		
1990	2 %	18 %	10 %	70 %
1991	21 %		8 %	71 %
1992	24 %		8 %	68 %
1993	23 %		10 %	67 %
1994	25 %		9 %	67 %
1995	24 %		7 %	69 %
1996	N/A		N/A	N/A
1997	N/A		N/A	N/A
1998	3 %	28 %	7 %	61 %
1999	3 %	35 %	7 %	55 %
2000	3 %	30 %	6 %	60 %

Adapted from Yoltar (Yoltar, 2002, p. 32)

[41] State Economic Enterprises

3.2 Industry Structure and Trademarks

Turkish industry policies have to a large extent focused on low growth in wage levels, in order to stay competitive in the world market (Yoltar, 2002). Figure 3.2 shows how this has lead to a tremendous growth in manufactured exports, which is traditionally labour intensive. However, aggregate export as a contributor to GDP stays relatively constant. This could indicate that Turkish technological competitiveness is not developing as rapid as one could desire; a view that is supported by the fact that the ratio of low-tech products to total manufactured exports have stayed between 70-80% since 1965 (Yoltar, 2002).

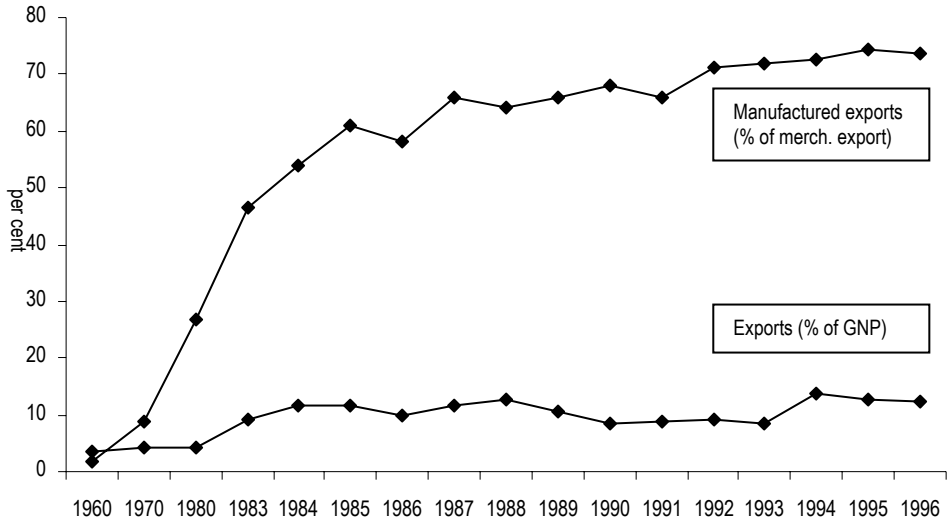


Figure 3.2: Development of Turkish Exports 1960-1996 (Adapted from Yoltar 2002, p. 23)

A 2003 study by Didem Baser, Diana Farrell and David Meen (Baser et al, 2003) studied the Turkish industry structure with the aim of finding potential for productivity growth. Figure 3.3 shows how the productivity of some important industries is well below best practice countries (given the y-value 100); the average productivity being only 40% of best practice countries. Obviously, some of the industries included in Figure 3.3 are important infrastructure sectors, namely wireline and wireless telecommunications, and electricity

generation and distribution. As discussed earlier, weak performance in such sectors may be detrimental to a country's economic and technological growth.

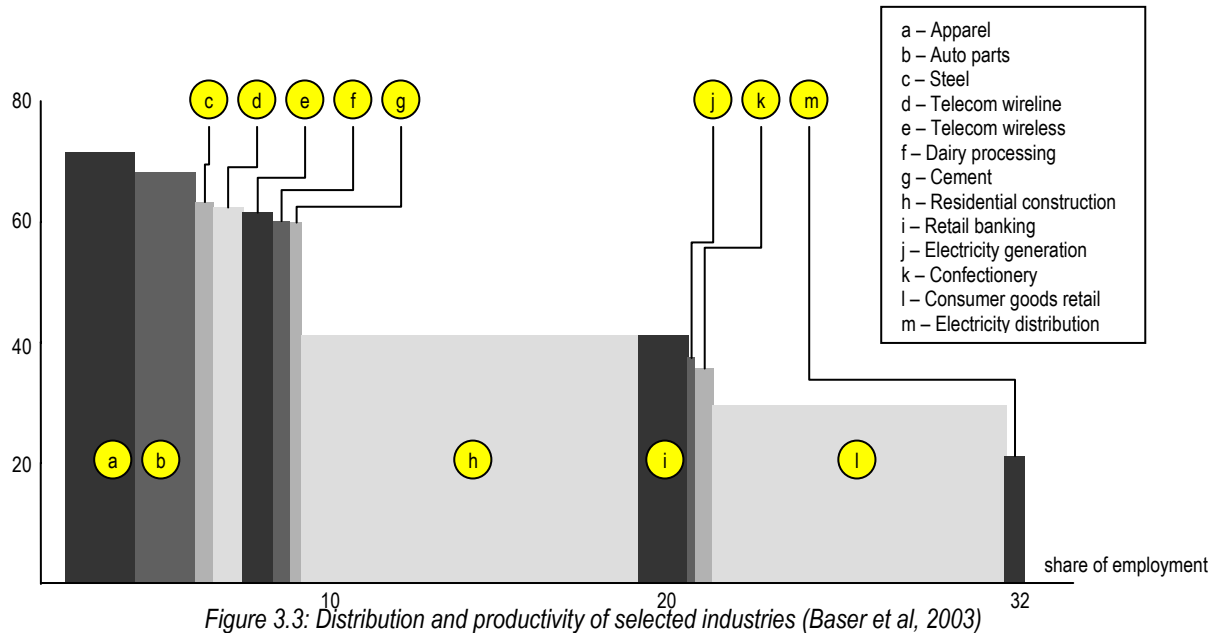


Figure 3.3: Distribution and productivity of selected industries (Baser et al, 2003)

The study explains the productivity problem with the large informal economy, macroeconomic and political instability and government ownership. The macroeconomic and political instability will be dealt with in the section on macroeconomic climate. This section will concentrate on the Turkish informal economy.

Baser and colleagues found that Turkish industry can be divided in two. Firstly, there are modern, high-performing companies that have adopted cutting-edge technology and maintain international competitiveness. The average productivity of these companies is 62% of US level. However, there is a traditional sector which employs about half the work force and displays a productivity level well beyond 25% of US level. In a well-functioning economy these companies would not be able to survive in the market place, due to their consequently low margins. However, the majority of these traditional companies improve their operation margins by operating informally; for instance by failing to pay VAT or social

security payments, not adhering to hygiene or product quality standards, or by paying less than minimum wages. This undeserved competitive advantage allows these companies to continue using often 30-40 year old technologies with exceptionally low productivity levels (Baser et al, 2003).

The study found no regulatory loopholes that would allow these companies to avoid their social obligations. It thus concludes that the problem largely lies in the weak enforcement of existing laws; naming one striking example of how Turkish governments since 1963 has issued ten tax amnesties, often allowing companies to pay in old Turkish lira values (which gives a large financial gain in a country where the inflation in the 1980s and 1990s hovered around 60%) (Baser et al, 2003).

3.3 Macroeconomic Climate

Turkey has in its recent history been struck by a number of political and economic crises; it is frequently referred to as a yoyo-economy with rapid expansions followed by subsequent drastic contractions. Baser and colleagues claim that the volatile Turkish macroeconomic climate is due to historically weak and short-lived governments (Baser et al, 2003). This claim is supported by a 2002 World Bank study on political stability where Turkey ranked 74th out of 106 developing countries, between Lebanon and Bangladesh[42].

