

Keskusteluaiheita - Discussion papers

No. 462

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SUMMARY OF THE CRITIQUE ON PORTER'S DIAMOND MODEL

**Porter's Diamond Model Modified to Suit
the Finnish Paper and Board Machine Industry**

Kansallinen kilpailukyky ja teollinen tulevaisuus -projektissa tutkitaan, millaista teollista toimintaa voidaan harjoittaa Suomessa menestyksekkäimmin. Siinä tutkitaan menestyneitä vientiyrityksiämme ja pohditaan, miten niiden toimintaympäristöä tulisi kehittää, jotta ne pystyisivät saavuttamaan kilpailuetuja kansainvälisiin kilpailijoihin verrattuna.

Projektin päärahoittajina ovat Suomen itsenäisyyden juhlarahasto (SITRA), Elinkeinoelämän Tutkimuslaitos (ETLA), kauppa- ja teollisuusministeriö (KTM) sekä eri alojen tärkeimmät yritykset.

"The Competitive Advantage of Finland" research project evaluates the competitiveness of Finnish export industries and crucial elements behind their performance. The project focuses on what kind of industrial activities have the best possibilities for success in Finland.

The project is organised by Etlatieto Ltd and financed mainly by the Finnish national Fund for Research and Development (SITRA), The Research Institute of the Finnish Economy (ETLA), Ministry of Trade and Industry (KTM) as well as major companies in various fields.



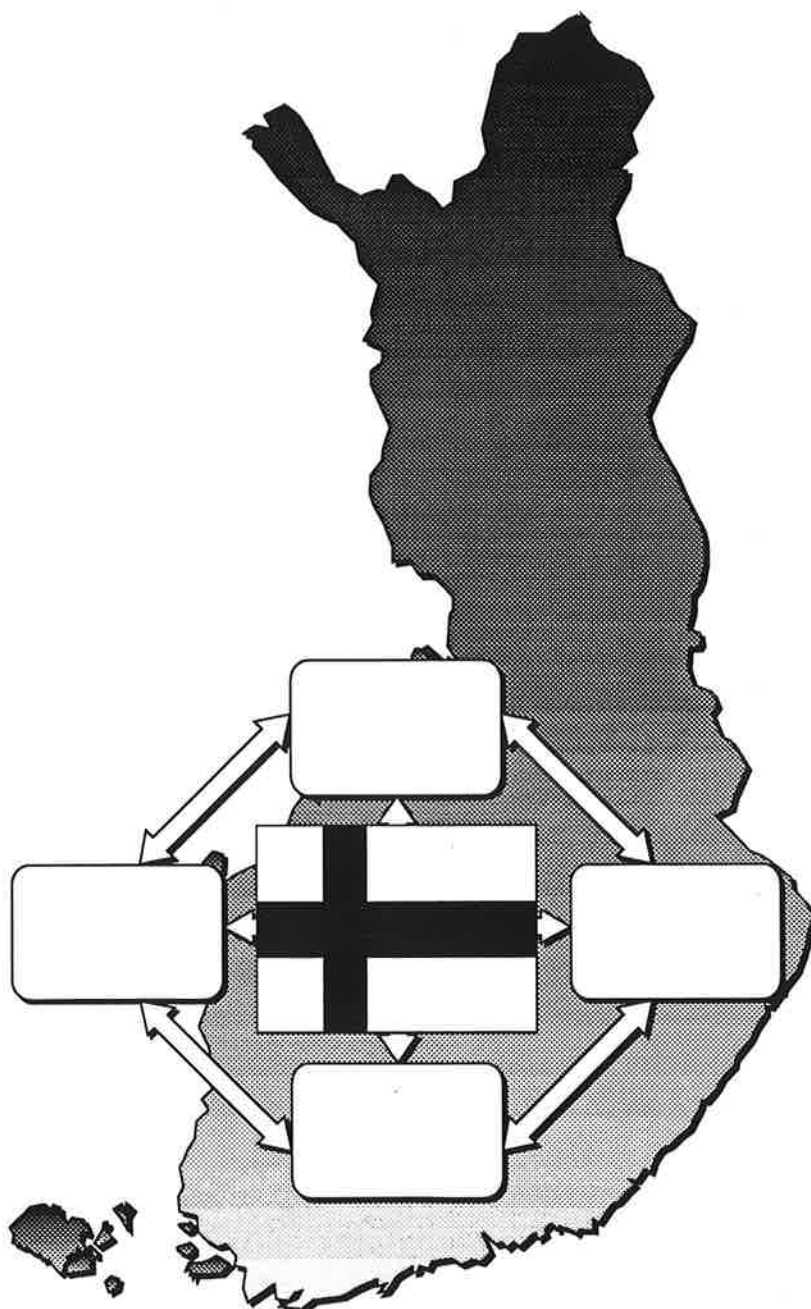
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Kansallinen kilpailukyky ja teollinen tulevaisuus

The Competitive Advantage of Finland

SUMMARY OF THE CRITIQUE ON PORTER'S DIAMOND MODEL Porter's Diamond Model Modified to Suit the Finnish Paper and Board Machine Industry



Penttinen, Risto. SUMMARY OF THE CRITIQUE ON PORTER'S DIAMOND MODEL. Porter's Diamond Model Modified to Suit the Finnish Paper and Board Machine Industry, Helsinki. Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 1994, 82 s. (Keskustelunaiheita, Discussion papers. ISSN 0781-6847; no 462).

TIIVISTELMÄ: Michael E. Porterin kirjassaan "Kansakuntien kilpailuetu" (The Competitive Advantage of Nations) vuodelta 1990 esittämä timanttimalli on julkaisemisensa jälkeen herättänyt suurta mielenkiintoa ja kiihkeää keskustelua sekä tutkijoiden että yritysjohtajien keskuudessa. Porterin kirja piti sisällään kymmenen maan teollisuudesta tehdyt tutkimukset, joissa timanttimallin avulla pyrittiin selittämään kunkin maan kilpailuedun vahvuutta ja syitä. Vuoden 1990 jälkeen samantyyppinen tutkimus on tehty myös useissa alkuperäisen kirjan ulkopuolelle jääneissä maissa. Timanttimalli on suosioistaan huolimatta kohdannut ankaraa kritiikkiä. ETLAn päätettyä tehdä samantyyppinen tutkimus Suomen kilpailukykyisistä klustereista, syntyi tarve tutkia timanttimallin heikkoudet ja parannusehdotukset. Tässä tutkimuksessa esitetään lyhyesti kilpailukyky-käsitteessä ajan myötä tapahtunut muutos, käydään läpi Porterin timanttimallin pääpiirteet sekä selvitetään timanttimallia kohtaan esitetty kritiikki ja mallin parannusehdotukset. Kritiikin ydinkohtia selventämään laaditaan yhteenvetotaulukko, jossa esitetään ensin Porterin alkuperäinen näkemys asiasta, sitten kyseistä asiaa kohtaan esitetty keskeisin kritiikki sekä Porterin vastaus kritiikkiin. Lopuksi pohditaan timanttimallin ja sitä kohtaan esitetyn kritiikin soveltuvuutta Suomen paperi- ja kartonkikonetoimialan kannalta ja ehdotetaan malliin lisäyksiä.

AVAINSANAT: timanttimalli, klusteri, Porterin kritiikki, kansainvälinen kilpailukyky, kilpailuetu, paperi- ja kartonkikonetoimiala

ABSTRACT: Michael E. Porter's diamond model, presented in "The Competitive Advantage of Nations", has since its appearance in 1990 aroused great interest and keen discussion both among researchers and managers. Porter's book contained studies of the economies of ten countries and in each of these the strength and determinants of competitive advantage were analyzed using the diamond model. After 1990 a similar study has been conducted in several countries which were left out of the initial book. In spite of its popularity the diamond model has been severely criticized. When The Research Institute of the Finnish Economy decided to conduct a study of the competitive Finnish industry clusters, the need to find out the shortages of and the suggested improvements to the diamond model became evident. In this study the evolution of the concept of competitiveness, the main ideas of Porter's diamond model and the critique on and suggested modifications to the diamond model are reviewed. In order to clarify the main points of the critique a summary table is compiled where first Porter's initial views, then the core of the critique and Porter's answers are presented. Finally, the diamond model and the critique are discussed and compared to the characteristics of the Finnish paper and board machine industry. Suggestions for modifying the model are made.

KEY WORDS: diamond model, cluster, Porter's critique, international competitiveness, competitive advantage, paper and board machine industry

YHTEENVETO

Michael E. Porterin mukaan perinteiset talousteoriat eivät kykene nykyään tyydyttävästi selittämään kainsainvälistä kilpailukykyä vaan tarvitaan uusi näkökulma ja ymmärrys kilpailukyky-käsitteestä. Porterin mukaan aiempi tutkimus on selittänyt kilpailukykyeroja liiaksi hintakilpailukykyyn nojaten ja unohtanut monet muut tärkeät tekijät. Esimerkiksi klassikoiksi tulleet Adam Smithin ja David Ricardon teoriat selittävät kilpailukykyä joko absoluuttisten tai suhteellisten kustannusten pohjalta. Porter on aiemmissa kirjoissaan lanseerannut käsitteen kilpailuetu, joka hintakilpailukykyyn lisäksi pitää sisällään vaikeammin mitattavia seikkoja kuten teknologisen kilpailukykyyn (esimerkiksi tutkimuksen, tuotekehityksen ja innovaatioiden muodossa) sekä teollisuuden kansainvälistymisen ja kyvyn reagoida nopeasti markkinoiden muutoksiin. Tämänkaltaisia kilpailukykyyn tekijöitä kutsutaan usein myös reaalisiksi kilpailukyvyksi.

Kirjassaan "Kansakuntien kilpailuetu" vuodelta 1990 Porter laajentaa aikaisempia teorioitaan ja luo mallin, jolla hän selittää kansakuntien kilpailuedun syitä ja vahvuutta. Porter tosin toteaa, että kansakunnan tasolla ei voida kilpailuedusta puhua vaan oikea taso kilpailuedun tutkimiselle on toimiala tai jopa yksittäinen yritys. Mutta toimialan menestykselle on ratkaisevan tärkeää, millaisessa ympäristössä se toimii eli millainen kansakunta sillä on kotinaan. Kymmenessä maassa toteutetun laajan tutkimuksen pohjalta Porter kehittää niin sanotun timanttimallin, jonka neljä särmää muodostuvat tuotantotekijöistä, kysyntätekijöistä, kilpailuoloista sekä tuki- ja lähialoista. Lisäksi timanttiin vaikuttavat ulkopuolisina tekijöinä valtio ja sattuma. Timantin neljän tekijän vahvuudesta ja niiden yhteistoiminnasta muodustuu vahva toimiala, jota Porter kutsuu klusteriksi. Klusteri ei ole toimiala sanan perinteisessä merkityksessä vaan käsite, joka rikkoo toimialarajoja. Klusterin muodostavat toiminnallisesti toisiinsa liittyvät ja toisiaan tukevat yritykset ja yhteisöt virallisesta toimialaluokituksesta riippumatta. Esimerkiksi Suomen metsäklusterissa on yrityksiä ja laitoksia metsäteollisuudesta, metalliteollisuudesta, kemianteollisuudesta, konsultointitoimialalta sekä tutkimuksen piiristä.

Porterin timanttimalli on suosioistaan huolimatta saanut osakseen ankaraa kritiikkiä. Kritiikkiä on erityisesti esitetty maissa, joiden teollisuudesta on Porterin mallilla tehty tutkimus joko alkuperäiseen kirjaan tai sen jälkeen. Siksi nyt, kun Elinkeinoelämän Tutkimuslaitos ETLA on päättänyt toteuttaa samantyyppisen tutkimuksen myös Suomessa, on tärkeää selvittää, mitä asioita timanttimallissa on kritisoitu ja minkälaisia parannusehdotuksia esitetty. Kritiikki voidaan jakaa yhdeksään pääalueeseen, jotka ovat 1) kilpailuedun maantieteellinen sijainti, 2) suorat ulkomaiset investoinnit, 3) pienet avoimet taloudet, 4) luonnonvaroihin perustuvat toimialat, 5) kansallinen kulttuuri, 6) käytetty metodologia, 7) makrotaloudelliset muuttujat, 8) mallin dynamiikka sekä 9) mallin kurinalaisuus.

Porter ja kriitikot ovat eri mieltä kilpailukykyyn alueellisesta sijainnista. Porterin mukaan kilpailuetu syntyy pienellä alueella lähellä olevien yritysten, asiakkaiden, alihankkijoiden ja tutkimusyhteisöjen tiiviin vuorovaikutuksen tuloksena. Tärkeimpien tuotantotekijöiden on Porterin mielestä löydettävä toimialan kotipesästä. Kriitikot viittaavat uuteen kansainvälistymistutkimukseen ja toteavat, että monet yritykset ovat tänä päivänä jo luoneet itselleen kansainväliset verkostot, joiden kautta ne pystyvät hyödyntämään eri maissa sijaitsevia asiakkaita, alihankkijoita, tutkimustietoa, raaka-aineita ja muita tuotantotekijöitä. Ne eivät siis ole enää riippuvaisia kotipesästään, kuten Porter väittää. Lisäksi kriitikot huomauttavat, että ulkomaiset suorat sijoitukset ovat edesauttaneet tällaisen kehityksen syntymistä ja on mahdotonta enää sanoa, onko kotimainen vai ulkomainen yritys hyödyllisempi jollekin maalle. Pääasia on, että yritystoimintaa ja työpaikkoja on.

Porterin timanttimallin soveltuvuutta erityisesti pienten avointen talouksien sekä luonnonvaroi-

hin perustuvien toimialojen tutkimiseen on epäilty. Kriitikoiden mukaan pienessä maassa ei aina ole mahdollista ylläpitää Porterin vaatimaa kilpailua ja lisäksi pienten maiden yritykset kansainvälistyvät ja joutuvat nopeammin riippumattomiksi omista kotipesistään kuin suurten maiden yritykset. Porterin näkökulmaa kritisoidaan liian Yhdysvallat-keskeiseksi ja hänen mielipiteitään pidetään Yhdysvaltain kulttuurissa syntyneinä.

Kriitikot pitävät Porterin metodologiaa lepsuna ja jotkut jopa väittävät, että hänen johtopäätöksensä olisivat samat ilman minkäänlaista tutkimusta. Lisäksi kriitikot huomauttavat, että makrotaloudellisia muuttujia on turha unohtaa vaan ne on edelleen hyödyllistä pitää analyysissä mukana. Joidenkin kriitikoiden mielestä Porterin timanttimallin lisäksi esittämä kilpailuedun vaihemalli ei ole pätevä selittämään kansakunnan kehitystä vaan on liian yksinkertaistava.