A low political stability has tremendous negative effects on the investment climate of a country's industry. Firstly, the aversion towards investment is cemented by the sky-high real interest rates. In the 1990s real interest rates averaged about 20%, with extremes of about 90% following the currency devaluation in 2001 (Baser et al, 2003). High real interest rates lead to bank savings as a preferred means of investment and highly expensive loans; both

[42] Source: http://publications.worldbank.org/subscriptions/WDI/

factors detrimental to the investment climate. Figure 3.4 shows an example of income distribution for a large Turkish retailer. We can clearly see that the revenues resulting from the company's operations (operating income) is negligible compared to non-operating revenues (bank deposits and other non-strategic financial investments). Needless to say, with such an income distribution, the incentives for making investments in operating capabilities are severely hampered.

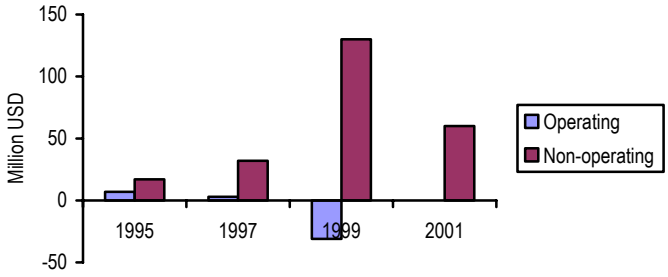


Figure 3.4: Income Distribution for a Turkish Retailer (Baser et al, 2003)

Secondly, tremendously high inflation rates, combined with the low wage growth in Turkey, lead to decreasing purchasing power. This will in turn have negative effects on the incentives of companies to invest and innovate, since the market expectations are highly unpredictable when they are not negative. Table 3.3 shows the rate of inflation in Turkey from 1991 to 2002.

Table 3.3: The Rate of Inflation in Turkey 1981-2002

1981-1990	1991-1995	1996-2000	2000	2001	2002
46,3%	79,3%	74,1%	54,9%	54,4%	45%

(Domaç, 2004, p. 2)

Thirdly, the level of corruption in Turkey is perceived to be very high. A 2002 survey by Transparency International performed among business people and risk analysts on their perceptions of a country's level of corruption, ranked Turkey 64th of 102 countries. Turkey scored 3.2 on a scale from 0 (highly corrupt) to 10 (highly clean), placing it among countries like El Salvador, Thailand, Senegal and Panama (Transparency International, 2002). A 2002 study by the World Bank ranked Turkey 53rd among 106 developing countries concerning control of corruption, placing it between Iran and the Dominican Republic[43]. Evidently, high levels of corruption will be detrimental to, in particular, foreign investors.

Finally, there has been much talk about Turkey's possible EU accession in 2007 and its positive effect on the Turkish economic climate. However, even leaving the obvious political, cultural and religious aspects out, there are still a high number of remaining obstacles to an accession. Although Turkey has managed to slow down the consumer price index (from 68,5% in 2001 to 10,2% in August 2004) it is still well beyond the requirement for EU accession at 2,5%. The image repeats itself for budget balance (-13,2% in 2002, EU accession requirement -3,0%) and public debt stock as percentage of GDP (100%, req. 80%) (McKinsey, 2003).

3.4 Foreign Direct Investment

Turkey has never experienced the surge in foreign direct investment inflows of comparable countries. Figure 3.5 shows the historical development of inflows from 1970 to 1998. The World Bank estimated that the inflows in 2000 and 2001 were, respectively, 982 and 3266 million USD. Even though there is an increasing trend in the absolute amount of inflow, the

[43] Source: http://publications.worldbank.org/subscriptions/WDI/

relative importance is stable, hovering around 0.4 % of GDP; a low figure compared to other CEEEs[44].

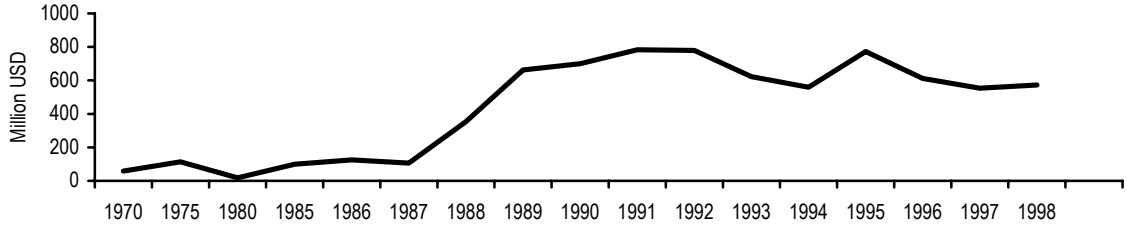


Figure 3.5: FDI Inflow to Turkey (Adapted (Yoltar, 2002, p. 38)

The importance of increasing the level of FDI inflows is recognized and there are currently efforts being made to improve the investment environment in order to attract foreign capital, both in cooperation with external organisations such as FIAS[45] and internally in setting up an Investment Consulting Council[46]. The restrictions put on foreign investors are very few, both as a consequence of Turkey's WTO membership since 1995 which, as shown earlier, prohibits most restrictive practices on performance requirements, the EU Customs Union of 1996[47], and law 4875 of June 2003[48].

[44] Central European countries may be used for comparison regarding FDI as they display similarities in terms of geographical advantages, newly opened economies, and to some extent educational composition. Some CEEEs and their FDI/GDP ratio for 2001: Czech Republic (8.6%), Croatia (7.7%), Bulgaria (5.1%), Georgia (4.9%), Hungary (4.7%), Poland (3.1%), Romania (2.9%), and Belarus (0.8%). Source: http://devdata.worldbank.org/data-query/

[45] Foreign Investment Advisory Service, http://www.fias.net/data/mena.html

[46] Cihan News Agency, 16.03.2004

[47] The 2003 Accession Partnership explicitly states that Turkey should remove all restrictions affecting FDI originating from EU countries (Dutz et al, 2003).

[48] "[Law 4875] replaces the old FDI approval and screening system with a notification and registration system, bans nationalization without fair compensation, guarantees national treatment to foreign investors, does not restrict FDI in any sectors or impose any performance requirements, eliminates the old minimum capital limit, grants foreign investors full convertibility in their transfers of capital and earnings, allows them to own property without any restrictions, and recognizes foreign investors' right to international arbitration." (Erdilek, 2003, p. 93)

Analysts disagree to some extent on the reasons for the lack of inflows and the prospects for future inflows. Dutz and colleagues claim that Turkey's possible EU accession will attract more foreign investors (Dutz et al, 2003). However, as we have seen, such an accession is quite far away and, additionally, Turkey's Customs Union with EU of 1996 has yet to show any improving effect on FDI inflows. It can not, however, be neglected that Turkey has an extremely favourable geographical position and an interesting demographic composition, which should be attractive for future foreign investments (Dutz et al, 2003).

The Baser and colleagues study ascribe Turkey's lack of inflows to a large informal economy, macroeconomic and political instability, and government ownership; the same factors they found to handicap general productivity in Turkish industry (Baser et al, 2003). Erdilek (2003) separates the causes in economic and non-economic causes. The former includes high transaction cost of entry and operation, chronic high inflation, increasing economic instability, historical inward orientation, lack of IPR[49] protection, lack of inflation accounting and internationally acceptable accounting standards, failure of privatization, insufficient legal structures and inadequate infrastructure. The latter encompasses chronic political instability, internal conflicts, historical animosity towards foreign economic presence, fear of foreign political domination, lack of FDI promotion, and the structure of Turkish industry.

[49] Intellectual Property Rights

CHAPTER 4

EMPIRICAL FINDINGS

According to an agreement with the studied company, the names of neither company nor interviewees will be disclosed; thus it will merely be referred to as 'the company' throughout the paper. Worldwide the company employs approximately 470 000 people in 190 countries; it is truly one of the world's most influential multinationals. Its Turkish history dates back to 1856, although the Turkish subsidiary was formally established as a joint venture with a Turkish partner in 1958. The subsidiary became a fully owned division in 2000. Today, the company employs approximately 3100 people in Turkey and offers products and services in the electronical systems and appliances and communication sectors. The total sales of the Turkish subsidiary amounted to EUR 630 million in the 2003 fiscal year (1st of October 2002 to 30th of September 2003). The company is organized in a number of separate business units; the interviewees from Sales & Marketing and Logistics work in one of these business units, while the interviewee from Human Resource is employed in the central HR unit.

This chapter presents the information obtained from the interviewees. The information is grouped under the headings established in Chapter 2.2 (horizontal firm-firm cooperation (Chapter 4.1), horizontal firm-knowledge producer cooperation (4.2), vertical customer linkage (4.3), and vertical supplier linkage (4.4)). The information presented in this chapter will be discussed and analysed in forthcoming chapters.

4.1 Horizontal Firm-Firm Cooperation

This category of network linkages was included in order to capture any joint research and development between competitors (equal partners). As the company investigated in this thesis had no research and development efforts situated in Turkey, no such horizontal linkages could be discovered. It is, however, quite reasonable to believe that the company in its home country has such collaborations. Whether these foreignly originated research efforts are directed towards Turkish cooperation partners are unknown, but rather unlikely (as such information most likely would have surfaced in the interviews).

The only horizontal firm-firm linkage that could be identified and discussed in the interviews was that of the flow of employees between competitors (as a form of knowledge spillovers or leakages). The average turn-over for the company's employees is eight years. This does however include lay-offs initiated by the company itself, and does not discriminate between departments; the interviewee believed the turn-over to be relatively uniform among departments and divisions. The voluntary turn-over rate (employees leaving the company on own initiatives) is, according to the human resources interviewee, although quantitatively non-specified, very high. The turn-over is naturally negatively correlated with the length of the employee's stay, and the company has identified the two year- and five year marks as key points for whether an employee will have a long career in the company.

4.2 Horizontal Firm-Knowledge Producer Cooperation

Horizontal cooperation with knowledge producers was intended to capture two functions; namely that of competence building in the national work force and as a source of technological knowledge used for company innovation. For the latter of these, the situation is of course the same as in the previous chapter. No collaborative or absorptive efforts are made towards national educational or research institutions. Again, it is quite likely that the mother company performs such activities, but, yet again, it is quite unlikely that any of these activities are targeted towards Turkish institutions[50].

The human resources interviewee informed in the interview that about 90% of the employees (with graduations) come from Turkish universities[51], the remainder mainly educated in the home country of the mother company. A share of the employees with foreign education is made up of Turkish citizens that have studied abroad and then returned for their professional career. One interviewee informed that the foreigners working in the company often are at higher management or technical expert levels.

The company offers no financial support or incentives for their employees to return to state universities (or any other form of institution external to the company) in order to deepen or broaden their competencies. Other countries' subsidiaries of this company do offer such financial support, especially for MBA trainings. Furthermore, the company offers a five level management training development programme. Only the two lower levels are provided by the Turkish subsidiary. For further training employees are sent to company facilities in the mother company. In order to participate at these program levels, employees are also often

[50] The Turkish company informs that they have performed joint research efforts with national universities. The nature and purpose of this collaboration is however unknown. They also engage in absorptive technology monitoring activities towards these national universities in order to foresee coming technologies.
[51] The proportion for the Turkish company is informed to be approximately 98% for undergraduates, and somewhat higher for post-graduates.

sent on language training in the United Kingdom (English is the working language of the company)[52].

The company yearly provides approximately 500 internship positions for students, ranging from high school to university level. The human resources representative estimated that as few as 5% of these internship students actually went on to work for the company full time when embarking professional careers. The reason for employing this many interns without the intention of further hiring is

- Legal issues. Companies in Turkey must offer internships for high school students equal to 5% of their total work force. Hence, about 33% of the students/pupils employed by the company fall in this category.
- Customer and employee relations. Large customers contact the company asking ("very strongly asks us", according to one interview) them to hire friends or relatives of theirs. They will also offer positions for relatives of faithful employees when asked. The company sees this hiring as a long term investment in the relations with this particular customer or employee.
- Educational skills. A small fraction of the total number of internship students is recruited based on their academic records. These hirings are made in order to increase the possibility of this particular student wanting to start their professional career in the company.

The high number of student interns implicitly leads to these students having lower order work assignments. At the time of interview, 60 students were working in the accounting department. The real need of the accounting department was two internship positions. According to one interviewee, the majority of the students working on internship therefore

[52] The Turkish company claims to offer virtually all its further education of employees in Turkish institutions. The extent of and quality of this education is however unknown.

merely perform supportive tasks around the office. In addition to the high number of internships, an interviewee estimated that five to ten students each year wrote their Master's Thesises about or for the company. This is arranged by students offering research proposals to the company; if these proposals are coherent with the company's current needs or ongoing projects the students are allowed access to the company's resources. The company does not actively offer research projects[53].

The company yearly offers scholarships to approximately 6-7 students, with the additional opportunity of supporting internships later in their educational career. These students are monitored by following their GPA trajectory, and from time to time (this is no requirement made or serviced offered by the company) they confer with the company when faced with choices on elective courses. The company does not perform any active career guiding for students at any level, neither do they offer universities the possibility of using the company's employees as guest lecturers.

There was no mention in the interviews of requirements from the Turkish authorities regarding the company's conduct towards state institutions (neither towards private agents).

[53] The Turkish company informs that they actively support Master's Thesises related to their manufacturing and design issues. Whether these Thesises are results of student offers or company projects' needs is unknown.

4.3 Vertical Customer Linkage

Vertical customer linkages were included to capture the important function of customers being hands-on indicators of new possibilities for market penetrations through new and/or improved products and for early indications of new markets and/or use situations. This company's products are sold on three levels of outlets. Firstly, some products are sold directly from the company itself, secondly, the majority of products are sold to wholesale distributors, and, finally, a small proportion is directly sold to 'corner shop stores' for distribution to small customers.

The products being sold directly from the company to end users contribute the only share of product development that is done by the company's Turkish subsidiary. This passing of the two lower levels of distribution outlets is done when the quantity of the products sold constitutes a larger system of technology. The company then offers projecting services, making minor adjustments to the technology in order to fit the present customer's particular needs. Contact with the two lower distribution levels is made solely on a financial basis; reporting sales volume of the previous period, ordering volumes for the forthcoming period, and, if applicable, making payments to the company based on the volume of products having been sold to end users. The only feedback coming from users at these two levels is made up of customer complaints and warranty claims.

Regarding the impact on the product technology as a result of feedback from Turkish users; all technology amendments and alterations are made by the research and development department in the home country (as previously mentioned, the company has no research and development facilities in Turkey). Smaller alterations can be made on a very infrequent basis by the Turkish subsidiary, but these changes are very incremental and made on a technologically superficial level. Such minor changes must also be communicated to and

approved by the company's mother's research and development institution before being employed.

According to the interviewee from markets and sales, the mother company does quite frequently make changes in the basic technology as a result of customers' complaints or communicated needs. However, since the technology is supposed to be globally equal, such changes are only made if the source user market is sufficiently financially important for the mother company (the subsidiary making up a non-negligible fraction of the company's total global sales). In this sense, the Turkish market is too small to have any impact on the global technology changes made by the mother's research and development division.

4.4 Vertical Supplier Linkage

Vertical supplier linkages were included in order to capture the suppliers' functioning as fulfiller of buyer's requests and enabler of new product development by opening up new 'design spaces'. The term 'supplier' includes suppliers of technological components as well as suppliers of 'soft' functionalities ('outsourcing').

The company buys an overwhelming majority of its technological components from foreign subsidiaries of the same global company. The amount originating from external companies is, according to the logistics interviewee, almost negligible. The main part of internally bought components originate from the central country (the main office), with the remainder coming from other European countries.

Regarding the components bought from external companies, these products range from low- to high-tech components. The also differ in how central they are in the resulting technological system. They are, however, all generic technologies available from a multitude of sources (as discussed in Chapter 2.2.2). The screening and choosing of which supplier to

buy from is made by the Turkish subsidiary without any imposed directives from the mother company. All external suppliers are companies located in European countries other than Turkey[54]. Contact with component suppliers are made on an arm-length contractual basis, mainly exchanging quantitative data on amounts needed and prices offered. Suppliers do, however, maintain some sort of technical reporting to the logistics department, announcing their current technological developments. This reporting is used by the company to make future decisions on choices of suppliers (as no Turkish research and development facilities exists, these reports are naturally not used for altering technologies).