Kriitikot esittävät timanttimalliin lähinnä sellaisia parannuksia, jotka ottavat alkuperäistä mallia paremmin huomioon kansainvälisen liiketoiminnan. Parannetuista malleista monitimanttimalli (multiple-linked diamond) on kattavin. Siinä analysoidaan kaikkien yritykselle tärkeiden markkina-alueiden timantit erikseen sekä niiden yhteydet toisiinsa. Resurssien rajallisuuden vuoksi on kuitenkin useimmiten tyydyttävä analysoimaan kansainvälistä liiketoimintaa yhtenä, valtioon ja sattumaan rinnastettavana tekijänä. Tässä tutkimuksessa päädytään siihen, että myös Suomen paperi- ja kartonkikonetoimialaa olisi paras tutkia monitimanttimallilla, mutta käytännön toteustus jäänee kansainvälisen liiketoiminnan huomioimiseen yhtenä ulkopuolisista tekijöistä. Lisäksi analyysiin on syytä ottaa huomioon myös makrotaloudellisia muuttujia kuten hintoja.

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1. INTRODUCTION

1.1 Background

This paper is written related to the Advantage Finland project led by ETLA, the Research Institute of the Finnish Economy. The project seeks to identify competitive clusters in the Finnish economy and explain their competitive advantage based on the model presented by Michael Porter in his book "The Competitive Advantage of Nations",¹ and in his article in Harvard Business Review.² The project is made up of several studies conducted by researchers of ETLA and students of Helsinki School of Economics and Business Administration and Helsinki University of Technology, and will culminate in the research report in spring 1994. One of the individual studies will be assessing the competitive advantage of the Finnish paper and board machine industry. In this paper Porter's theoretical framework on competitive advantage, the so called diamond model, is modified to suit the case of the Finnish paper and board machine industry. The conclusions of the paper will be used in the study on competitive advantage of the Finnish paper and board machine industry.

1.2 Research objective and point of view

The objective of this paper is to modify Porter's diamond model to suit the Finnish paper and board machine industry. Porter's diamond model has been used to analyze the competitive advantage of different industries in several countries, first in Porter's book and later in separate studies. Finnish industries have, however, not yet been analyzed with this framework and in order to be able to compare the results from Finnish industries with the studies from other countries, the researchers of ETLA decided to use Porter's model as a starting point for their study. Porter's framework has, in spite of its wide usage, been criticized, especially when it comes to applying it to industries in small and open economies, like Finland.³ One of the most active critics, Alan M. Rugman, concludes that "rather than using the Porter formula to study issues of international competitiveness in a mechanical fashion, scholars must consider it only as a starting point and be careful to modify it for their research in international business."⁴ Therefore, the emphasis in this paper is on the critique. Based on the critique and the basic characteristics of the Finnish paper and board machine industry Porter's framework is modified so that it can be used in the study on competitive advantage of the Finnish paper and board machine industry.

1.3 Research problem

The research problem of this paper is: *how should Porter's theoretical framework be modified*

¹ Porter 1990b

² Porter 1990a

³ Management International Review for example offered a special issue, 1993:2, solely for the critical analysis of Porter's diamond model.

⁴ Rugman 1993, 6

to suit the case of the Finnish paper and board machine industry?

1.4 Research questions and their relevance

The following research questions are posed in order to answer the research problem:

1) How has the concept of competitiveness developed?

The first research question is relevant because it is important to know where Porter stands relative to earlier research in the field of competitiveness. This gives a broader view and enables understanding Porter's assumptions and omissions and how important they are to the case of the Finnish paper and board machine industry. This research question is answered in part 2.

2) What does Porter's model say about the creation of competitive advantage in an industry?

This question is relevant because it is necessary to know what the main points in Porter's study are in order to understand the critique presented. This research question is answered in part 3.

3) How has Porter's model been criticized?

The critique of Porter's diamond model has partly been so hard that it would be irresponsible not to review it when intending to use the model. Moreover, much of the critique has covered issues of relevance to small open economies like Finland. This research question is answered in part 4.

4) How has Porter's model been modified?

This question is relevant because it is necessary to know the different modifications proposed by the critics in order to find the modifications best suited to the Finnish paper and board machine industry.

1.5 Methodology

The research method of this paper is literature review. The emphasis is on reviewing the writings criticizing the diamond model. Also information concerning the concept of competitiveness and the characteristics of the Finnish paper and board machine industry are sought in the literature available.

1.6 Limitations of the paper

There would be a vast amount of published research and writings available discussing the same topics as Porter's diamond model and proposing different conclusions than those of Porter's. Because of limited space and time this paper concentrates solely on writings in which Porter's diamond model is actually criticized. It is believed that these articles contain the main arguments against Porter's ideas and therefore also speak for a larger body of research.

Because the aim of the paper is to modify Porter's diamond model to suit the Finnish paper and board machine industry, the conclusions of the paper cannot as such be used in the context of some other country or some other industry. The critique towards the diamond model is compared to the characteristics of the paper and board machine industry in Finland, i.e. in a small and open economy. The conclusions therefore probably don't apply to a similar or even the same industry in a larger country. But part four as such, the critique towards the diamond model, is of course general and not restricted to the specific situation of the Finnish paper and board machine industry. Only the conclusions in section six are specifically drawn concerning the situation of the industry in question.

1.7 Structure of the paper

The paper is written in the order of the research questions presented above. Parts two to four each give the answer to one research question. The first part of the paper is the introduction. It covers the background, the research objective, the research problem, the research questions, and the limitations of the paper. Also the structure of the paper is explained.

The second part of the paper gives a historical perspective on the development of the concept of competitiveness. In this part the aim is to create the understanding of where Porter stands in the field of research and the previous scientific work on competitiveness. This part answers research question number one.

The third part of the paper reviews briefly Porter's theory on competitive advantage in an industry. This part answers research question number two.

The fourth part of the paper reviews the critique presented towards Porter's diamond model. This part answers research question number three.

The fifth part of the paper reviews the modifications and additions made to Porter's diamond model by the critics. This part answers research question number four.

In the sixth part of the paper the research problem is answered by discussing the critique of the diamond model and the main characteristics of the Finnish paper and board machine industry. Based on this comparison the necessary modifications to Porter's diamond model are made. These modifications together with the comments presented are the conclusions of this paper.

2. THE CONCEPT OF COMPETITIVENESS

In this part of the paper the traditional theories on price or cost competitiveness, the concepts of real competitiveness and Porter's competitive advantage, and the school of Schumpeterian dynamics are briefly presented.

2.1 Traditional theories

Traditionally competitiveness has been seen as price or cost competitiveness as in the famous theories by Adam Smith, David Ricardo and later Eli Hecksher, Bertil Ohlin and Paul Samuelson.⁵ In Smith's theory of absolute advantage countries export the goods in the production of which they have an absolute cost advantage compared to other nations. Smith presented the theory in his book "Wealth of Nations" already in 1776.

In his book "On the Principles of Political Economy and Taxation" in 1817 Ricardo broadened Smith's theory and established the principle of comparative advantage. He stated that a nation gains from trade by exporting the goods or services in which it has its greatest comparative advantage in productivity and importing those in which it has the least comparative advantage. According to this principle a nation gains from trade even if it cannot produce anything at lower cost than its trading partners. It is enough that the nation can produce some good at a comparatively less higher cost than some other good.

The theory named after Eli Hecksher and Bertil Ohlin was developed gradually by the two Swedish academics during a period from 1919 to the 1930s. The Hecksher-Ohlin theory predicts that countries export the products that use their abundant factors intensively. A factor is abundant in a country if there is a higher ratio of the factor to other factors in the country than in the rest of the world. A product is intensive in the use of a factor if the factor costs are a higher share of the product's value than they are of the value of other products. Paul Samuelson derived mathematical conditions under which the Hecksher-Ohlin prediction was true.

Common to the traditional theories on competitiveness is that they have tried to explain differences in competitiveness between countries with differences in the costs of resources or final goods. Because of the great influence of these theories on modern research, most studies on competitiveness, also on the industry level, have concentrated on the development of costs and prices. But according to several recent studies, the development of costs or prices has not been able to explain the differences in competitiveness in different countries and industries.⁶ The traditional theories on absolute and comparative advantage only concentrate on the prices of domestic factors of production. However, competition today is increasingly international and firms can source factors from abroad. Competitiveness thus depends on other factors in addition to the prices and costs of domestic factors. These are presented next in the part concentrating on real competitiveness.

⁵ See Lindert 1991, 18-41, for a more precise discussion on the traditional theories of competitiveness.

⁶ Pours and Kero 1992, 23.

2.2 Real competitiveness

Product differentiation in industrialized countries has gone far. As the product's degree of working up grows, the importance of prices and costs as means of competing decreases. In an environment of rapid change and technological development the importance of technology and innovations as means of gaining competitive advantage grows.⁷ In the current international environment, a company's ability to innovate is rapidly becoming the primary source of competitive success.

According to Bartlett and Ghoshal the advantages once gained by exploiting global scale economies or arbitraging imperfections in the world's labor, materials, or capital markets have eroded over time. Today successful companies must be sensitive to market or technological trends no matter where they occur, creatively responsive to worldwide opportunities and threats, and able to exploit their new ideas and products globally in a rapid and efficient manner.⁸ The importance of price competitiveness has diminished because of the rising costs of R&D, the narrowing technology gap between countries and companies, and the shortening of product life cycles.

Peura and Kero divide competitiveness into two broad categories, which should encompass all the determinants of competitiveness. The first is the traditional price or cost competitiveness and the second is called real competitiveness, as illustrated in table 1. Real competitiveness is divided into the competitiveness of technology and the internationalization of the industry. Real competitiveness includes determinants such as quality, technology, advertising, marketing, upgrading of products and firms, and the ability to react quickly to changes in the markets.⁹

Table 1: Price competitiveness and real competitiveness.

COMPETITIVENESS		
Price competitiveness	Real competitiveness	
Comparative costs and prices	Technological competitiveness	Internationalization of the industry
<ul style="list-style-type: none"> • Unit labor costs • Producer prices • Export prices • Consumer prices • Profitability 	<ul style="list-style-type: none"> • Research, development, innovation • Transfer and adaptation of technology • Share of high-tech products 	<ul style="list-style-type: none"> • Outward FDI • Inward FDI

Source: Peura and Kero 1992, 24.

⁷ Peura and Kero 1992, 9

⁸ Bartlett and Ghoshal 1989, 115

⁹ Peura and Kero 1992, 24

Price competitiveness and real competitiveness are closely connected to each other but it is easier to formulate mathematical models with which to measure price competitiveness and much more difficult to measure real competitiveness. Dahmén's example clarifies the distinction between these two concepts. Dahmén uses the concepts 'development power', which can be understood as real competitiveness and 'competitiveness', which can be understood as price competitiveness in this paper. He explains the distinction between the static concept 'competitiveness' and the dynamic 'development power' by stating that industry and trade may be internationally competitive, perhaps due to a recent devaluation, but can still have weak development power.¹⁰ The weak development power can be caused by a poor general environment for entrepreneurial activities and therefore long term competitiveness cannot be good. Price competitiveness can be temporarily artificially maintained with government action, e.g. devaluation, but development power, and thus real competitiveness, cannot be created by a devaluation.

2.3 Porter's competitive advantage

Porter himself writes that "The Competitive Advantage of Nations" challenges previous notions such as the role of classical comparative advantages and the importance of static economies of scale in international competition.¹¹

Already in 1613 a study was written where cumulative causations and economies of scale were emphasized as causes of competitiveness.¹² But in neoclassical economic theory from the late 19th century onwards the cumulative causations and dynamic economies of scale were rejected as economic factors. In neoclassical economic theory the nation is like a black box that can only be affected by monetary and tax policy. Companies in the nation are all alike, the so called representative firm. The similarity of economic activities is an effect of the extensive use of mathematics in neoclassic economics and therefore neoclassical theoretical concepts are not sufficient to capture industrial dynamics. They don't make the kinds of micro observations which are essential in building macrotheories of economic development.

The new theory of growth has tried to improve the shortcomings of neoclassic theory. Some of the assumptions of neoclassical theory have been eased and for example increasing returns to scale are allowed. The black box can be affected by factors like education, but the firms are still all alike. In addition to criticizing the traditional theories on comparative advantage, a number of researchers haven't been satisfied with the new theory of growth, either.

In the 1980s and 1990s Michael Porter has probably been the best known critic of the above mentioned economic theories. Porter criticizes main stream economics of concentrating only on factor endowments in the theory of comparative advantage and international trade. Devens writes that Porter's attitude towards the ability of economists to contribute to understanding competitiveness is oversimplified and unjustified. Devens mentions that economists have

¹⁰ Dahmén 1989, 112

¹¹ Porter 1993, 21

¹² Reinert 1993, 58

developed the proofs of differences in consumer tastes as a basis for trade and that this should have fit nicely with Porter's view of demand conditions.¹³ Also Bellak and Weiss find that Porter's critique does not hold. They write that Porter does not take into account modern trade theory, for example concepts developed from the 1960s onwards like mobility of labor, capital and technology, differences in national production functions, variable terms of trade, economies of scale, and diversified economies. According to Bellak and Weiss, for example the neo-factor and neo-technology approaches make endogeneous use of the same variables mentioned as important by Porter.¹⁴ Also Reinikainen takes up this issue and points out that also in the traditional theory it has long been acknowledged that comparative advantage is too simplistic a concept and has to be complemented with other determinants.¹⁵

However, even if Porter's views about the so called traditional economics may be too one-sided, the concept of competitive advantage has become widely used thanks to Porter's work. Competitive advantage is used when also determinants of real competitiveness are meant. According to Porter competitive advantage grows fundamentally out of value a firm is able to create for its buyers that exceeds the firm's cost of creating it. Porter identifies two basic types of competitive advantage: cost leadership and differentiation.¹⁶ The origin of competitive advantage lies in a combination of determinants and the way they are interrelated. According to Dunning, Porter sets out a paradigm within which the determinants of national competitiveness may be identified, and the way in which they interrelate with each other, and offers some hypotheses on the reasons why the significance of these determinants may vary between countries and sectors.¹⁷

Porter aims to explain real competitiveness with his value chain, the five forces of industry competition, and the diamond model. The diamond model is Porter's latest contribution and also the one with the largest point of view. The model tries to explain the competitiveness of industries in the context of their national settings. Innovation is a product of different determinants in the "industry diamond" and only a dynamic "industry cluster" with innovative capabilities is able to sustain long term competitiveness. The creation and upgrading of competitive advantage determine the success of firms both in the export of goods and services, and foreign direct investments. Porter's book "The Competitive Advantage of Nations" aims to present a holistic theoretical framework for the analysis of the determinants of competitive advantage. This is a more holistic view of competitiveness than the famous classic theories on trade presented by Adam Smith and David Ricardo in the eighteenth century.