Regarding suppliers of 'soft' resources, there are no imposed directives from the mother company on what suppliers to choose. According to the human resources interviewee there are however no substantial outsourcing of these activities; most of them are performed by institutions internal to the company. The activities actually outsourced include medical emergency assistance, employee satisfaction surveying, and some ICT services (in particular the construction of a recruitment web service). All outsourcing discussed in the interviews, with the exception of medical emergency assistance, is made to Turkish subsidiaries of foreign service companies (consulting agencies, market survey institutes and such). In the interview, two particular activities were discussed. The Human Resources Department had recently undergone an organisational structure change. The actual reorganizing had been performed by the Turkish subsidiary, trying to accommodate it to the organisational model required by the mother company. Secondly, a web service for recruitment purposes had recently been developed. The actual implementation had been outsourced to a Turkish subsidiary of a large foreign agency, based on the requirements and system structure developed by the mother company.

[54] The Turkish company, on the other hand, hold Turkey, Europe and the Middle East as the main locations for their suppliers. The quantitative distribution among these three regions is however unknown.

4.5 Flow of Knowledge Resources to and from the Mother Company

One particular area was discussed in the interviews that do not fit very well with the above categorizations. This seemed quite important, and deserves some particular attention. As part of a global company, there is some level of human capital flow between company subsidiaries and between subsidiaries and the main office.

According to the human resources interviewee, Turkish workers are exchanged to the global company for periods of time, most commonly ranging from three to five years. There are also some exchanges made when particular competencies are needed on an ongoing project; this seemed however to be rather unidirectional, with foreign (management or technical) experts being hired to Turkish projects. The probability of employees with technical backgrounds and work assignments having international careers is comparably (with supportive functions) quite high.

The interviewee from market and sales had the impression that most of these employees, when returning to the Turkish subsidiary, were given quite substantial promotions (often to middle management position). However, according to the human resources interviewee, this does not always happen. Quite often, the returning employee has reached a level of specialisation high enough to render her/him somewhat overly qualified for the Turkish subsidiary. This would result in one of three possible career paths being taken. Firstly, the employee will return to the global company, taking on a technical position in another country, often being the main office home country. Secondly, the employee will be assigned a position as a technical manager. Such positions offer a higher level of aggregate responsibility, with the responsibility areas being, compared to the position held prior to the global exchange, skewed to an administrative rather than technological domain. Finally, the employee may be assigned to her/his old technological position.

CHAPTER 5

ANALYSIS

The empirical investigations done in this thesis, as presented in Chapter 4, clearly indicates that the foreign company maintains a drastically low level of interaction with the Turkish national system of innovation. Compared with the initial information obtained from a comparable Turkish company, the interaction loops running from the foreign company is virtually non-existent; and when present they are mostly of a quantitative quality. The frame of analysis in this thesis was chosen to be the national system of innovation. However, the empirical findings clearly indicate that this particular multinational company transcends such borders. The majority of cooperation partners for the company in question is placed outside this national boundary, and it seems no consideration are made in relation to cultural proximity in terms of the further educating of employees, choices of trade partners, or in product development. Whether this indicates a weakness in the NSI approach to innovation and economic growth when faced with multinational enterprises or a weakness in the strategy of the multinational company is outside the scope of this paper. Hence, it will not be discussed further here, and the forthcoming discussion will be performed in the theoretical light already established. Furthermore, the discussion will be performed as if the company researched is representative for its particular category of firms. This chapter will thus take a closer look at the possible effects the lack of interaction might have on the Turkish development of technological capabilities.

5.1 Horizontal Cooperation

Quite a substantial proportion of the functionalities intended to be covered by the category 'horizontal cooperation' is of course rendered impossible due to the missing research and development facilities of the company. Without such facilities, there are no possibilities for joint technological development efforts with neither competitors nor national knowledge producers; neither does it allow for any voluntary sharing of or involuntary spilling of research results that could have had a positive impact on the capabilities in the Turkish system of innovation.

The only options for involuntary and/or voluntary horizontal cooperation are thus related to employee training and employee's pre- and post-company careers. Formal training of employees is, as I have described, partially performed in Turkey and partially abroad. The training performed in Turkey is, however, on a comparably low level of specialisation. It seems safe to assume that the employees receiving and utilizing the possibility of further training can be placed in the category of employees with long careers in the company. The average turn-over rate was estimated to be as low as eight years; however, as this includes employees being laid-off and newly recruited people quitting within the two year mark of employment, the turn-over rate relevant to this thesis is indeed lower. This would imply that an employee that recently has received training in the Turkish subsidiary rarely enters the system of innovation by means of changing employer. Low turn-over rates as in this case would mean that the transfer of (especially tacit) knowledge carried by trained personal is very low. Combined with the fact that training is performed in-house, without the assistance of any external Turkish agents, the organisational knowledge is tried to be maintained securely within the company.

As for employees receiving foreign training, which is on a higher level of specialisation, two main pitfalls were discovered. Firstly, the chance of 'brain-drain' seems to be quite high. After providing the foreign training, the company in a number of cases has problems finding positions where the employee fully can utilize the newly acquired competencies. Working in a company with a global internal work market, there is thus a high risk for the employee finding more challenging positions elsewhere within the same conglomerate and thus being in some sense lost from the Turkish system. Secondly, even when avoiding the emigration of the employee, the position given to her/him on return will quite frequently under-utilize the technical competencies held by the employee. The effects of employee training spread out to the Turkish system of innovation are thus almost negligible.

Regarding the interaction with the education system for developing future employees, the company holds a central position due to the high number of trainee- and internships offered to Turkish students. However, the work assignments in these internships and the rationale for offering them severely reduce the possible effects on the Turkish system of innovation. The low amount of advanced technological and organisational tasks performed by the company is reflected in its employment strategies towards students from Turkish universities and lower level educational institutions. The majority (actually as much as 99%) of the internships are offered with rationale other than the competency level of the students. Customer and employee relationships (in addition the obvious compliance to Turkish legal issues) are a much stronger incentive for employing students. This reflects the fact that the Turkish subsidiary largely works as a sales agency, rather than a technological agency in the international conglomerate. The high number of internships offered for these (to name them crudely) non-productive reasons lead the work assignments to being of very low level and in no way in vital functions. Given that a very low percentage of the interns actually spend their

forthcoming careers in the company could have led to large spillover effects by having company trained students working for other companies in the Turkish system of innovation. However, with the low level of work assignments, the competencies and knowledge obtained by these students are of such a nature that they are of negligible importance in their future career. Again, I must conclude that in terms of developing basic qualities in future employees the effects of this foreign company are rather non-existent.

This conclusion is further established by the fact that the company offers virtually no advisory services to students on career paths to follow or courses that are of special commercial interest, and that no services are offered to Turkish universities in terms of guest lecturers or development of courses in order to fit more closely with the needs of the corporate sphere. This may have the effect that the problem solving skills developed by graduate students are to some extent not compliant to the problem solving skills needed by the industry.

5.2 Vertical Linkages

Vertical linkages were included in this thesis to capture the user-producer relationships that initiated the term of a national system of innovation. Fruitful connections between seller and buyer require the flow of qualitative information in order to stimulate and develop innovative capabilities on both sides of the relationship; the empirical findings show that no such information flows from Turkish customers to the company. The need for such information is of course severely diminished by the fact that the company has no research and development facilities in Turkey. It is further cemented by the comparably negligible proportion made up by the Turkish end market in the company's aggregate global sales. Without customer feedback having a possible role in the development of technologies there is obviously no

apparent need for a long term strategy concerning such communication. This lack of communication may have two detrimental effects on the aggregate capabilities present in the Turkish system of innovation. Firstly, customers that are not conferred with in developing new technologies or adapting existing technologies to new user situations will not experience a growth in their 'customer competence'. The customers will of course not fill the position of a demanding customer towards this particular company (as no such function is allowed due to the lack of communication channels), but additionally, imagining the system as a chained user-producer network, this may also have a negative effect on the level of functionality demanded from other Turkish companies. Secondly, the company will offer no technologies that are specifically designed to Turkish user situations. This may lead to technologies and products performing at a sub-optimal level when faced with specific Turkish needs. This weakness may of course be lessened if the company is faced with direct domestic competition (where a Turkish company will offer technologies more adapted to needs in its home market); however, this is not the case for the company in this study. If other Turkish companies are not challenged by ever growing needs of their domestic customers or the components used in their products are sub-optimal, these effects may of course have a negative effect on, among other things, the export competitiveness of the Turkish industry.

When asking questions on the relationship between the company and Turkish suppliers the answers were surprisingly straight forward; no Turkish suppliers are currently employed by the company. The suggestion from the theoretical discussion that FDI companies often prefer to maintain ties with the suppliers of the mother company was to some extent confirmed by the fact that an overwhelming majority of components were bought from other foreign subsidiaries of the same global company. The reasons for why no Turkish suppliers had been chosen are unclear. The choice of a (external) supplier was made based on technological monitoring of potential suppliers, which would indicate that the

technological levels of Turkish candidates are perceived to be too low compared with foreign suppliers. The company will obviously act as a geographically neutral buyer in the market place; one can not expect that a customer (apart maybe from governmental customers) makes idealistic decisions based on the development of a country's technological capabilities. Turkish suppliers will in this sense miss out on a financially promising (as a foothold with the Turkish subsidiary may work as a boot strap for international supplier contracts) and technologically demanding (provided that the assumption of FDI companies as technologically resourceful companies holds) customer. This may again, as in the previous case with customer interaction, have negative effects on the international competitiveness of the Turkish industry.

The IDP approach classifies stages 1 and 2 (Table 2.3) as developing countries (which corresponds to the more naïve classification of Turkey based on GDP/capita). Stages 1/2 assume the R&D effort of a foreign multinational in a host country to be "adaptation of product and process" (corresponding to Bartlett and Ghoshal's (1990) central-for-global international innovation management strategy). This fits very well with the activities performed by the researched company (no research and development on a basic technological level, but offering projecting services to accommodate the technology to large customers). Quite a large fraction of the unexploited potential for interaction can, in my opinion, be traced to the lacking research and development division. Based on the theoretical presentations made in this thesis this renders a number of network spillovers impossible or, for the company, strategically unsound. The lack of such a division transforms the Turkish subsidiary into a sales, rather than technology, agency. This will in turn lead to a lessened need for qualitative network communication channels intended to increase the innovativeness of the company. It may also give the company a lower need for technological competence which, as described, may lead to highly specialised employees taking on more demanding

projects in other countries or under-utilizing their competencies in Turkey. A lot of the weaknesses discovered in this thesis can thus seemingly be traced to this lacking division in the researched company; it rules out horizontal cooperation of an influential degree, it renders long term strategies for qualitative customer communication somewhat strategically unnecessary, and it may also in fact reduce the technological work content for the company's employees.

When combining theories on national systems of innovation with the technology gap approach, the technological capabilities (or absorptive capacity) residing in an innovation system partly originates from the interactive learning spaces described by Arocena and Sutz (2003). Given the conduct of this particular multinational company and its subsidiary it seems that few (or none) learning spaces are created between this company and the Turkish system of innovation. Following Nonaka and Takeuchi (1995) it thus seems that little organizational knowledge (neither problem solving nor learning capacity) is created and exchanged, as this strongly relies on the processes of socialization and externalization; which obviously require such learning spaces. Paradoxically, due to its sheer size, the company is a large actor in the Turkish economy, but a very weak actor in the innovation system. This company to a large extent internalises its knowledge, and the exploited potential for knowledge spillovers through network linkages is very low.

CHAPTER 6

POLICY IMPLICATIONS AND FUTURE RESEARCH ISSUES

6.1 Policy Implications

The discussion in chapter 2.6 on policies claimed that there are two groups of policy actions related to foreign direct investments; one to attract investments to the country and one to exploit investments already made in the country. Figure 3.5 clearly states that the inflow of foreign investments to Turkey is substantially lower than in a number of comparable countries, despite her geographical and demographical advantages. The previous analysis in Chapter 5 shows that there is a large unexploited potential for development of technological capabilities and knowledge spill-overs resulting from investments (given that the company investigated is relatively representative for its category). Thus, both groups of FDI policies should be viable candidates for further discussions. However, this paper will concentrate on the latter, assuming that the underlying mechanisms are interrelated. This seems a safe assumption to make, as both the investment attractiveness and the interaction attractiveness rely on an established system of innovation that offer the investor a desired level of capabilities and complementarities. Chapter 2.6 showed that, in addition to improving the domestic innovation system, direct policy measures for improving type I spillovers do exist. These are however not as desirable as a more fundamental improvement of capabilities, as a large proportion of them are prohibited by international agreements and too extensive investment requirements may seem unappealing to potential investors. Neither is there in Turkey any established practices for imposing such investment requirements.

The number of possible reasons for the lack of interaction discovered in this paper is of course extremely high and on different level of detail. Finding the exact reasons would pose a tremendously challenging research task, and it is doubtful whether the results would be very interesting as they would probably significantly differ from company to company. But, in order for interactions to occur the foreign company clearly has to be willing and able to interact. 'Willing' implies that financial or strategic incentives for interacting with the local innovation system exists, while 'able' presupposes that the existing innovation system offer the complementarities needed by the company on the quality level demanded. Thus, the lack of interaction can occur when a company is either[55]

- Willing, but unable: The company wishes to interact with local companies as this would present financial or strategic gains, but is not able to due to the low compatibility of the national system of innovation and the comparably low level of technological and organizational capabilities in the country's economic agents.
- Able, but unwilling: The surrounding system of innovation is qualitatively and quantitatively sufficient to offer the services demanded by the foreign company, but the lack of incentives or imposed global restrictions (from the mother division) lead the company to interact outside the national borders.

It would be futile, not to mention enormously overly ambitious, within the frames of this thesis to make specific suggestions for policies that could or should be chosen by the Turkish authorities to amend weaknesses discovered here. However, it is my opinion that policies should be chosen to enable unable and motivate unwilling companies. Obviously, there are large amounts of political work that needs to be done in order to amend the, to say the least, not optimal Turkish macroeconomic climate; especially to lower the levels of inflation and to

[55] These are obviously extremes; most companies will be somewhere between these two situations. However, for analytical purposes, black-and-white situations are more easily grasped.

improve the international reputation of Turkish control of corruption and political stability. This is however outside the scope of this paper.

There is contradictory evidence whether foreign companies are able to interact with Turkish companies. Theoretically, a classification of Turkey as a stage 1/2 country in the IDP approach assumes a medium to low level of absorptive capacity, which in turn would indicate a low level of technological capabilities. The low productivity in central sectors of the economy (seemingly due to the use of outranged technologies in a large informal economy), the low work force participation of educated women, and the high export content of labour intensive products (manufactured exports, see Figure 3.2) would confirm this. The fact that the investigated company performs technology monitoring of potential Turkish suppliers without actually choosing them gives even further indications. However, the Turkish work force is relatively well educated (Figure 3.2), the university environments are active researchers (Table 3.2), and there is a modern part of the industry sectors that performs on a satisfactory productivity level. However, if companies' being unable is the case, possible policy measures could be

- Improve basic education
- Increase the amount of industry participation in university education to make sure that problem solving skills are developed in accordance with industry needs
- Stimulate research and development efforts in domestic companies

There is less evidence to indicate whether companies are willing to interact with Turkish companies. Such information was naturally not easily retrieved in the interviews, and there is little theoretical or macro economical statistics that could give indications. An unfavourable macroeconomic climate would quite possibly render companies unwilling to cooperate with local companies. This is clearly the case in Turkey with high levels of inflation, and low

ratings on control of corruption and political stability, but, as previously mentioned, policy measures for this are not going to be further discussed here. If companies' being unwilling is the case, possible policy measures could be

- Government procurement which would leave non-cooperating companies missing large contracts
- Financial stimulation of intra- and inter-industry cooperation

This paper will not go any further in the discussions on policy measures and their effects; I will however pose some questions in the next chapter on future research issues.