According to Porter competitiveness based on competitive advantage is longer lasting than competitiveness based solely on costs or prices, which can be the result of devaluations, rich natural resources, government subsidies, low wages, and low interest rates. Price competitiveness can diminish quickly. Some environmental change can suddenly change the factor costs or a competitor with a new production technology may be able to produce at even lower prices. Competitive advantage in e.g. know-how, management of customer relations, or

¹³ Devens 1991, 40-41

¹⁴ Bellak and Weiss 1993, 112

¹⁵ Reinikainen 1991, 42

¹⁶ Porter 1985, 3

¹⁷ Dunning 1990, 9-10

continuous development resulting in innovative capability and upgrading of the product or service is a much safer way to compete than having a low-priced product.

The traditional theories in international economics are macro-level theories with a wide point of view. Their object is the whole nation or industry (industry understood in the superficial level of for example metal industry) and they start the analysis from this level. Often the studies based on these theories are characterized by long time-series with statistics of different variables, but the reasons underlying the variables are only superficially touched upon. These kinds of analyses help to understand the basic trends and big lines of the economy but they pay no attention to the determinants underlying the trends. Porter's idea, on the contrary, is to explain the macro events, the big picture, by first examining the micro-level consisting of activities of individual firms and industries.

In contrast to the traditional theories of competitiveness, Porter sees the industry (industry understood as consisting of companies competing against each other in the same markets) as the natural unit of analysis when analyzing competitiveness. Competitiveness takes place in an industry, because an industry consists of firms competing with each other for the same needs of customers. Therefore competitiveness measured in a firm alone is a too narrow viewpoint and competitiveness measured between different countries is a too large viewpoint. According to Porter the competitiveness of a country is made up of the competitiveness of its firms competing in various industries.

2.4 Schumpeterian dynamics

As noted before, Porter has been widely read and quoted in the 1980s and early 1990s. But according to many writers, for example Dunning,¹⁸ Reinert,¹⁹ Dalum et al.²⁰, Bellak and Weiss²¹ and Reinikainen,²² Porter's thoughts are not new or unique. Some of these writers note that Porter's work lacks reference to current theory, i.e. to other researchers who have addressed the same questions as Porter. Porter is a representant of a school that has criticized and questioned the stringent mathematical rules of neoclassical economics already for some time. Others have been Schumpeter already in the 1920s, Perroux 1950, Dahmén 1950/88, Hirschman 1958, Linder 1961, Freeman 1982, Nelson 1988, and Lundvall 1992. The Austrian/American economist Joseph Schumpeter is regarded as the father of this school of economists who have emphasized innovations and their creation through clusters and linkages within them.²³ They have been of the opinion that the most important factors influencing different competitive advantages in different countries are not possible to be contained in a mathematical model. The assumptions needed in mathematical models are always more or less

¹⁸ Dunning 1991, 9

¹⁹ Reinert 1993, 58-59

²⁰ Dalum et al. 1991, 37

²¹ Bellak and Weiss 1993, 113

²² Reinikainen 1991, 41

²³ Instead of clusters these researchers have used other words with more or less the same meaning. Such words have for example been "development blocks" and "national systems of innovation". For example, Dahmén writes about 'development blocks', a concept with which he refers to a set of factors in industrial development which are closely interconnected and interdependent.

unrealistic.

The school of Schumpeterian dynamics has been an inspiration to Porter's cluster concept with interrelated companies and institutions in a geographically concentrated area. In addition to the Schumpeterian school of thought, Dalum et al. identify also other research traditions which they see as sources of inspiration to different determinants of Porter's diamond model.²⁴ Factor conditions were the sole explaining determinants of competitiveness and international trade in the theories of comparative advantage. (See 2.1 for a review of the main ideas of this tradition.) Firm strategy, structure and rivalry have their origin in industrial economics, Porter's initial area of research. Demand conditions as a determinant of creating internationally competitive products were studied by Linder 1961 and Vernon 1966.

Next the main ideas of the Schumpeterian school are shortly reviewed as seen by Dahmén to enable the reader to compare Porter's diamond model with these ideas and to put Porter in his right context in the field of research.

According to Dahmén Schumpeterian dynamics is characterized by its focus on economic transformation rather than on economic growth, defined as an increase in national product, capital stock and other related broad aggregates like employment, price levels and business cycles. In this respect Schumpeterian dynamics contrasts with the macroeconomic equilibrium theory and the neoclassical and postkeynesian macroeconomic growth models. These traditional economic theories do not analyze underlying processes and disequilibria at the micro level and in markets but instead relations between a number of broad aggregates and the result of such processes.²⁵

Dahmén introduces two operational concepts which according to him give substance to transformation analyses: 'structural tension' and 'development block'. Both refer to complementarities. Dahmén explains: "Economic success at certain stages in a development process might require the realization of one or more specific complementary stages. This implies development potentials. It may lead to a depressive pressure in stages which are 'premature' as long as the complementary ones are missing. This represents a 'structural tension'." The development block concept "refers to a sequence of complementarities which by way of a series of structural tensions, i.e. disequilibria, may result in a balanced situation".²⁶ The uncompleted development block is completed.²⁷

Putting transformation in the centre means focusing on changes through time within and among micro entities. These changes are for example introduction of new production processes, appearance of new products and services, opening up of new markets, exploitation of new sources of raw materials and energy, and the scrapping of the respective old ones. In almost every transformation there is a conflict between new and old things. It is largely a

²⁴ Dalum et al. 1991, 34-35

²⁵ Dahmén 1986, 182

²⁶ Dahmén 1989, 111

²⁷ For empirical evidence on development blocks, see Dahmén, E. *Entrepreneurial Activity and the Development of Swedish industry 1919-1939*. American Economic Association Translation Series. Richard D. Irwin. Homewood. 1970.

matter of innovations and their diffusion as well as creative destruction.²⁸

Like Porter, Dahmén speaks of pressure in the transformation process. A transformation process can for firms mean something between the creation of opportunities or a necessity to adjust and to adapt. In the first case the transformation pressure is positive and in the latter negative. The difference between Dahmén and Porter is, that Porter emphasizes forced change. Firms only innovate when they have to. But according to Dahmén entrepreneurs can, in addition to answering the signals of structural tension in uncompleted blocks, also visualize development blocks in advance and act based on this vision.²⁹

Dahmén doesn't even try to outline a general theory which could possibly be empirically tested, i.e. by econometrics. Instead he provides a tool-box with analytical instruments, which have proved useful in historical analyses.³⁰ In fact, Dahmén writes: "What has now been said should not be taken to mean that transformation analyses ought to replace macroeconomic and neoclassical growth models". According to Dahmén such models should be seen as complements to transformation analyses. In research some kind of synthesis between the different models should be sought.³¹

²⁸ Dahmén 1989, 110

²⁹ Dahmén 1989, 113

³⁰ Dahmén 1989, 109

³¹ Dahmén 1986, 183

3. PORTER'S DIAMOND MODEL

3.1 The diamond model

The question Porter aimed to answer in his study was "Why are certain companies based in certain nations capable of consistent innovation? Why do they ruthlessly pursue improvements, seeking an evermore sophisticated source of competitive advantage?"³² Porter is interested in why a specific country is successful in specific industries. According to Porter the traditional explanations of competitiveness like macroeconomic indicators including exchange rates, interest rates and government deficits, cheap and abundant labor, bountiful natural resources or government policy are not anymore valid for explaining the competitiveness of different nations. None of them is sufficient in itself and in addition to these determinants many more exist. Porter states: "Firms, not nations, compete in international markets."³³ With this statement Porter means that in order to understand the competitiveness of a nation, it is necessary to study its industries and even individual firms in these industries. It is not sufficient to analyze only large aggregates like macroeconomic variables.

Porter states that the only meaningful concept of competitiveness at the national level is *productivity*. Porter defines productivity as the value of the output produced by a unit of labor or capital. Productivity is the prime determinant of a nation's long run standard of living. Only through *upgrading* can an economy sustain productivity growth and the standard of living. Upgrading happens when product quality is raised, desirable features are added, product technology and production efficiency are improved. The companies must be able to compete in more and more sophisticated industry segments and finally develop the capability to compete in entirely new, sophisticated industries.³⁴

Porter argues that there are major country specific attributes that stimulate the competitive advantage of particular industries. According to Porter competitive advantage is created and sustained through a highly localized process. Differences in national values, culture, economic structures, institutions, and histories all contribute to competitive success.³⁵ Porter sees successful global competition of an industry or a firm as a result of the characteristics of the *home base*. A firm's home base is "the nation in which the essential competitive advantages of the enterprise are created and sustained. It is where a company's strategy is set, where the core product and process technology is created and maintained, and where the most productive jobs and most advanced skills are located."³⁶ The home base is also central to choosing the industries to compete in.³⁷

Porter strongly emphasizes the role of *innovation* in the creation of competitive advantage. According to Porter creating competitive advantage in sophisticated industries demands

³² Porter 1990a, 77

³³ Porter 1990b, 33

³⁴ Porter 1990a, 84-85

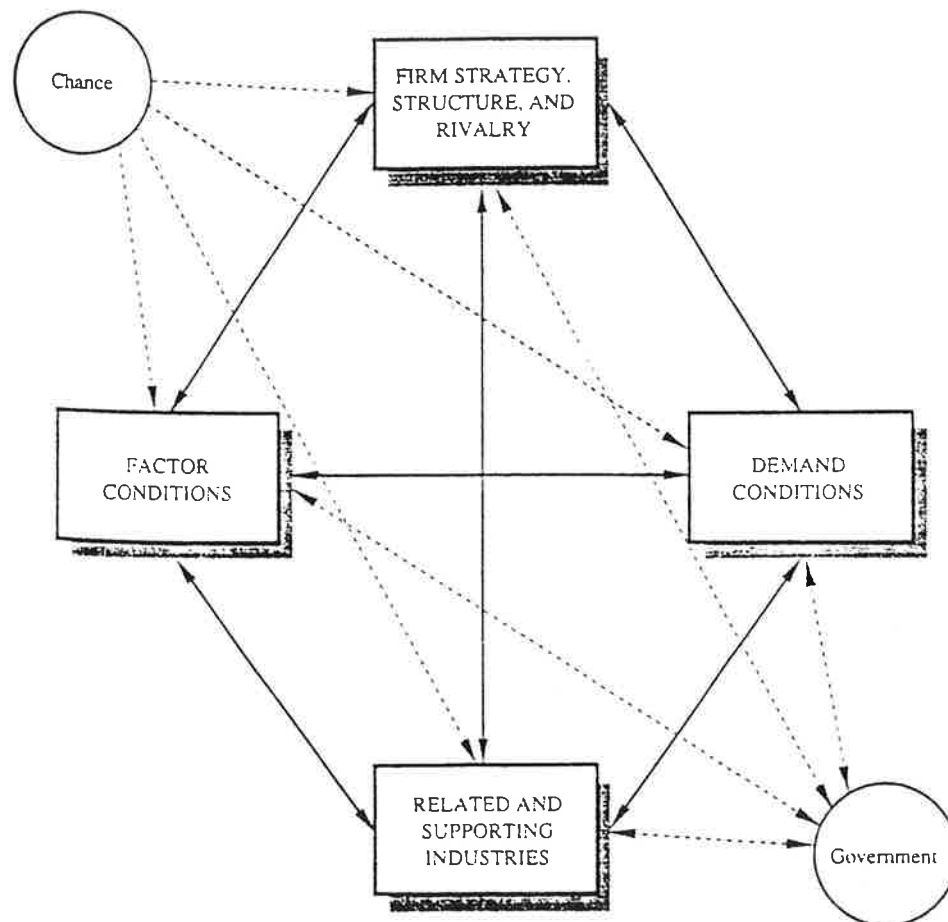
³⁵ Porter 1990a, 74

³⁶ Porter 1990a, 85

³⁷ Porter 1990b, 599

improvement and innovation - finding better ways to compete and exploiting them globally, and relentlessly upgrading the firm's products and processes. "Nations succeed in industries if their national circumstances provide an environment that supports this sort of behaviour", Porter writes.³⁸ According to Porter the answer to why some companies and industries are especially good at innovating is found in the characteristics of the nation in which these companies and industries are based.

Figure 1: The diamond model.



Source: Porter 1990b, 127.

Porter depicts and analyzes the national characteristics of the firm's environment through the *diamond model*. This is the core of Porter's theoretical contribution in "The Competitive Advantage of Nations". The model incorporates the determinants of a company's environment which influence the company's ability to create and sustain competitive advantage in the international marketplace. The "national diamond" is in fact not a diamond of the whole

³⁸ Porter 1990a, 67

country, but of a closer environment of the company. This environment is by Porter called a *cluster*. The diamond model is made up of four determinants, i.e. factor conditions, demand conditions, related and supporting industries and firm strategy, structure and rivalry. In addition to these 'inside' determinants there are two outside forces shaping the environment of firms and industries, namely government and chance.³⁹ See figure 1.

Factor conditions

Porter recognizes hierarchies among factors. He distinguishes among basic factors which are inherited by a nation, and advanced factors which are created in the nation. Basic factors include natural resources, climate, location, and demographics. Advanced factors include communications infrastructure, sophisticated skills, and research facilities. Advanced factors are a product of sustained and heavy investment by individuals, firms or government and they are the most significant for competitive advantage.

Porter also distinguishes between general and specialized factors. For example, Porter states that contrary to conventional thinking, simply having a general work force that is college educated represents no competitive advantage. To support competitive advantage a factor must be highly specialized to an industry's particular needs. Specialized factors are more scarce, more difficult for competitors to imitate, and they require sustained investment to create.

The relationship between basic and advanced factors can be complex. Basic factors can lead to the creation of advanced factors. An example is the Finnish forest industry, where ample wood reserves have through investment led to advanced forest, paper, board, and pulp technology. Or conversely, selective disadvantages in basic factors can create pressures to invest in advanced factors. An example is the creation of automated equipment in a country where the price of labor is high. However, disadvantages can become advantages only under certain conditions. First, they must send companies proper signals about circumstances that will spread to other nations. Second, there must be favourable conditions elsewhere in the diamond.

Demand conditions

According to Porter globalization has not diminished the role of home demand. On the contrary, Porter emphasizes home demand as a feature of great importance in creating sophisticated skills and new technologies. He explains the importance of home demand by stating that firms are typically most sensitive to the needs of their closest customers who thereby create the most important pressure effects for innovation and quality improvement. Also, home demand conditions help build competitive advantage when a particular industry segment is larger or more visible in the domestic market than in foreign markets, like the forest cluster in Finland.

Porter places particular emphasis on the role of sophisticated and demanding domestic customers, who can anticipate the needs of other nations. According to Porter the quality of home demand is much more important than its quantity. Demanding customers pressure companies to meet high standards, to improve, to innovate, and to upgrade into more

³⁹ See Porter 1990a, 77-89 and Porter 1990b, 69-130.

advanced segments. Local values and circumstances are an important factor in creating sophisticated home demand. For example, strict environmental or safety regulations in a country pressure firms to create competitive advantage in these areas. Especially important are local values and circumstances that anticipate future global trends.