6.2 Future Research Issues

- *The validity of the NSI approach when faced with multinational companies*

In the analysis part of this thesis I mentioned briefly that the NSI approach may fail to describe the interactive conduct of multinational companies. These companies may transcend cultural and geographical borders and ignore being hampered by institutional differences. Research could be made to validate or deny the viability of the approach when faced with highly vertically integrated multinational companies.

- *The importance of FDI companies establishing R&D facilities in the host country*

A central point in the analysis in this thesis was that a large proportion of the potential spill-over effects from FDI companies rely on the presence of an R&D facility in the host country. Research could be made to compare FDI companies with such facilities with companies without and investigate the effects on network interactions with and spill-overs to the host system of innovation.

- *The performance of FDI industry clusters*

This thesis has made the theoretical deduction that collaborating with multinationals are beneficial to the development of absorptive capacity and technological capabilities in the collaboratee. Empirical investigations should be made to confirm or deny this to be the case. Research could be made comparing clusters with FDI companied with clusters without on a number of performance parameters (e.g. export competitiveness, innovation capabilities, or market shares).

- *The importance of industry participation in shaping university curricula*

Several theorists claim (as do I) that one of the main tasks of the (higher) education system is to develop problem solving skills adapted to the needs of the industry. Research could be made to investigate whether the participation of industry agents in shaping the education (through for instance career guidance or provision of guest lecturers) leads to problem solving skills being more closely fitted to 'real life' needs.

- *The effect of locally dependent economic parameters on the behaviour of FDI companies*

In an economy with high presence of locally dependent economic parameters (e.g. corruption, political stability, informal economies, 'clan economies') it is plausible to believe that local companies with locally adapted behaviour and business ethics would perform better than foreign companies compared to economies with a low presence of such parameters. This research could investigate whether such an economic climate affects the behaviour of foreign companies, especially when choosing collaboration partners.

REFERENCES

Abramowitz, M. (1986). Catching Up, Forging Ahead, and Falling Behind. *Journal of Economic History*, 66, 385-406.

Aldrich, H. E., & Wetten, D. A. (1981). Organisation-Sets, Action-Sets and Networks. Making the Most of Simplicity. In P. C. Nyström & W. H. Starbuk (Eds.), *Handbook of Organisational Design Vol. I*. Oxford: Oxford University Press.

Ansoff, H. I. (1957). Strategies for Diversification. *Harvard Business Review*, Sept/Oct, 113-24.

Argyris, C. (1993). *Knowledge for Action*. San Francisco: Jossey-Bass.

Argyris, C., & Schön, D. (1978). *Organizational Learning: a Theory of Action Perspective.* Reading: Addison-Wesley.

Arocena, R. , & Sutz, J. (2003). Knowledge, Innovation and Learning: Systems and Policies in the North and in the South. In J. E. Cassiolato, H. M. M. Lastres & M. L. Maciel (Eds.), *Systems of Innovation and Development. Evidence from Brazil*. Cheltenham: Edward Elgar.

Arocena R., & Sutz, J. (1999). Looking at National Systems of Innovation from the South. Paper submitted to the *DRUID Conference on Innovation Systems*, 9-12th June 1999, Skørping (DK)

AT Kearney (2003). FDI Confidence Index – Global Business Policy Council. *AT Kearney*, September 2003, Volume 6.

Bartlett, C. A., & Ghoshal, S. (1990). Managing Innovation in Transnational Corporations. In C. A. Bartlett, Y. Doz & G. Hedlund (Eds.), *Managing the Global Firm*. London: Routledge.

Baser, D. D., Farrell, D., & Meen, D. E. (2003). Turkey's Quest for Stable Growth. *The McKinsey Quarterly*, 4.

Bower, J. L., & Christensen, C. M. (1995). Disruptive Technologies: Catching the Wave. *Harvard Business Review*, 73, 1.

Breschi S., & Malerba, F. (1997). Sectoral Innovation Systems. In C. Edquist (Ed.), *Systems of Innovation: Technologies, Institutions and Organizations*. London: Pinter Publishers.

Bush, V. (1945). Science - The Endless Frontier. *http://www.nsf.gov/od/lpa/nsf50/vbush1945.htm*

Callon, M. (1993). Is Science a Public Good? Fifth Mullins Lecture, Virginia Polytech Institute, 23 March 1993. In P. E. Stephan & D. B. Audretsch (2000, Eds.). *The Economics of Science and Innovation. Volume I*. Northampton: Edward Elgar Publishing.

Carlsson, B., & S. Jacobsson, S. (1997): Diversity Creation and Technological Systems: a Technology Policy Perspective. In C. Edquist (Ed.). *Systems of Innovation: Technologies, Institutions and Organizations*. London: Pinter Publishers.

Chesbrough, H. W., & D. J. Teece, D. J. (2002). Organizing for Innovation: When is Virtual Virtuous?. *Harvard Business Review*, August.

CIRCLE 2004
Centre for Innovation, Research and Competence in the Learning Economy. *Plan of Action, 2004-03-23*. Lund: Lund University.

Cohen, W. M., & Levin, R. C. (1989). Empirical Studies of Innovation and Market Structure. In R. C. Schmalensee & R. Willig (Eds.), *Handbook of Industrial Organization* (pp. 1059-1107). Amsterdam: Elsevier.

Cohen, W. M., & D. A. Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1).

Conceição, P., M. V. Heitor, M. V., & B.-Å. Lundvall (Eds.) (2003). *Innovation, Competence Building and Social Cohesion in Europe. Towards a Learning Society*. Cheltenham: Edward Elgar, Cheltenham.

Cooke, P., & Schienstock, G. (1996). Structural Competitiveness and Learning Regions. Paper prepared for the *EMOT 4th Workshop: "Economic Performance Outcomes in Europe: the Role of National Institutions and Forms of European Organization"*. WZB Berlin, Jan 30 – Feb 1

Cooper, R. G. (1993). *Winning at New Products, Accelerating the Process from Idea to Launch (2nd ed.)*. Addison-Wesley Publishing Company, Inc.

Coriat, B., & Weinstein, O. (1999). Organization and Institutions in the Innovation Generation – Towards a Theory of "Corporate Systems of Innovation". Paper submitted to the *DRUID Conference on Innovation Systems*, 9-12th June 1999, Skørping (DK)

Dodgson, M. (2000). *The Management of Technological Innovation – An International and Strategic Approach*. Oxford: Oxford University Press.

Domaç, I. (2004). Explaining and Forecasting Inflation in Turkey. *World Bank Policy Research Paper 3287*, April.

Dosi, G., Freeman, C., Nelson, R., Silverberg, G., & Soete, L. (Eds.) (1987). *Technical Change and Economic Theory*. London: Pinter Publishers.

Dunning, J. H., & Narula, R. (1996). The Investment Development Path Revisited. Some Emerging Issues. In J. H. Dunning & R. Narula (Eds.). *Foreign Direct Investment and Governments*. New York: Routledge.

Dutz, M., Us, M., & Yilmaz, K. (2003). *Turkey's Foreign Direct Investment Challenges: Competition, the Rule of Law, and EU Accession*. http://www.cie.bilkent.edu.tr/fdi.pdf.

Edquist, C. (2003). Systems of Innovation – A Critical Review of the State of the Art. Draft for chapter in J. Fagerberg, D. Mowery & R. Nelson (Eds.). *Handbook of Innovation*. To be published by Oxford: Oxford University Press.

C. Edquist, C. (1997). Systems of Innovation Approaches – Their Emergence and Characteristics. In C. Edquist (Ed.), *Systems of Innovation: Technologies, Institutions and Organizations*. London: Pinter Publishers.

Edquist, C., & Hommen, L. (1999). Systems of Innovation: Theory and Policy for the Demand Side. *Technology in Society*, 21, 63-79.

Edquist, C., & Johnson, B. (1997). Institutions and Organizations in Systems of Innovation. In C. Edquist (Ed.), *Systems of Innovation. Technologies, Institutions and Organizations*. London: Pinter.

Edquist, C., & Lundvall, B.-Å. (1993). Comparing the Danish and Swedish Systems of Innovation. In R. R. Nelson & N. Rosenberg (Eds.), *National Systems of Innovation: a Comparative Study*. Oxford: Oxford University Press.

Edquist, C., Eriksson, M.-L., & Sjögren, H. (2000). Collaboration in Product Innovation in the East Gothia Regional System of Innovation. *Enterprise & Innovation Management Studies*, 1, 37-56.

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review,* 14(4), 532-50.

Emerson, R., & Cook, K. (1984). Exchange Networks and the Analysis of Complex Organizations. *Research in the Sociology in Organisations*, 3.

Erdilek, A. (2003). A Comparative Analysis of Inward and Outward FDI in Turkey. *Transnational Corporations*, 12(3), 79-105.

Fagerberg, J. (1995). User-Producer Interaction, Learning and Comparative Advantage. In J. Fagerberg (Ed.) (2002), *Technology, Growth and Competitiveness*. Cheltenham: Edward Elgar.

Fagerberg, J. (1987). A Technology Gap Approach to Why Growth Rates Differ. In J. Fagerberg (Ed.) (2002), *Technology, Growth and Competitiveness*. Cheltenham: Edward Elgar, Cheltenham.

Freeman, C. (1987). *Technology Policy and Economic Performance: Lessons from Japan*. London: Pinter.

Freeman, C. & F. Louçã, F. (2001). *As Time Goes By: from the Industrial Revolutions to the Information Revolution*. Oxford: Oxford University Press.

Gadde, L.-E., & Håkansson, H (2001). *Supply Network Strategies*. Chichester: John Wiley & Sons, Ltd.

Goldin, C. (1994). The U-shaped Female Labor Force Function in Economic Development and Economic History. *National Bureau of Economic Research*, http://www.nber.org/papers/w4707.pdf

Gu, S. (1999). Concepts and Methods of NIS Approach in the Context of Less-Developed Economies. Paper submitted to the *DRUID Conference on Innovation Systems*, 9-12th June 1999, Skørping (DK)

Göle, N. (2000). Global Expectations, Local Experiences: Non-Western Modernities. In W. Arts (Ed.), *Through a Glass Darkly*. Brill.

Henderson, R. M., & Clark, K. B. (1990). Architectural Innovation: the Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, 35, 9-30.

Holmen, E., Håkansson H., & Pedersen, A.-C. (2003). Designing and Monitoring a Supply Network. Paper for the *19th Annual IMP Conference*, 4-6 September 2003, Lugano, Switzerland

Håkansson, H., & Snoheta (1995). *"Developing Relationships in Business Networks"*. International Thomson Business Press.

Jarillo, J. C. (1988). On Strategic Networks. *Strategic Management Journal*, 9(1), 31-41.

Jarillo, J. C., & Ricart, J. E. (1987). Sustaining Networks. *Interfaces*, 17, 82-91.

Johnson, B., & Lundvall, B.-Å. (2003). Promoting Innovation Systems as a Response to the Globalizing Learning Economy. In J. E. Cassiolato, H. M. M. Lastres & M. L. Maciel (Eds.), *Systems of Innovation and Development. Evidence from Brazil*. Cheltenham: Edward Elgar.

Johnson, B. (1992). Institutional Learning. In B.-Å. Lundvall (Ed.), *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Pinter.

Jorde T. M., & Teece, D. J. (1998). Rule of Reason Analysis of Horizontal Arrangements: Agreements Designed to Advance Innovation and Commercialize Technology. *Federal Trade Commission*, http://www.ftc.gov/opp/global/jorde2.htm.

Kim, L. (2001). Pros and Cons of International Technology Transfer: a Developing Country's View. In S. Lall (Ed.), *The Economics of Technology Transfer*. Cheltenham: Edward Elgar.

Kline, S. J., & Rosenberg, N. (1986). An Overview on Innovation. In R. Landau & N. Rosenberg (Eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth*. National Academic Press.

Kogut, B., & Kulatilaka, N. (1994). Options Thinking and Platform Investments: Investing in Opportunity. *California Management Review*, Winter.

Kvale, S. (1994). *InterView. En introduktion til det kvalitative forskningsinterview*, *Chapter 2, pp. 31-38*. Copenhagen: Hans Reizels Forlag.

Kvinge, T. (2004). *Knowledge Diffusion through FDI – Established Wisdom or Wishful Thinking?*. Working Paper 31/2004, Center for Technology, Innovation and Culture, University of Oslo, Oslo.

Lall, S. (2000). The Technological Structure and Performance of Developing Country Manufactured Exports, 1985-98. *Oxford Development Studies*, 28(3).

Lall, S. (1998. Technological Capabilities in Emerging Asia. *Oxford Development Studies*, 26(2).

Lall, S. (1995). Employment and Foreign Investment: Policy Options for Developing Countries. *International Labour Review*, 134(4-5).

Lall, S. (1993). Promoting Technology Development: the Role of Technology Transfer and Indigenous Effort. *Third World Quarterly*, 14(1).

Link, A. N. (1987). *Cooperative Research Activity in U.S. Manufacturing.* Report to the National Science Foundation, grant PRA 85-212664

López, R., Thomas, V., & Wang, Y. (1998). *Addressing the Education Puzzle – The Distribution of Education and Economic Reforms.* The World Bank.

Lundvall, B.-Å. (1999). National Business Systems and National Systems of Innovation. *International Studies of Management & Organization*, 29(2).

Lundvall, B.-Å. (1998). Why Study National Systems and National Styles of Innovation?. *Technology Analysis & Strategic Management*, 10(4).

Lundvall, B.-Å.(1997). Development Strategies in the Learning Economy. Paper submitted at *STEPI's 10th Anniversary Conference* in Seoul, May 26-29.

Lundvall, B.-Å. (Ed.) (2000). *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Pinter.

Lundvall, B.-Å. (1987). Innovation as an Interactive Process: from User-Producer Interaction to the National System of Innovation. In Dosi, G., Freeman, C., Nelson, R., Silverberg, G., & Soete, L. (Eds.), *Technical Change and Economic Theory*. London: Pinter Publishers.

Lundvall, B.-Å. (1985). *Product Innovation and User-Producer.* Aalborg: Aalborg University Press.

Lundvall, B.-Å., & Borrås, S. (1997). *The Globalising Learning Economy: Implications for Innovation Policy.* Report on seven contributions to the Targeted Socio-Economic Research Programme (TSER) to Commission of the European Union.

Lundvall, B.-Å., Johnson, B., Sloth Andersen, E., & Dalum, B. (2002). National Systems of Production, Innovation and Competence Building. *Research Policy*, 31, 213-31.

Mahoney, J. T. (1995). The Management of Resources and the Resource of Management. *Journal of Business Research*, 33, 91-101.

Maskell, P., & Malmberg, A. (1999). Localised Learning and Industrial Competitiveness. *Cambridge Journal of Economics*, 23, 167-86.

McGrath, R. G. (1999). Real Options Reasoning and Entrepreneurial Failure. *The Academy of Management Review*, Jan.

McKinsey Global Institute (2003). *Turkey – Making the Productivity and Growth Breakthrough*. McKinsey & Company, http://www.mckinsey.com/knowledge/mgi/turkey/

McKinsey & Company (2002). *Multinational Company Investment: Impact on Developing Economies*. McKinsey & Company

Metcalfe, J. S. (1995). The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives. In P. Stoneman (Ed.), *Handbook of Economics of Innovation and Technological Change*. Oxford: Blackwell.

Mintzberg, H. (1979). *The Structuring of Organizations: a Synthesis of the Research*. Englewood Cliffs: N. J. Prentice Hall Inc.