Related and supporting industries

According to Porter the successful industries in the world are grouped into clusters, i.e. networks of related and supporting industries in a geographically limited area. An industry's investments in advanced factors of production are likely to have spillover effects to other, nearby industries. Economies external to individual firms are internalized within the cluster.

According to Porter internationally competitive related and supporting industries create advantages in several ways. First, they deliver the most cost-effective inputs in an efficient, early, rapid and sometimes preferential way. Second, the close working relationships in a geographically limited area provide good possibilities for a rapid flow of information and technology which results in innovation and upgrading. For example, companies have the opportunity to influence their suppliers' technical efforts and can serve as test sites for R&D work, accelerating innovation. However, Porter states that the positive effects of proximity are not automatic, the companies and suppliers have to work on the relationships.

A company draws advantage from internationally competitive related and supporting industries. Therefore it is self-defeating for a company or nation to create "captive" suppliers who are totally dependent on the domestic industry and prevented from serving foreign competitors. This idea also applies the other way around: a company can readily source inputs from the international marketplace without a major effect on the industry's innovation.

Firm strategy, structure, and rivalry

Porter identifies differences in national characteristics which affect how companies are created, organized, and managed, as well as what the nature of domestic rivalry will be. These characteristics include strategies, structures, goals, managerial practices, individual attitudes, and intensity of rivalry.

According to Porter the management system and practices in a country must suit some industries especially well. For example, the German management system works well in technical or engineering oriented industries. Countries also differ in the goals that companies and individuals seek to achieve. As an example Porter mentions the Swiss goal of long-term appreciation and thereof resulting investment of money on bank accounts, and on the other hand the USA with an emphasis on risk taking and a large pool of risk capital. Individual motivation to work and expand skills is important. In short, nations tend to be competitive in industries and activities that people admire and depend on.

Porter especially emphasizes domestic rivalry in creating and sustaining competitive advantage. According to Porter domestic rivalry is the most important of all the determinants in the diamond because of the powerfully stimulating effect it has on all the others. Rivalry pressures firms to cut costs, improve quality, and innovate. Domestic rivalry is more important than international rivalry because competition between domestic companies tends to be more intense than competition with foreign firms. Domestic rivalry is more emotive and

personal and domestic competitors have a common domestic environment to compete in. Geographical proximity magnifies the power of domestic rivalry as a firm cannot explain its poor performance compared to its rivals by referring to a less favourable national environment. Domestic rivalry also creates pressure for constant upgrading of the sources of competitive advantage, because the presence of competitors cancels the types of advantages that come from simply being in a particular nation. Such advantages are for example factor costs or costs to foreign competitors who import into the nation.

In accordance with his statements about the importance of domestic rivalry Porter says that domestic mergers and acquisitions are generally a mistake. It is a mistake for companies to try to become competitive by dominating their home market and eliminating home market competitive pressure. It is better to make acquisitions in other countries in order to create a global network. The acquisitions must be integrated and a clear home base established for each product line.⁴⁰

The two outside determinants in Porter's diamond model, government and chance, affect competitive advantage *through* the other four determinants, not alone.

The role of government

According to Porter the role of the government in helping the industries is not a thing of the past. But the role should be understood in a new way. The government should stay in the background and guarantee that the resources needed for growth exist and that they are concentrated in order to enable upgrading of competitive advantage in some chosen industrial clusters. The government should not actively be involved in steering the supply of products and services. The government's economic policies affect the industries indirectly, through the four determinants of the diamond. Porter says that the government only can help by being in the background, the industries must themselves have the initiative. They pull, the government can help by being a pusher and challenger. According to Porter many of the ways in which government tries to help can actually hurt a nation's firms in the long run.

According to Pade⁴¹ Porter is often misunderstood concerning the role of the government. The role of government should not be in directly aiding the companies and industries. Rather, the government should challenge and create pressures for the industries.

Porter mentions some principles that governments should follow in its supportive role. The government should focus on the creation of specialized and advanced rather than general or basic factors. The government should avoid intervening in factor and currency markets with for example subsidized factor prices or devaluations. According to Porter such measures work against the upgrading of industry and the search for more sustainable competitive advantage. The government should enforce strict product, safety, and environmental standards, as these pressure companies to upgrade and improve and may anticipate future international standards. The government should limit direct cooperation among industry rivals. The government should promote goals that lead to sustained investment in human skills, innovation and physical

⁴⁰ A Conversation with Michael Porter, 356

⁴¹ Gardel 1991

assets. A suitable policy measure is a tax incentive for long term capital gains restricted to new investment in corporate equity. The government should deregulate competition. The government should enforce strong domestic antitrust policies. And the government should reject managed trade in the form of orderly marketing agreements, voluntary restraint agreements, or other devices that set quantitative targets to divide up markets.

The role of chance

According to Porter also chance events play a role in the histories of most successful industries. Chance events have little to do with circumstances in a nation and they cannot be influenced by firms. Examples of chance events are acts of pure invention, major technological discontinuities, discontinuities in input costs such as oil shocks, significant shifts in world financial markets or exchange rates, surges of world or regional demand, political decisions by foreign governments, and wars. These kinds of events can create discontinuities that allow shifts in competitive position. New firms and industries can take advantage of the changed situation. In Finland wars have created selective factor disadvantages and thereby catalyzed periods of domestic innovation and creation of import substituting technology. However, if the determinants of the diamond are not present in the nation where the chance event takes place, the industry is not likely to be able to have a long term advantage of the event.

The diamond as a system

The four determinants, or rather four sets of national influences on competitive advantage operate interdependently, not individually. They form an interlinking system. The ability for companies in a specific industry to innovate successfully is dependent on this inter-linking national system. In order to positively affect competitive advantage it is usually required that all four determinants are present. However, according to Porter two elements, domestic rivalry and geographic concentration, have especially great power to transform the diamond into a system. Domestic rivalry promotes improvement in all the other determinants and geographic concentration elevates and magnifies the interaction of the four separate determinants.

The interaction between the determinants is seen in complex dynamics of the diamond. The diamond promotes clustering, i.e. the formation of several competitive industries which are related and mutually supporting. The Finnish forest cluster for example has at its core the pulp, paper and board industries which are supported by producers of machines and equipment for forestry, pulp, paper and board manufacturing, consultant agencies, research institutions, manufacturers of chemical inputs, transportation and marketing firms and other related and supporting industries. The cluster has grown step by step in a mutually supporting process, where the needs of one industry has been met by the creation of competitors in another, related industry.

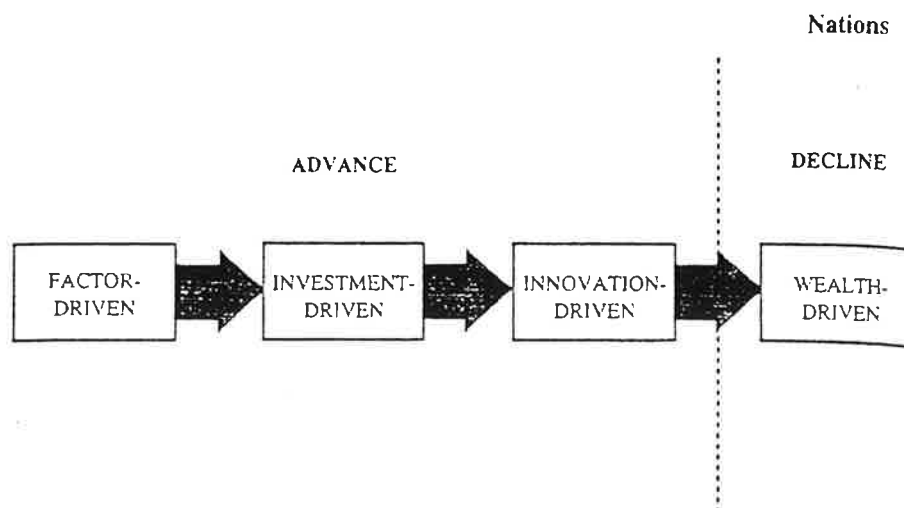
Porter explains the importance of clustering by stating that the creation of advanced factors such as technologies, sophisticated employee skills, design capabilities, and infrastructure is greatly facilitated by vertical and horizontal linkages between successful industries. Geographical proximity is beneficial to competitive advantage because it accelerates diffusion of innovation, facilitates investment in skills, and encourages the development of supporting industries. Once the cluster forms, the whole group of industries becomes mutually supporting and benefits flow forward, backward, and horizontally. Technology and know-how of one

industry spreads through spin-offs and established companies diversify to related fields. Entry from other industries in the cluster spurs upgrading by stimulating diversity in R&D approaches and facilitating the introduction of new strategies and skills. Because suppliers and customers have contact with many competitors, information and innovations diffuse rapidly. The interconnections of the cluster lead to new ways of competing and new opportunities.

Stages of competitive development

In addition to the diamond model Porter also presents a model for describing the different stages of competitive development a nation's industries move through.⁴² Porter suggests four distinct stages of national competitive development: factor-driven, investment-driven, innovation-driven, and wealth-driven. "The first three stages involve successive upgrading of a nation's competitive advantages and will normally be associated with progressively rising economic prosperity. The fourth stage is one of drift and ultimately decline" Porter writes. However, Porter points out that it is *not* inevitable that nations pass through all the stages. Different industries in a nation can be at different stages, but one of the stages will be more characteristic of the nation than the other stages. No nation will fit a stage exactly but the stages are an effort to understand how economies develop, the characteristic problems faced by a nation's firms at different points in time, and the forces that propel the economy to advance or cause it to falter. See figure 2.

Figure 2: Four stages of national competitive development.



Source: Porter 1990b, 546.

In nations in the factor-driven stage virtually all internationally successful industries draw their advantage almost solely from basic factors of production such as natural resources, favorable growing conditions for certain crops, or an abundant and inexpensive labor pool. In the investment-driven stage competitive advantage is based on the willingness and ability of a nation and its firms to invest aggressively. Firms invest to construct modern, efficient, and

⁴² Porter 1990b, 545-565

large-scale facilities equipped with the best technology available on global markets. In the innovation-driven stage the full diamond is in place in a wide range of industries and the interactions of the determinants are strong. The wealth-driven stage leads to decline of competitive advantage in a nation because the driving force in the economy is the wealth that has already been achieved. An economy driven by past wealth cannot maintain its wealth because the motivation of investors, managers, and individuals undermine sustained investment and innovation.

3.2 The implicit assumptions

The synopsis above is in short the theory presented by Porter. But according to Yetton et al.⁴³, Porter's theory extends beyond the formal espoused theory as described above. Lying behind the diamond framework is an implicit theoretical construct that should be made explicit because of its importance to the model's scope and causal explanations. The main points of Porter's implicit theory made explicit by Yetton et al. are here presented.

The core concept underlying Porter's diamond framework is the centrality of innovation to sustained performance. The theory addresses in different ways, and at different levels, questions about what makes innovation sustainable and whether it will be sustained in the same place. It appears that Porter identifies two critical forces on firms: pressure and proximity.⁴⁴

Pressure is the key driver of innovation, and therefore, of performance. Porter sees firms as inactive and unable to overcome inertia and vested interest. They upgrade factors and innovate only under pressure. Porter himself writes in his Harvard Business Review article: "to succeed, innovation usually requires pressure, necessity, and even adversity: the fear of loss proves more powerful than the hope of gain".⁴⁵ Porter also writes: "Few companies make significant improvements and strategy changes voluntarily; most are forced to. The pressure to change is more often environmental than internal."⁴⁶ Porter's logic goes: good factors make the firms lazy, and only problems force them to innovate. The more sophisticated the demand, the more pressure it generates.

Proximity further intensifies the pressure on firms. Porter emphasizes domestic rivalry, local clusters, and physical neighbourhoods. Porter writes: "proximity increases the concentration of information, and thus the likelihood of its being noticed and acted upon."⁴⁷ Proximity increases the speed with which information flows in the industry and innovations diffuse, but proximity also "tends to limit the spread of information outside because communication takes forms (such as face to face contact) which leak out only slowly".⁴⁸

⁴³ Yetton et al. 1992, 16

⁴⁴ Yetton et al. 1992, 16

⁴⁵ Porter 1990a, 76

⁴⁶ Porter 1990b, 52

⁴⁷ Porter 1990b, 157

⁴⁸ Porter 1990b, 157

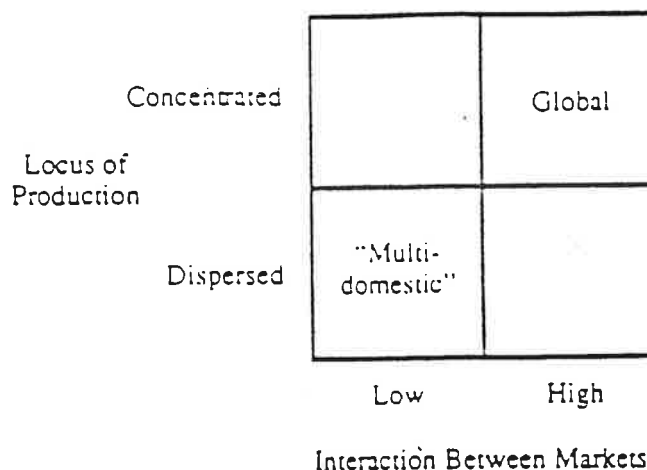
Proximity and pressure together explain many of Porter's views on innovation. They for example explain, why Porter sees that only domestic rivalry can create enough pressure. The closer the rivals, the better. National rivals are good but rivals in the same region or city are even better. "Rivals located close together will tend to be jealous and emotional competitors".⁴⁹

Porter's underlying theory is in contrast to other viewpoints. "It stands in contrast to the alternative Austrian perspective in which firms, or at least some firms, are actively seeking opportunities, looking to generate and capture rents and wealth. Competition as a process is driven by such factors as search, energy and emulation."⁵⁰

Because of his preoccupation with innovation, Porter favours and emphasizes industries that draw on *advanced technologies and sophisticated capital equipment*. Resources are assumed to be commodities whose only contribution can be as a source of upgrading to more innovative, technologically driven industries.⁵¹

Because of his underlying theory, Porter's categorisation of firms is somewhat unconventional. To him firms are either global or multi-domestic. According to Yetton et al. the two key notions underlying the categorisation appear to be the locus of production, which can be either concentrated or dispersed, and interaction between markets - whether what happens in one country is important to the same firm's operations in another country.⁵² This categorisation is shown in figure 2.

Figure 3: Porter's categorisation of global firms.



Source: Yetton et al. 1992, 18.