Morgan, G. (1993). *Beyond Method: Strategies for Social Research.* London: Sage.

Morgan, R. M., & Hunt, S. D. (1994). The Commitment-Trust Theory of Relationship Marketing. *Journal of Marketing*, 58, 20-38.

Morisset, J. (2000). *Foreign Direct Investment in Africa – Policies also Matter.* World Bank Paper Draft

Mowery, D. C., & Oxley, J. E. (1995). Inward Technology Transfer and Competitiveness: the Role of National Innovation Systems. In S. Lall (Ed.) (2001), *The Economics of Technology Transfer*, Cheltenham: Edward Elgar.

Mowery, D. C., & Rosenberg, N. (1989). *Technology and the Pursuit of Economic Growth.* Cambridge: Cambridge University Press.

Nelson, R. R. (1993). *A Retrospective.* In R. R. Nelson & N. Rosenberg (Eds.), *National Systems of Innovation: a Comparative Study*. Oxford: Oxford University Press.

Nelson, R. R., & Rosenberg , N. (Eds.) (1993). *National Systems of Innovation: a Comparative Study.* Oxford: Oxford University Press.

Nelson, R. R., & Soete, L. L. G. (1987). Policy Conclusions. In G. Dosi, C. Freeman, G. Silverberg & L. L. G. Soete (Eds.), *Technical Change and Economic Theory*New York: Pinter Publishers.

Niosi, J. (2003). Alliances are not Enough Explaining Rapid Growth in Biotechnology Firms. *Research Policy*, 32, 737-50.

Niosi, J. (2002). National Systems of Innovation are "X-Efficient" (and X-Effective). Why some are Slow Learners. *Research Policy*, 31, 291-302.

Niosi, J., Saviotti, P. P., Bellon, B., & Crow, M. (1993). National Systems of Innovation: in Search of a Workable Concept. *Technology in Society*, 15, 207-27.

Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company. How Japanese Companies Create the Dynamics of Innovation.* New York: Oxford University Press.

Oliga, J. G. (1988). Methodological Foundation of System Methodologies. *System Practice*, 1.

Page, A. L. (1991). PDMA New Product Development Survey: Performance and Best Practices. Presented at the *PDMA Conference in Chicago (MA)*, 13th of November.

Patel, P., & Pavitt, K. (1994). The Nature and Economic Importance of National Innovation Systems. *STI Review*, 14, 9-32.

Perez, C. (1983). Structural Change and Assimilation of New Technologies in the Economic and Social Systems. *Futures*, Oct, 357-75.

Pettersen, A. (1993). *Utvikling av strategiske allianser: Fra et neo-klassisk til et nettverksteoretisk perspektiv på faktorer som påvirker suksess.* Dr.ing. thesis, Norwegian University of Science and Technology, Trondheim.

Polyani, M. (1958). *Personal Knowledge.* London: Routledge.

Polyani, M.(1966). *The Tacit Dimension.* Chicago: University of Chicago Press.

Porter, M. E. (1990). *The Competitive Advantage of Nations.* New York: Free Press.

Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance.* New York: Free Press.

Rath, A. (1993). Technology Transfer and Diffusion. In J.-J. Salomon, F. R. Sagasti & C. Sachs-Jeantet (Eds.) (1993), *The Uncertain Quest: Science, Technology, and Development*. New York: United Nations University Press.

Ringdal, K. (2001). *Enhet og mangfold. Samfunnsvitenskapelig forskning og kvantitativ metode.* Trondheim: Fagbokforlaget Vigmostad & Bjørke AS.

Schmitz, H. (2003). Clusters and Chains: How Inter-Firm Organization Influences Industrial Upgrading. In J. E. Cassiolato, H. M. M. Lastres & M. L. Maciel (Eds.), *Systems of Innovation and Development. Evidence from Brazil*. Cheltenham: Edward Elgar.

Schumpeter, J. A. (1939). *Business Cycles: a Theoretical, Historical and Statistical Analysis of the Capitalist Process.* New York: McGraw Hill.

Shin, 1996. *The Economics of Latecomers.* New York: Routledge.

Sivadas, E., & Dwyer, F. R. (2000). An Examination of Organizational Factors Influencing New Product Success in Internal and Alliance-Based Processes. *Journal of Marketing*, 64(1).

Skinner, B. F. (1969). *Contingencies or Reinforcement.* New York: Appleton-Century Crofts.

Souder, W. E. (1983). Organizing for Modern Technology and Innovation: a Review and Synthesis. *Technovation*, 2, 27-44.

Stake, R. E. (1994). Case Studies. In Denzin & Lincoln (Eds.), *Handbook of Qualitative Research*. Thousand Oaks: Sage Publications.

Stiglitz, J. E. (1997). *Economics 2nd ed*. W. W. Norton & Company, Inc.

Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research. Chapters 3 (pp. 41-7) and 5 (pp. 57-74)*. Newbury Park: Sage Publications.

Sull, D. N. (1999). Why Good Companies Go Bad. *Harvard Business Review*, 77(4).

Tatoglu, E., Glaister, K. W., & Erdal, F. (2003). Determinants of Foreign Ownership in Turkish Manufacturing. *Eastern European Economics*, 41(2), 5-41.

Teece, D. J.(2000). Firm Capabilities and Economic Development: Implications for Newly Industrializing Economies. In L. Kim & R. R. Nelson (Eds.), *Technology, Learning, and Innovation. Experiences of Newly Industrializing Economies*. New York: Cambridge University Press.

Teece, D. J. (1988). Capturing Value from Technological Innovation: Integration, Strategic Partnering, and Licensing Decisions. *Interfaces*, 18, 46-61.

Teece, D. J. (1977). Technology Transfer by Multinational Firms: the Resource Cost of Transferring Technological Know-How. In S. Lall (Ed.) (2001), *The Economics of Technology Transfer*. Cheltenham: Edward Elgar.

Transparency International, 2002. *Transparency International Corruption Perceptions Index 2002*. www.transparency.org

United Nations Conference on Trade and Development, 2004a. *Making FDI Work for Sustainable Development.* Geneva: United Nations.

United Nations Conference on Trade and Development, 2004b. *Partnership for Development: Information and Knowledge for Development.* Issues Note, 11th Session, Sao Paulo, 13-18 June 2004

United Nations Conference on Trade and Development, 2003. *Foreign Direct Investment and Performance Requirements: New Evidence from Selected Countries*. Geneva: United Nations.

United Nations Conference on Trade and Development, 2002. *Report of the Expert Meeting on the Development Dimension of FDI: Policies to Enhance the Role of FDI in Support of the Competitiveness of the Enterprise Sector and the Economic Performance of Host Economies, Taking into Account the Trade/Investment Interface, in the National and International Context*. Geneva: United Nations.

United Nations Conference on Trade and Development, 2001. *The Impact of FDI Policies on Industrialization, Local Entrepreneurship and the Development of Supply Capacity of Developing Countries, in Particular the Least Developed Countries.* Outcome of the Expert Meeting on the Impact of FDI Policies on Industrialization, Local Entrepreneurship and the Development of Supply Capacity, United Nations, Geneva 5-7 November 2001.

United Nations Conference on Trade and Development, 1994. *World Investment Report: Transnational Corporations, Employment and the Workplace*. Geneva: United Nations.

von Hippel, E. (1988). Successful Industrial Products from Customer Ideas*. Journal of Marketing*. 42, 39-49.

Yin, R. K.(1989). *Case Study Research. Design and Methods. Chapter 1, pp. 13-26*. Newbury Park: Sage Publications.

Yoltar, C. (2002). *Technological Change and Economic Performance in Turkey: Analyzing the Turkish 'National System of Innovation' over the 1960-1980 and Post-1980 Periods.* Istanbul: ESST Master Thesis, Istanbul Technical University.

Ögütçü, M. (2002). *How to Improve the Business Environment for Foreign Direct Investment – Globally and in Turkey.* Interview with Mehmet Ögütçü, head of Non-Members Liaison Group and OECD Global Forum on International Investment, in Turkish Daily News, 4th of July 2002.