⁴⁹ Porter 1990b, 157

⁵⁰ Yetton et al. 1992, 17

⁵¹ Yetton et al. 1992, 17

⁵² Yetton et al. 1992, 17

According to Yetton et al. Porter assumes that firms either concentrate, and have a global strategy, or disperse and are multi-domestic. A global strategy typically involves export while dispersing activities involves overseas direct investment. Learning is easier for global companies because their activities are concentrated in one place and information flows faster than in multidomestic companies with dispersed activities.⁵³ Multidomestics have little chances for intra-firm learning because of the geographically dispersed activities, and because the companies consist of separate national operations with little in common. Porter also implies that dispersed, or multidomestic, operations contribute little to national economic performance - either for the headquarters nation, or for host countries.⁵⁴

⁵³ Porter 1990b, 57-59

⁵⁴ Yetton et al. 1992, 18

4. CRITIQUE TOWARDS THE DIAMOND MODEL

In this section the critique presented against Porter's diamond model is reviewed. Porter has answered some, though not all, of this critique and Porter's answers are also presented. It must be noted that this section aims to capture all the main points in the critique towards the diamond model or the study in general. No emphasis is here put on questions of special interest to the Finnish paper and board machine industry. This discussion is reserved to section six: Conclusions.

The critique towards the diamond model and Porter's study in general is in this paper divided into nine parts, which discuss the questions of ¹where the competitive advantage is created, ²whether the diamond model has an appropriate view of foreign direct investment in an MNE, ³whether the diamond model applies to small open economies, ⁴whether the diamond model applies to resource-based industries, ⁵whether Porter pays sufficient attention to national culture, ⁶whether Porter's methodology is valid, ⁷whether Porter's study forgets macro variables, ⁸whether the diamond model is dynamic or static and finally ⁹whether Porter's study is rigorous enough. Because the critique reviewed is scattered and the discussion sometimes looks at the same phenomenon from many different angles, a summary table with the main points of critique is presented to better enable the reader to get a picture of the whole. The table is presented as the tenth point in this section.

4.1 Where is competitive advantage created?

At the core of the criticism towards Porter's diamond model lies the question of where the competitive advantage in an industry is created: within the nation state, or in a transnational setting where the diamonds cross country borders and oceans or where the companies can tap into the diamonds of different countries. The diamond model has perhaps been most criticized of its poor understanding of the activities of multinational enterprises.

Porter argues that despite growing internationalization of companies, the *nation* remains the most important area for a company. Demand conditions are affected by macroeconomic policy, the dynamism of competition by antitrust and trade policy, the level and type of skills by the education system, and attitudes of managers, workers and customers by a national culture. A global strategy merely supplements the competitive advantage created at home base. National virtues create the opportunity to cross borders and it is of crucial importance that companies hang on to those virtues in order to remain successful internationally in the long run. Firms cannot take their management systems or technology and apply them wherever they like. Global activities can help to sustain and upgrade competitiveness but Porter stresses the importance of the home base.⁵⁵

According to Porter advantage arises, when the most dynamic environment for innovation is present. By co-locating product line management, R&D, and some production in that environment, the conditions for rapid innovation are present. This location is the driving force for

⁵⁵ Porter vs Ohmae 1991

the global strategy and activities located elsewhere can be used to reinforce and support the home base, through tapping into labour pools or resources and securing market access. Without central control and integration "the problems of coordinating dispersed production, R&D, and product development among equal subsidiaries in different countries is a next-to-impossible problem. The company with a clear home base in a dynamic location will always innovate faster than the company which is trying to coordinate."⁵⁶ So Porter's argument for the strong localization, the home base, is really based on the speed of innovation, which he sees is fast enough only in a localized diamond.⁵⁷

Porter's views about the possibilities of firms to innovate only in a geographically small area are not shared by most critics. Reinert, Rugman, Dunning, Tryggestad, McKelvey, Yetton et al., Darroch and Litvak, Stewart, Dalum et al. and Reinikainen argue against Porter's view.

Reinert writes that in the same manner as the regional clusters of earlier times gradually developed into national clusters, so will national clusters develop into transnational ones. According to him Porter concentrates too heavily on the nation state. Reinert thinks that Porter is affected by the size of his own home country, the USA.⁵⁸

Rugman's critique is in line with Reinert's. He states that most Canadian companies use a double diamond framework, the North American framework. They think in terms of the North American diamond and cannot rely on just the Canadian diamond. Rugman notes that Porter's view about multinationals only being able to succeed with a strong home country base may still be true for the USA, but it is at least 30 years out of date for Canada, whose firms are highly integrated with the USA.⁵⁹ In this way Rugman seems to agree with Reinert, that the national clusters have already developed, or are developing, into transnational ones. In the transnational setting firms can source factors, seek related and supporting industries, and meet demand and rivalry in "clusters" that cross national borders. The nation state no longer represents the base for a business, a multinational enterprise. In fact Rugman explicitly states, that even the North American diamond must be interpreted as an intermediate step in the development of globally competitive Canadian business. He thus sees a continuing development in the transnational direction. Rugman concludes his view by writing: "Contrary to Porter's thinking, there is no particular reason why a multinational needs a home base."⁶⁰

Porter's diamond model does not include international business activity in the form of multinational enterprises (MNEs).⁶¹ This lack has been criticized by several writers, of whom

⁵⁶ A Conversation with Michael Porter, 355-357

⁵⁷ It must be noted, that when Porter uses the word "localized", he can mean either a cluster which is "domestic", i.e. within national boundaries, or he can mean a cluster crossing arbitrary national boundaries. Important in Porter's argument is the geographical proximity.

⁵⁸ Reinert 1993, 63

⁵⁹ Rugman 1992a, 59. For a thorough discussion of the US/Canadian double diamond framework, see Rugman and D'Cruz 1993.

⁶⁰ Rugman 1991, 64.

⁶¹ Multinational enterprise (also known as multinational corporation or MNC) is here understood as defined by Dunning 1973: the MNE is a firm which owns and controls income-generating assets in more than one country. The transnational enterprise (also known as transnational corporation, TNE or TNC) is understood as by Bartlett and Ghoshal 1989: an integrated network characterized by distributed, specialized resources and capabilities, large flows

Dunning seems to have best captured the main ideas. Dunning writes: "While Michael Porter provides a useful paradigm in identifying the main determinants of national competitiveness, his lack of attention on the ways such competitiveness is affected by the internalization of cross-border markets weakens both the content and force of his thesis".⁶² Porter believes, that the main thrust to improving competitiveness must come from home based companies drawing on domestic resources. But Dunning states that 30–40 % of the sales of the leading industrial MNEs are produced outside their national boundaries and that the value of these sales now exceed that of international trade. According to Dunning the capabilities of MNEs may be influenced by the configuration of diamonds of the foreign countries in which they produce, and that this may affect the competitiveness of the resources and capabilities of the home countries.⁶³ According to Dunning MNEs have been responsible for fostering networks of national diamonds of competitive advantage.⁶⁴

Dunning is left with the impression that Porter considers the global influences on the diamond as an 'add-on' to the domestic influences. According to Dunning it should be the other way around: the domestic influences on the diamond should be considered as only a special case of the global influences. Like Reinert and Rugman, Dunning blames Porter of having a very ethnocentric U.S. way of looking at the world. Dunning is also in line with Reinert and Rugman on the issue of the national diamonds growing towards transnational, or at least regional ones. Dunning writes: "he (Porter) underestimates the quite fundamental changes which have taken place over the last decade or so in their (MNEs) trans-border activities". Dunning continues: "...particularly within Europe, MNEs are one of the main driving forces of economic integration. Through their internalization of intra-EC markets, MNEs are regionalizing the national diamonds of member countries...". Dunning concludes that integration inevitably means national diamonds have to be replaced by supranational diamonds. "The *principle* of the diamond may still hold good - but its geographical constituency has to be established on very different criteria."⁶⁵ Dunning also points out that clustering in a geographically limited area may, after a point, lead to diseconomies of agglomeration.⁶⁶

According to Tryggestad Porter does not address the question of globalization in the sense of what is domestic and what is foreign for a transnational corporation. Tryggestad finds the notion of a national home base to be of a normative character. With it Porter argues for what firms and nations should do in a globalized economy, and less why they do what they really do. According to Tryggestad the home base may be mere wishful thinking on behalf of governmental policy makers.⁶⁷ Tryggestad points out that to Porter ABB is a Swedish company, even if its foreign sales were 84 % of total sales and 79 % of its employees were outside Sweden in 1988. Tryggestad finds this curious and writes that Porter seems to think

of components, products, resources, people, and information among interdependent units, and a complex process of coordination and cooperation in an environment of shared decision making.

⁶² Dunning 1991, 42

⁶³ Dunning 1991, 12

⁶⁴ Dunning 1993, 14

⁶⁵ Dunning 1993, 12

⁶⁶ Dunning 1991, 36

⁶⁷ It cannot go without noticing that Tryggestad hints that Porter's role as an advisor to governments affects his view of the importance of the home base for a nation's companies.

that this MNE is after all Swedish when it comes to the identification with national culture and goals. According to Tryggestad this is a misconception and he points out that it is difficult to find capital that is loyal to some country. An MNE invests where it is most profitable and it can choose between several nations with different government policies.⁶⁸

To make his point more clear, Tryggestad takes an example of the Advantage Sweden -study. Sölvell, Zander and Porter write: "Foreign suppliers have been used when sourcing standardized equipment and components, whereas the proximity within Swedish clusters has facilitated joint development and upgrading of more specialized and more critical products and manufacturing processes."⁶⁹ Sölvell, Zander and Porter further write that "successful tapping of foreign diamonds was *selective*, and could not have worked without the support from a dynamic home base".⁷⁰ Tryggestad argues that technology sourcing is not restricted to the Swedish national setting but is transnational as well and includes *both* sourcing of standardized and more specialized design.⁷¹

Tryggestad writes that it is tempting to interpret Porter as assuming that there are specific national companies, secured through the nationality of ownership and/or management control and that these companies participate in a system of a higher order that seeks to raise the standard of living for the nation's citizens. It seems to Tryggestad that Porter formulates "a theory of national cultural homogeneity, that is, a theory of consensus over roles and goals of a nation." Tryggestad argues that a nation may include several sub-cultures that are closer to geographically distant sites than to the national culture. According to Tryggestad any assumption of a homogeneous national culture that coincides with the geographical boundary of the state is problematic.⁷²

Tryggestad further points out that economic decision making may not be identical with geographical or national space. For example, a European producer may be "closer" to its American supplier than to its European suppliers. Tryggestad is not satisfied with Porter's use of terms like "closeness" or "proximity", for example to suppliers. According to Tryggestad there are at least two ways to understand national space in relation to the economic entities that constitute technological systems. One is concrete geographical space and the other is the more abstract sense of institutional space, for example cultural/political rules and regulations. The two meanings of space may or may not coincide geographically within a nation. People or economic organizations may have close cultural relations to each other but be geographically distantly located, or vice versa be close geographically but distant in a cultural sense. Tryggestad states that a transnational technological system will not necessarily show any identity with goals, policies, or values that a particular government pursues through the state apparatus. As an example of such a transnational system is the transnational corporation, whose decision making and culture are separated from and transcending those of the focal nation state.⁷³

⁶⁸ Tryggestad 1992, 22-23

⁶⁹ Sölvell, Zander and Porter 1991, 196

⁷⁰ Sölvell, Zander and Porter 1991, 197

⁷¹ Tryggestad 1992, 24

⁷² Tryggestad 1992, 22

⁷³ Tryggestad 1992, 24-25

McKelvey writes that Porter overemphasizes the importance of national home markets. According to her the national market may have very little to do with companies' ability to continue innovating, once the companies are international. "MNEs are actors in many markets and Porter's four conditions exist in all these markets/countries; therefore these companies' capacity to innovate may be based on national systems of innovation in many countries and not just one." McKelvey sees this fact as a problem for the validity of Porter's research, because Porter specifically sets out to analyze how a national environment supports industrial innovation.⁷⁴

Yetton et al. have a similar reasoning as McKelvey. They draw evidence from the Australian economy and state that most Australian top manufacturing firms are in less traded industries and operate small to medium scale plants in multiple locations, across many different countries. For these companies home base is not the only research, production or learning site, and may not be the key site. Much learning occurs by frequently building new plants or acquiring foreign companies.⁷⁵

Also Darroch and Litvak see the reality of multinational corporations as such that their value-adding activities are unlikely to be located all in one place. According to these writers the strategic question of MNCs is whether or not to locate different activities in appropriate clusters to optimize global systems.⁷⁶ In their conclusions Darroch and Litvak stress that Canadian managers must have an international approach, a point they see as lacking in Porter's approach.

Stewart sees the boundaries of the diamond as too restricting. According to Stewart world-class demand and competition don't exist in the model, if it is taken literally. Stewart notes that it is true, that the most favorable conditions for competitive firms and industries to develop occur when all of the determinants of competitive advantage are well developed in a national economy. "Such a confluence of favorable factors, however, will not likely often exist in anything but the largest and most complex economies", Stewart writes.⁷⁷

Dalum et al. question the validity of Porter's diamond model as a general theory, which would apply to all industrialized nations and even be used as prognostic. The writers want a systematic presentation and testing of hypotheses and ideas contrary to Porter's idea of a self-enforcing cluster in a geographically limited area. Dalum et al. propose a hypothesis of a diamond-based cluster, which has an inborn tendency to disperse. This tendency would be caused by the international relations which the companies in the cluster acquire outside the national diamond. The international relations would internationalize the diamond in for example the demand and supplier determinants. A successful diamond would also raise the interest of international capital and through mergers and acquisitions the domestic companies would be integrated into multinational enterprises, for example their R&D networks.⁷⁸

⁷⁴ McKelvey 1990, 9-10

⁷⁵ Yetton et al. 1992, 37

⁷⁶ Darroch and Litvak 1992, 71

⁷⁷ Stewart 1992, 11

⁷⁸ Dalum et al. 1991, 35-36

According to Dalum et al. the question of primary importance, which Porter does not ask, is whether the internal dynamics of a cluster works to break up or strengthen the diamond connections in the case of increasing internationalization. Dalum et al. question whether the proximity concept is of similar importance in all industries. Is the nation only a framework for some industries? Does the importance of proximity change over time? Is it possible to make suggestions for the future by looking at the history? Dalum et al. write that Porter's book does not give evidence enough to make conclusions of the future role of the national context in an internationalizing environment. They conclude by noting that it seems that the national home base will have a greater role than many expect, but at the same time a complex network of relations between the national diamonds will emerge. They also point out, that it shouldn't be expected that all diamonds in different countries and industries are as strong and stable, or self-enforcing as Porter seems to believe.⁷⁹

Reinikainen notes that Porter does not take appropriate notice of the new theory of internationalization. Reinikainen points out that the competitiveness of companies from a nation cannot anymore be equalled to the competitiveness of that nation.⁸⁰ Also the advisory committee of the Advantage Finland study, consisting of Finnish top managers and researchers, criticize Porter's view of the home base. According to the committee many companies are international in the sense that they use the determinants of competitive advantage of several different nations.⁸¹

Yetton et al. seem to capture the core issue in the differing opinions of Porter and the writers who criticize his work. They write that Porter limits himself to interaction between markets, i.e. *external* competition, or *inter-firm rivalry*, and overlooks interaction within the firm. Porter's diamond framework implicitly assumes that useful learning can only take place in the home base. Multi-domestics⁸² provide an example of the ability to capture learning and other factors across different locations. This can be called *internal* competition. According to Yetton et al. the diamond exists intra firm and *intra-firm rivalry* can operate highly effectively and it can be done in a way that maximizes learning.⁸³

Also Rugman and D'Cruz note that the diamond model is not valid, operational, in a world of intra-firm and intra-industry trade. They write: "Today there are two way flows of exports and imports across national borders. These have little to do with a nation's home country diamond and cannot be measured by exports alone." According to the writers the sources of international competitiveness stem from successful global corporate strategy.⁸⁴

⁷⁹ Dalum et al. 1991, 37-38

⁸⁰ Reinikainen 1991, 43

⁸¹ Hernesniemi 1993, 21

⁸² According to Yetton et al. 1992, 32 especially one group of firms, multi-domestics, can be successful internationally without exporting much. Yetton et al. define the multidomestic corporation as an organization which competes by locating small to medium sized production facilities in the markets in which it sells, rather than by exporting. Multi-domestics are firms operating in less traded sectors, where they have to use FDI's instead of exports to internationalize. This can be due to e.g. trade barriers, transport costs or the nature of the product. According to Yetton et al. Porter's methodology does not suit firms in these industries as only export figures are used as the critical test of international competitiveness.

⁸³ Yetton et al. 1992, 38

⁸⁴ Rugman and D'Cruz 1993, 28

Ohmae argues in his book "The borderless world"⁸⁵ that a company should strive to become global and shake off its origins. Ohmae argues against nearsightedness of firms. With this he means that multinational firms tend to be dominated by their parent headquarters whose view in turn is dominated by the views of local customers. Because customers are different everywhere, Ohmae speaks for tailoring of products to each market and this requires that the subsidiaries of multinational companies have independence of their parent headquarters.⁸⁶

Porter answers the critique by writing that despite the fact that in global industries, firms operate in many countries, and source inputs and even scientific knowledge from many locations, it is important not to confuse global strategies with the location of competitive advantages. Internationally successful firms have clear home bases for each distinct business. Top management is typically located in this home base, core product and process innovation created and sustained in the home base, and a critical mass of sophisticated production takes place therein. The clusters are so *concentrated, basically to one country*, because competitive advantage arises not from generic resources or basic science but from the ability of a firm to continuously innovate and upgrade. Innovation and upgrading in their turn arise in an environment which provides a concentration of specialized skills, applied technologies, sophisticated nearby customers, suppliers of specialized machinery, and the rapid information flow and pressure that grow out of the presence of several rivals. This critical mass of specialized information, expertise, and suppliers is *not mobile, and cannot readily be accessed by firms based elsewhere*.⁸⁷ Porter and Armstrong point out that problems in areas of education, training, science and technology cannot be solved by sourcing these skills elsewhere. They must be created in the home base in order to attract companies also in the future.⁸⁸

Porter and Armstrong write that it is not correct to understand the diamond model as inconsistent with an international perspective. According to them all firms aspiring to be competitive must adopt an international perspective, but the ability to do so is critically dependent on the characteristics of the home market. "Competing globally cannot cure fundamental weaknesses at home but only accentuates them."⁸⁹ According to Porter and Armstrong Rugman doesn't understand the diamond framework. They write that Rugman fails to distinguish between the geographic scope of competition (for example North American or global) and the geographic locus of competitive advantage, as reflected in the diamond. Competition is global but the sources of competitive advantage are local.⁹⁰

Porter admits that sometimes the relevant economic region can cross national borders, where culture and institutions are similar and physical distances are short. Yet the location of

⁸⁵ Ohmae 1990

⁸⁶ For a comparison of Porter's and Ohmae's views, see: Porter v Ohmae. The Economist 1990:August 4, 55. Kenichi Ohmae is one of the best known authors who propose a contrary view to that of Porter's about the nature of international competition. However, Dalum et al. consider Ohmae's book as a representant of the current fashion in international business, and according to them Ohmae's book contains no methodological analysis of the presented material. See: Dalum et al 1993, 37.

⁸⁷ Porter 1993, 22

⁸⁸ Porter and Armstrong 1992, 8-9

⁸⁹ Porter and Armstrong 1992, 6-7

⁹⁰ Porter and Armstrong 1992, 8

worldclass clusters tends to be contained in relatively *small areas and within countries*.⁹¹ Thus, Porter sees it only as an exception that clusters cross national borders.

Rugman answers Porter and Armstrong and writes that the only point in dispute is the size of the diamond. Rugman agrees with Porter and Armstrong that diamonds can go down to state levels. Rugman calls such diamonds sub-national diamonds. But Rugman criticizes Porter and Armstrong for not being able to take a symmetrical logical step and visualize a double diamond that goes up across national borders. Rugman yet again points out that this is common in smaller nations and that the size of the diamond depends on the strategy of the firm. Multinational firms compete globally, not nationally, Rugman writes. Rugman also points out that even if he believes that education, training, science and technology to some extent can be sourced from the US, he does not believe that upgrading in Canada is unnecessary.⁹²

4.2 Foreign direct investment

According to Porter foreign subsidiaries are not sources of competitive advantage, and they are importers, which is a source of competitive disadvantage.⁹³ "Widespread foreign investment usually indicates that the process of competitive upgrading in an economy is not entirely healthy because domestic firms in many industries lack the capabilities to defend their market positions against foreign firms" Porter writes.⁹⁴ Porter's thinking seems to rule out the possibility that foreign-owned subsidiaries could contribute to the development of a country's industry.

Several writers criticize the views presented by Porter on foreign direct investment (FDI). According to Rugman, and later Rugman and D'Cruz, Porter's book has a flawed understanding of the nature of two-way FDI. The methodology used by Porter permits only an examination of exports and outward FDI, and Porter sees only exports and outward FDI as valuable in creating competitive advantage. Rugman and D'Cruz state that in Canada there is as much inward FDI as outward and the imports of foreign-owned subsidiaries are matched by their exports. Therefore, foreign owned firms act and play as significant a role as do the domestic-owned companies.⁹⁵ Bellak and Weiss agree with Rugman and D'Cruz and point out that the aspect of two-way FDI is extremely important for Austria since it lacks large MNCs and is host country for foreign MNCs.⁹⁶

According to Porter local ownership and a local home base generate greater benefits than foreign ownership and a foreign home base. Rugman criticizes this statement heavily and notes that there is no serious literature in international business supporting such a nationalist bias. Canadian-based scholars have demonstrated that the research and development underta-

⁹¹ Porter 1993, 22

⁹² Rugman 1992b, 8

⁹³ Porter 1991, 14 and 18

⁹⁴ Porter 1990b, 671

⁹⁵ Rugman and D'Cruz 1993, 24-25

⁹⁶ Bellak and Weiss 1993, 114

ken by foreign-owned firms is not significantly different from that of Canadian-owned firms. Rugman has also found that the 20 largest American subsidiaries in Canada export virtually as much as they import. Rugman further notes that Porter does not specify the nature of benefit of the domestic home base relative to a foreign owned company. "Is this to be measured by wealth generation, by jobs, by R&D, by process technology, by regional benefits or by other criteria?" Rugman asks.⁹⁷ Also Hodgetts finds Porter's statements questionable and mentions the same Canadian evidence taken up by Rugman.⁹⁸

According to McKelvey companies can benefit from a favourable national environment for innovation but still expatriate the earnings to another country. McKelvey sees it as a logical flaw in Porter's argument that creating or supporting innovation in a country automatically increases the standard of living in that country.⁹⁹

Narula sees outward and inward direct investment as far more positive issues than Porter. According to Narula it is possible to sustain growth of a firm by the shift of production to locations where the comparative advantage is better suited to continue profitable operations, that is, where e.g. the wage rate does not rise faster than productivity. Through inward direct investment, e.g. imports of advanced technology, it is possible to promote structural adjustments and growth. However, Narula sees it as harmful to the industry in a country if *all* the value added activities are moved abroad.¹⁰⁰

Rugman writes that "Porter's attempt to classify foreign direct investment into three alternative types - resource based, market access based and home based - is not useful; indeed it is wrong. In reality, managers of multinationals consider many more factors, like tariffs, political risk, home-country and international institutional factors, and internal strategic factors." According to Rugman multinationals exist to internalize firm-specific advantages to conduct successful international business operations¹⁰¹

Rugman defines a multinational enterprise as a corporation that operates across borders in the production and distribution of its goods and services.¹⁰² According to him the type and degree of control in multinationals vary. Some are highly centralized, others are much more decentralized. Some even operate as networks of virtually autonomous firms. Porter's views are in the centralized control end of the continuum. He speaks for both economic and cultural integration of the multinational enterprise operating in several nations. Control must be retained in the home base of each product line. According to Porter "A network, in the sense of separate companies linked in a federation, is not the right model."¹⁰³

According to Dunning MNEs generate both costs and benefits in the world economy. "The extent and balance of these costs and benefits will vary according to the kind of FDI

⁹⁷ Rugman 1991, 63 and 1992a, 62

⁹⁸ Hodgetts 1993, 45

⁹⁹ McKelvey 1990, 10

¹⁰⁰ Narula 1993, 94 and 106

¹⁰¹ Rugman 1992a, 63

¹⁰² Rugman 1992a, 60

¹⁰³ A Conversation with Michael Porter, 357

undertaken and the reasons for it."¹⁰⁴ It seems to Dunning that Porter concentrates on analyzing those benefits of MNEs which stem from the possession of very specific intangible assets, which gave firms a competitive edge over their foreign competitors *prior* to their undertaking FDI. According to Dunning Porter does not fully acknowledge that both assets and intermediate products of firms can be, and are increasingly being, procured from outside their national boundaries.

Dunning identifies two kinds of FDI, which Porter does not give enough attention to. First, Dunning mentions FDI helping to create those advantages of MNEs which are due to cross-border transactions. As examples of such cross-border advantages Dunning mentions the ability to arbitrage factor or intermediate product markets, the ability to reap economies of scale or scope, the ability to diversify geographical risk and to better exploit the gains of the common governance of related value added activities. Second, Dunning mentions FDI which is undertaken to acquire assets in order to sustain or promote the competitive advantage of the acquiring company. In sum, MNEs have an ability to lower the transaction costs of global markets.¹⁰⁵

Rugman and Verbeke criticize Porter's view that a simple distinction can be made between an MNEs home base, which provides the main source of the firm's competitive advantages, and other nations, which can be tapped into selectively but are certainly not as important as the home base. According to Rugman and Verbeke global strategic management in the real world is more complex than Porter sees it, especially for companies from small countries. MNEs are becoming increasingly independent from individual countries. The writers design a picture to portray four possibilities of potential impacts of national diamonds on the global competitiveness of MNEs. The horizontal axis measures the impact (low or high) of the initial home country diamonds on the global competitiveness of MNEs. The vertical axis measures the impact of other nations' diamonds on the MNEs' global competitiveness. Again the impacts can be low or high.¹⁰⁶ See figure 4.

According to Rugman and Verbeke the focus of Porter's work is in quadrant 4, where the initial home base is an MNE's core source of competitive advantage. The diamonds of other nations are primarily used to make the home base advantages more sustainable in a global context. But Porter also recognizes the possibility of shifting the home base of a distinct business to another country. In the picture this means a shift from quadrant 4 to quadrant 1, where the impact of other nations' diamonds is high.

Rugman and Verbeke argue, that quadrant 3 may be of particular relevance for multinational strategic management in MNEs from small open economies. Strategic decisions in such companies are guided to a large extent by the market access to, and competitiveness in, at least one of the triad blocks. Or, as may be the case for an MNE from a European country, the company has to consider the diamond conditions of not one but several countries. Rugman and Verbeke mention Bartlett and Ghoshal's observations of locally leveraged innovations and globally linked innovations as evidence speaking for their view. A locally leveraged

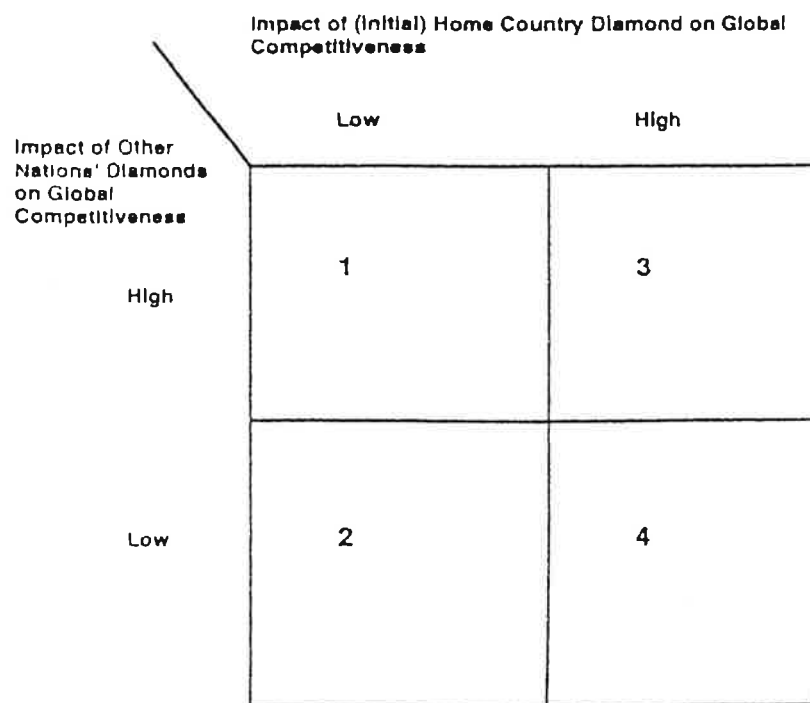
¹⁰⁴ Dunning 1993, 12

¹⁰⁵ Dunning 1993, 12-13

¹⁰⁶ Rugman and Verbeke 1993, 73

innovation means that a subsidiary located anywhere in the world can be the basis of an innovation, which will then be diffused all over the world inside the MNE. A globally linked innovation is one which is created with the contribution of several organizational units, located in different countries.¹⁰⁷ In both types of innovations global scope economies and worldwide learning occur. Such gains are impossible to achieve with Porter's single diamond viewpoint.¹⁰⁸

Figure 4: The impact of national diamonds on global competitiveness.



Source: Rugman and Verbeke 1993, 75.

Rugman and Verbeke further criticize Porter for having a too narrow view of subsidiaries and strategic business units (SBUs). Because, according to Porter, "A firm can only have one true home base for each distinct business or segment"¹⁰⁹, Porter sees that two types of operations exist: those, that are driven from the initial home base, and subsidiaries or SBUs driven from a home base in another country. According to Porter the operations in one country must be largely autonomous from the other operations in the MNE.¹¹⁰ To argue for their point that the management of subsidiaries of an MNE is much more complex, Rugman and Verbeke develop a framework to analyze the different ways in which an MNE's subsidiaries and SBUs can be

¹⁰⁷ Bartlett and Ghoshal 1989, 118-120

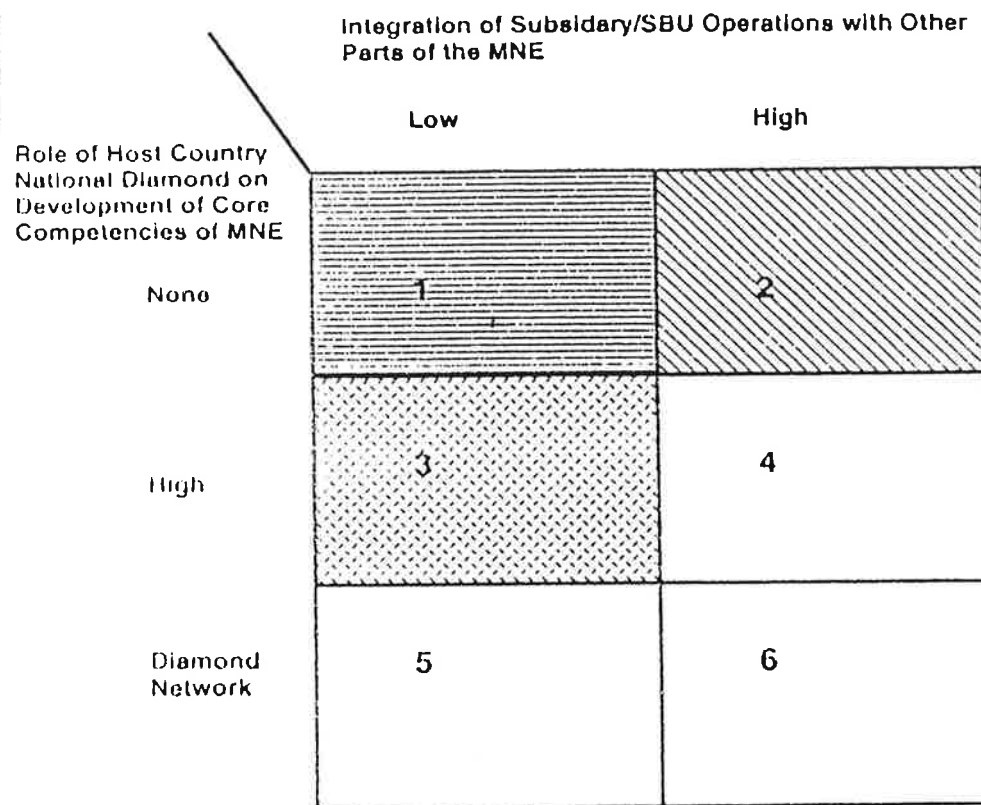
¹⁰⁸ Rugman and Verbeke 1993, 75

¹⁰⁹ Porter 1990b, 606

¹¹⁰ Porter 1990b, 615

managed.¹¹¹ See figure 5.

Figure 5: The impact of a subsidiary/SBU host country diamond on the MNE's corporate strategy.



Source: Rugman and Verbeke 1993, 80.

Figure 5 assesses the impact of the subsidiary/SBU's country diamond on the corporate strategy of an MNE. The vertical axis reflects the role of the host country diamond on the development of core competencies of the MNE. The horizontal axis measures the extent to which the activities of the subsidiary/SBU are integrated with other parts of the MNE.

According to Rugman and Verbeke Porter's views of subsidiaries/SBUs only recognize the first three cells of figure 5. According to Porter there are three types of FDI: market access seeking, factor sourcing and home base establishment. The first type can be positioned in cell 1 where subsidiaries are set up primarily to overcome tariff and non-tariff barriers, or to serve the national market from a proximate source. According to Porter, market access investments are usually evidence of competitive advantages in the investing rather than the host nation. In such a case little coordination with other operations of the MNE is required.

¹¹¹ Rugman and Verbeke 1993, 79

Also in the second type of FDI recognized by Porter, factor sourcing investments, the host country diamond is of little relevance to the development of the core competencies of an MNE. Higher coordination than in market access investment is required between the operations of the MNE because access to factors must be related to for example processing, marketing and distribution. This type of FDI can be positioned in cell 2.

In the third type of FDI recognized by Porter, home base FDI, the host country diamond becomes the home base of a subsidiary of the MNE. This type of FDI can be positioned in cell 3. Again, little coordination is required because the subsidiary is now a home base itself, the centre of its own strategy and the "nation in which the essential competitive advantages of the enterprise are created and sustained"¹¹² and not very reliant on the initial home base of the MNE.

Rugman and Verbeke argue that there are other types of FDI operations in addition to the three recognized by Porter. According to Rugman and Verbeke Porter's view that the MNE has a centralized and hierarchical organization is oldfashioned. The writers take evidence from recent literature and argue that MNEs are developing into networks where multiple points can emerge within the MNE with a similar degree of importance and centrality. Rugman and Verbeke mention three types of FDI not dealt with appropriately by Porter.

First the writers mention "globally rationalized operations", where the subsidiary only supplies a part of the product line, mostly only a fraction in the entire vertical chain of value added. This type of FDI is best positioned in cell 4 because the source of competitive advantages for the SBU are dispersed among two countries. This requires integration with other parts of the MNE. According to Rugman and Verbeke Porter implicitly acknowledges the existence of this type of operations when he writes that it is possible to "selectively tap"¹¹³ into a foreign nation's diamond. In this case the foreign nation's diamond substitutes for a portion of the initial home diamond.

Rugman and Verbeke further write that MNEs that can be positioned in cells 5 and 6 are not dealt by Porter at all. Cell 5 describes the existence of polycentric firms where individual subsidiaries control the core competencies of an MNE. The MNE is a decentralized federation of subsidiaries/SBUs with little central coordination or control. Cell 6 portrays a "differentiated network", where the MNE is seen as a network of exchange relationships among subunits, which are coordinated, but not necessarily from one central point.¹¹⁴

Why does Porter omit the importance of multi-domestics? The name of his book "The Competitive Advantage of Nations" may reveal the reason. He looks at the good of the national economy of the home base and sees, that foreign units of a multinational enterprise bring little good back home. In Porter's mind the foreign units tend to become too independent and the managers desire to retain power and autonomy which is a reason for why

¹¹² Porter 1990b, 19

¹¹³ See Porter 1990b, 606-609

¹¹⁴ Rugman and Verbeke 1993, 80-82. For a thorough discussion on different types of MNEs, see Bartlett and Ghoshal 1989.

firms fail to achieve competitive advantage.¹¹⁵ But in the views of the critics and other writers,¹¹⁶ in an indirect way, through sourcing of knowledge and new ideas from foreign diamonds, it is possible that a well organized network of foreign units in the long run brings more gains to the home base than it takes away.

Dunning understands some of Porter's concerns towards inward FDI but notes, however, that "it is often not a question of whether domestically owned investment should be preferable to foreign owned investment, but the extent to which a country or its people are willing to trade a degree of economic sovereignty for economic progress".¹¹⁷

Porter and Armstrong answer the critique by stating that their views on this point have been distorted. In their view Canada has clearly been a net beneficiary of foreign investment. They explain making a difference between domestic and foreign owned firms by stating that in case of a weak and less attractive diamond subsidiaries of foreign owned companies can more easily be drawn out of a country than domestically owned firms.¹¹⁸ Thain defends Porter's arguments and writes that any competitive advantage of a foreign subsidiary is on temporary loan from its ultimate owner and can be, and often is, recalled at any time on short notice by either the home base parent company or government. According to Thain foreign-owned subsidiaries are ultimately beyond local control.¹¹⁹

4.3 Small open economies

The relevance of Porter's theory especially for small open countries has been criticized. Many critics are of the opinion that Porter's viewpoint is too much that of a large country, specifically the USA. Rugman and D'Cruz write that "The home base diamond analysis, ... , is incorrect for small, open economies such as Canada, Finland and New Zealand." According to Rugman and D'Cruz, these countries are highly interdependent with one or more of the triad blocks and they are characterized by two way flows of trade and investment.¹²⁰ According to Bellak and Weiss Porter's view is mainly that of a large nation and doesn't apply to a small nation which depends to a large extent on foreign markets and foreign policy, e.g. monetary policy and foreign standards. Bellak and Weiss state that in the context of a small nation like Austria, the concept of clustering should be extended to a supranational level.¹²¹

Hodgetts mentions many small countries, also Finland, whose MNEs are based on small home diamonds and therefore rely on access to other countries' diamonds, notably one of the triad

¹¹⁵ Porter 1990b, 58

¹¹⁶ See for example Bartlett and Ghoshal 1989 for a discussion on a geographically dispersed firm, the transnational, where in various units important resources and valuable knowledge exist to be exploited and combined with competences in other units of the organization.

¹¹⁷ Dunning 1993, 13

¹¹⁸ Porter and Armstrong 1992, 9-10

¹¹⁹ Thain 1992, 11

¹²⁰ Rugman and D'Cruz 1993, 19

¹²¹ Bellak and Weiss 1993, 115

countries. Hodgetts' conclusion is: "Different diamonds need to be constructed and analyzed for different countries, and these diamonds often require integration and linkage with the diamonds of other economically stronger countries thus creating a double diamond paradigm."¹²²

Porter states that his theoretical perspective in "The competitive advantage of nations" applies both to large and small countries. According to Porter it explains the patterns of success across industries in *all* advanced countries. In Porter's view particular industry clusters are geographically concentrated *within* larger countries, in a state or even a single city.¹²³ With this Porter wants to say that his model is not made from the point of view of the USA, that even within the USA the clusters are geographically concentrated in a rather small area.

More specifically, four questions have been raised concerning the relevance of the diamond model to small open economies. These questions take up the issues of small home demand, weak rivalry between domestic companies, mergers between domestic companies, and the important role of resource industries for many small countries.

Home demand

First, some critics argue that small countries cannot rely on home demand for their competitive advantage. The home demand may not be large enough or the customers may not be demanding enough. Luostarinen for example writes that Finnish companies specialize in small (niche) missions and business ideas and this narrowing of the business mission within extremely small domestic markets makes these markets even smaller. Specialization therefore demands international markets, even in the early periods of the companies' lives.¹²⁴ Reinert's logic goes along the same lines as he states that all industries have a minimum effective size, which varies across industries and segments of industries. The national cluster in a small country may not be large enough for producers and distributors in a certain industry to satisfy the minimum effective size.¹²⁵

Stewart is in line with Luostarinen and Reinert and also sees Porter's diamond as suited to big countries, not countries with limited competition and markets like Canada. He states that because Canadian firms need to become more specialized, marketing a narrower line of products and services on a world scale, the most demanding customers will come from abroad.¹²⁶

Daly notes that the ratio of merchandise export to GDP is typically higher in small countries than in larger countries. According to Daly a probable reason for this is that the domestic market is typically too small for producers in manufacturing to attain minimum efficient scale and scale economies¹²⁷. Even small firms can get into markets by specializing in a narrow

¹²² Hodgetts 1993, 46

¹²³ Porter 1993, 21

¹²⁴ Luostarinen 1991, 263. It is worth noting that Luostarinen's argument is not written to specifically criticize Porter's model, but it is included in this paper because it clarifies the Finnish situation on this point.

¹²⁵ Reinert 1993, 63

¹²⁶ Stewart 1992, 11

¹²⁷ Daly sees product specific economies of scale as more important than economies of scale associated with plant size.

range of products but the sales necessary to get the low cost per unit associated with volume are more than can be made solely in a small domestic market. And because companies from a small country have to sell such a large proportion of their production to international markets, also a large proportion of the income is in foreign currencies. Costs, however, are largely paid in the domestic currency and therefore profits, often a narrow margin between the two larger totals, can be very volatile in response to exchange rate changes.¹²⁸ With this logic Daly criticizes Porter's lack of attention on exchange rates especially from the point of view of small countries and he argues for an incorporation of macro variables to the diamond model.

Reinert believes that Norwegian companies meet the most demanding customers abroad. He doesn't understand, why the customers should necessarily be situated in Norway instead of some other country in Europe.¹²⁹ Rugman writes that U.S.-based multinationals grow up in a large domestic market where new products can be rolled out across the U.S. regions. But a multinational from a smaller economy will experience greater opportunities in a larger foreign diamond. A Canadian manager needs to think about more than the Canadian diamond to develop a successful global strategy.¹³⁰ Rugman and D'Cruz write that the Canadian market is too small to support the development of the economies of scale that are required in many manufacturing product lines, and in services, in modern industry.¹³¹ The critique of Yetton et al. towards Porter's model is similar. They write, that "For any U.S. multidomestic, the domestic division will be sufficiently large that it makes sense to regard that and global headquarters as synonymous. In Australia, however, this is not the case since the firm's domestic market will inevitably be degrees of magnitude smaller than overseas ones."¹³²

Darroch and Litvak write about the Canadian industry and according to them "The small domestic market and small base of domestic supporting related industries means that Canadian managers must take a global approach to markets and suppliers from the beginning".¹³³ Similarly, Bellak and Weiss consider the small Austrian market and emphasize foreign demand as the main market force and pull factor for domestic supply.¹³⁴

Yetton et al. discuss the question of size and ask: "won't size always be an issue in a small domestic market, geographically isolated from most of the world's large and sophisticated customer bases?" Porter takes the example of Switzerland and claims that size has not been a problem for it. But Yetton et al. deny this example by stating that Switzerland directly borders densely and largely populated nations of similar living standard¹³⁵ and is therefore not an appropriate example. Instead, they see the New Zealand case as a valid example of a small isolated country that cannot rely solely on domestic markets. In fact, they point out that Porter himself relaxes the proximity condition of his model in the case of New Zealand as he writes:

¹²⁸ Daly 1993, 125-126

¹²⁹ Reinert 1993, 63-64

¹³⁰ Rugman 1992a, 60

¹³¹ Rugman and D'Cruz 1993, 30

¹³² Yetton et al. 1992, 38

¹³³ Darroch and Litvak 1992, 71

¹³⁴ Bellak and Weiss 1993, 112

¹³⁵ And similar culture, it may be noted.

"New Zealand cannot rely solely on the domestic base to increase its standard of living"¹³⁶ and "... the small size of the New Zealand market means that a successful product quickly saturates the local market. Firms that seek significant growth have to expand into international markets".¹³⁷

In answering this first question, Porter writes that those who argue that small countries cannot rely on home demand for their competitive advantage confuse the size of home demand with its quality. If home demand is sophisticated and anticipates needs in other countries, this feature far outweighs the significance of size *per se*. Based on his research Porter states that even if firms in smaller countries like Sweden and Switzerland routinely export more than 80 % of their production, the ability of those firms to be innovative rests heavily on close contact with some demanding customers at home.¹³⁸

Rivalry

As a second question taken up, it has been written that smaller countries cannot support local rivalry and still achieve economies of scale, given the size of the local market. According to Reinert, companies in smaller countries have been able to become world leaders even without local rivalry. Many companies in small countries have to go international in order to achieve minimum effective size. Foreign impulses are needed in order to keep the product up to date. On the other hand, the problems of USA's car industry show that local rivalry does not guarantee success. Reinert also sees it as unnecessary for Norwegian producers to compete each others' prices down if their level of technology and quality of the product already lag behind the foreign competitors'.¹³⁹

Spring takes evidence from the New Zealand Dairy Board, which has a single-seller structure, and is of the opinion that this is the best possibility for the dairy industry of a small country like New Zealand to be able to compete with the big multinational enterprises. Without cooperation the dairy farmers of New Zealand would not be able to maintain the network of offshore marketing companies to enable exports. A necessary amount of R&D would also be impossible without the combined and coordinated resources of the whole New Zealand industry. Cooperation is necessary to minimize the disadvantages caused by "distance from and lack of access to markets, the lack of a large local market in which to develop products, and smallness in relation to major customers and competitors."¹⁴⁰

Darroch and Litvak are of the view that the small size of the Canadian market means that competition policy must take global rivalry, rather than purely domestic rivalry into consideration.¹⁴¹ Also Stewart finds Canadian competition as too small and speaks for global competition. According to Stewart the competition will be just as intense as in the home base, because serving customers in the most demanding markets means that the company will also

¹³⁶ Crocombe, Enright, Porter 1991, 38

¹³⁷ Crocombe, Enright, Porter 1991, 91

¹³⁸ Porter 1993, 21

¹³⁹ Reinert 1993, 63-64

¹⁴⁰ Spring 1991

¹⁴¹ Darroch and Litvak 1992, 71

encounter the best competitors.¹⁴²

Dunning mentions Porter's example of a great number of Japanese firms in several industries as an illustration of strong local rivalry. But Dunning notes that the Japanese market was mainly closed to foreign competition at the time of Porter's research and the majority of the output of Japanese companies was sold to domestic consumers. Dunning writes that the situation is very different in the case of smaller advanced industrialised countries because many companies in these countries face competition almost exclusively from foreign companies. Dunning even suggests that in some cases rivalry by foreign firms might offer greater benefits than that between domestic firms.¹⁴³

As an answer to the second question Porter notes that even in smaller countries, the successful industries usually have significant local rivalry, which stimulates innovation. Firms sell globally to gain the needed scale. "If a country such as Norway cannot support local - or at least Nordic - competition in a particular industry, it will be unlikely to succeed in that industry. Efforts to build industries around single companies almost invariably fail."¹⁴⁴ Although there are cases of isolated international competitors or national champions, the majority are in industries where government plays a distorting role in competition, either through trade barriers or subsidies. Porter notes that the cases in which an isolated company achieves genuine international success without heavy government involvement are rare.¹⁴⁵

Reve defends Porter's argument by writing that foreign rivals can never quite compensate for the lack of domestic rivals, especially in terms of other than price competition, because foreign companies exist in other kinds of conditions. The company can always explain that the foreign rivals are more competitive because of their more favourable surroundings.¹⁴⁶

Mergers and acquisitions

A third question taken up specifically in the context of small nations is Porter's view of mergers and acquisitions. Porter warns against mergers. He sees them as a threat to tough domestic rivalry.¹⁴⁷ According to Brøndum and Søndergaard Porter's view does not suit the Danish situation. Brøndum and Søndergaard write that especially in a country like Denmark with many small and relatively few large companies, extensive R&D projects are difficult to finance. In Denmark mergers of companies have had the goal to enhance R&D and make its financing possible.¹⁴⁸

Natural resources

Fourth, Daly notes that a common, but not universal characteristic of small open economies is the relatively high proportion of natural resource products in the composition of their exports. This is according to Daly more apparent in the smaller countries in Eastern Europe,

¹⁴² Stewart 1992, 7

¹⁴³ Dunning 1991, 31

¹⁴⁴ Porter 1993, 21

¹⁴⁵ Porter 1993, 23

¹⁴⁶ Reve 1993, 16

¹⁴⁷ See Porter 1990b, 597-598

¹⁴⁸ Brøndum and Søndergaard 1991, 24

South America, Africa and some countries in Asia, than in Western Europe. For such countries the share of domestic production that is exported can be high but each firm is such a small part of the world supply that the firms are price takers in the world markets. Changes in exchange rates or in the world prices of their exports can have major impacts on corporate profits and export earnings.¹⁴⁹

4.4 Resource-based industries

Porter's views of resource-based industries and the appliance of his diamond model to these industries have been criticized. Porter argues that advanced factors like digital data communications infrastructure, engineers, and research institutes are most critical to competitive advantage, while the importance of basic factors such as natural resources, climate, and location "has been undermined by either their diminished necessity, their widening availability, or ready access to them by global firms through foreign activities or sourcing on international markets". The same reasons make the returns available to basic factors, including natural resources, low.¹⁵⁰ Porter writes that competitive advantage based on natural resources is unsustainable because it shifts rapidly and global competitors can easily circumvent it.¹⁵¹ Resource-based industries do not form the backbone of advanced economies and the capacity to compete in them is better explicable using classical theory.¹⁵²

Several writers argue against Porter's view and state that the theoretical perspective taken by Porter does not apply to natural resource industries. Rugman and D'Cruz find the view expressed by Porter on the role of natural resources oldfashioned and misguided.¹⁵³ According to Yetton et al. Porter's classification of resource-based industries with those characterized by low technology and skills is tenuous.¹⁵⁴ According to the evidence presented by the researchers criticizing Porter's work, resource-based industries can also have substantial competitive advantage, given that the resource product is differentiated either in terms of quality or suitability for specific purposes.

According to Porter Canada is stuck in the factor-driven stage because of a lack of technology and R&D spending. Rugman writes that there is substantial intangible value added in Canada's natural resource industries due to managerial and marketing skills.¹⁵⁵ So according to Rugman Canada's resource-based industries do, in fact, have sustainable advantages and he writes: "If there is value added in a resource-based industry due to marketing or management skills, it has just as much right to be in the innovation-driven stage as an R&D based business."¹⁵⁶ Hodgetts agrees with Rugman and writes that Canada has successful firms who have turned the country's comparative advantage in natural resources into proprietary firm-specific

¹⁴⁹ Daly 1993, 126

¹⁵⁰ Porter 1990b, 77

¹⁵¹ Porter 1990b, 72-73

¹⁵² Porter 1990a, 76

¹⁵³ Rugman and D'Cruz 1993, 25

¹⁵⁴ Yetton et al. 1992, 35

¹⁵⁵ Rugman 1991, 62

¹⁵⁶ Rugman 1992a, 62

advantages in resource processing and further refining.¹⁵⁷ Yetton et al. have a similar view about resource-based industry in their country: "In Australia, mineral prospecting and extractive techniques are frequently highly specialized, and dependent on advanced technologies. Nor are returns on these natural resources uniformly low."¹⁵⁸

Also Spring criticizes Porter's emphasis on only highly value added products. Spring writes that Porter did not grasp that in the dairy industry access to the markets of most industrialized countries is severely restricted by quotas and government subsidies and that the situation is especially bad in value added products. Therefore not only value added products can be emphasized.¹⁵⁹

According to Yetton et al. Porter relaxes the conditions of his theory in the Canadian case. Porter says that one can succeed in resource-based industries with only one of the elements of the diamond - basic factor conditions, and basic rather than advanced ones, in place. Resource-based industries usually have highly competitive international markets and the required demand characteristics of the diamond are globally dispersed rather than concentrated within one country. Yetton et al. ask: "But if elements of the diamond do not need to be co-located for resource-based industries, then the same may be true for other industries. For example, if it is possible to access demand in a market with foreign competitors, then access to that market may be a perfect substitute for domestic rivalry. If the diamond is not local, then the entire edifice becomes unstable."¹⁶⁰

Cartwright notes that Porter himself states: "We avoided industries that were highly dependent on natural resources".¹⁶¹ Therefore Cartwright thinks that the applicability of the diamond model to resource-based industries should not be accepted without question and he wants the diamond model to be tested with data from industries of this type. Cartwright further notes that many resource-based industries have a high export dependency and are not sustainable without presence in international markets. Cartwright designs a simplified quantitative model based on Porter's diamond model and tests the ability of the diamond model to predict or describe the competitive advantages of industries that are resource-based and export-dependent. Based on the results of his test Cartwright concludes that the diamond model is not appropriate for studying these industries and that it might even predict stronger international competitiveness for less competitive industries than for industries that are actually strongly competitive.¹⁶²

Cartwright identifies three reasons for why the diamond model predicts resource-based and export-dependent industries poorly. First, several such industries have very small home-base markets which offer few learning experiences from discerning customers, but the diamond model emphasizes domestic markets against international markets. Second, such industries often have coordinated exporting strategies which gives them economies of scale and scope,

¹⁵⁷ Hodgetts 1993, 45

¹⁵⁸ Yetton et al. 1992, 35

¹⁵⁹ Spring 1992, 65

¹⁶⁰ Yetton et al. 1992, 29

¹⁶¹ Porter 1990b, 28

¹⁶² Cartwright 1993, 60-65

but the diamond model speaks for strong rivalry between exporters in each industry. Third, some industries in Cartwright's test have extensive offshore investment and a sustained presence in international markets, which the diamond model essentially ignores as bases of competitive advantage.¹⁶³

Porter and Armstrong answer the critique by writing that they haven't ignored the significant firm-specific advantages that many resource companies have in marketing and management skills. But according to Porter and Armstrong Rugman seems to suggest that these skills have some intrinsic value. "They do not; their value is in enabling a company to sell its product at a premium to enter new segments or to develop a low-cost producing position." Porter and Armstrong note that even in resource-based segments where Canada has strong world export shares, the cost positions are poor and the productivity growth lagging.¹⁶⁴

Porter admits that firms may sometimes be able to sustain their competitive advantages for a time based solely on the country's natural resources. But according to him natural resource advantages alone are unstable and vulnerable to challenges by developing countries, which can access the basic technology by licensing or buying machinery and compete on the basis of low wages and low profits. The only way to sustain competitive advantages in natural resource industries is through continual innovation, like in other industries. It is also possible to sustain positions in natural resource industries despite disadvantages in the resources per se. Sweden has done this by producing more sophisticated, skill-intensive products, and using more sophisticated, resource conserving production processes, drawing on favourable home diamonds.¹⁶⁵

Thain is in line with Porter and writes that Canada should be relying less on natural resources because of unavoidable cyclical problems, relatively unskilled labor, simple technologies, depletable asset bases and lack of sustainable competitive advantage.¹⁶⁶

4.5 National culture

Van den Bosch and van Prooijen criticize the lack of attention given to the role of national culture in Porter's diamond model. They stress that the determinants of the national diamond in fact rest on national culture. They write: "While national culture is an important part of the national environment, a description of this national environment cannot be made without paying any attention to national culture."¹⁶⁷

Van den Bosch and van Prooijen give three examples of the impact of national culture on the determinants of competitive advantage, and based on them, they state: "These examples made clear that national culture works through the determinants, and not in isolation from them. Therefore, we will not add a fifth determinant to Porter's diamond. But we want to stress the

¹⁶³ Cartwright 1993, 65

¹⁶⁴ Porter and Armstrong 1992, 9

¹⁶⁵ Porter 1993, 21

¹⁶⁶ Thain 1992, 11

¹⁶⁷ Van den Bosch and van Prooijen 1992, 175

importance of national culture when explaining the differences in international competitive advantage. National culture is the base on which the national diamond rests.¹⁶⁸ Van den Bosch and van Prooijen see culture as exogenous to the firm. They don't think that firms can actively change the culture of the nation or region in which their home base is situated.

According to van den Bosch and van Prooijen it is important to realize that Porter and his diamond are a product of their own culture, too. They think that competition is an issue of great importance for Porter because he is American.¹⁶⁹ They base this argument on Hofstede's study, where he found that the United States is a masculine society.¹⁷⁰ Among the characteristics of a masculine society are the importance of performance and growth, achievement of visible and symbolic organizational rewards, and acquisition of money.

In his answer Porter disagrees with van den Bosch and van Prooijen about neglecting cultural issues. He also argues against their examples and disagrees about the exogenous role of culture. Porter summarizes his findings about the role of culture in competitive advantage in six notions. These are next presented in short.

First, cultural factors often lead to sustainable competitive advantages, because firms from competing nations are unable to quickly duplicate them and cultural changes tend to occur very slowly. Second, the influence of culture on competitive advantage is not direct but indirect, always acting through one of the four determinants of national competitive advantage. Third, apparent cultural differences can often be traced back to economic circumstances in the diamond. Culture itself is often the result of economic circumstances. Fourth, culture must always be viewed in the context of specific industries. A culture which fosters competitive advantage in one industry can be destructive to competitive advantage in another. Fifth, culture is not necessarily exogeneous to firms, as van den Bosch and van Prooijen seem to believe. Neither is it static and something to be passively accepted by the industry. It changes over time and can be changed. And finally, culture is a national, regional, or even local phenomenon, not a European one. Speaking of Europe and an economic region can be misleading.¹⁷¹

Porter concludes by stating that advantage grows out of national and even local circumstances in the diamond, one of which is culture. The importance of cultural factors only reinforces the notion that a firm's home base remains crucial even in the global competition. "European firms will prosper by drawing on and reinforcing their unique national cultures, not by seeking to eliminate them."¹⁷²

Even if she doesn't exactly state it, McKelvey also hints to the possibility that Porter is influenced by his own national culture. According to McKelvey the emphasis of Porter's study is not entirely correct: Porter emphasizes too much the economic goal of innovation. Other

¹⁶⁸ Van den Bosch and van Prooijen 1992, 176

¹⁶⁹ Dunning, in fact, raises the question of whether as much competition as possible always is desirable. See Dunning 1991, 30.

¹⁷⁰ Hofstede 1980

¹⁷¹ Porter 1992, 178

¹⁷² Porter 1992, 178

values, like social and environmental, may also influence the characteristics of innovation. Process technology which pollutes less is one current example. Porter does argue that strict product, safety and environmental standards can promote competitive advantage by stimulating and upgrading domestic demand,¹⁷³ but the social and environmental goals are mostly interesting in his analysis because they are also economically profitable.¹⁷⁴

Quite contrary to the view of van den Bosch and van Prooijen, Pressman seems to think that Porter emphasizes national character and cultural traits too much. He asks: "But if national character ultimately determines economic success, what explains the rise and decline of industry clusters in particular nations? And how can we make predictions about which countries will grow and prosper and which will tend to decline?" According to Pressman Porter has great difficulty answering these questions. Pressman also questions whether any policy measures can change the national character.¹⁷⁵

Thain does not specifically mention cultural attributes, but he writes that Porter's proposition that nations succeed in particular industries because their home environment is the most forward-looking, dynamic and challenging, pays inadequate attention to the human factor. According to Thain the practical link between firm and nation success and individual motivation and behavior remains largely unexplored.¹⁷⁶

4.6 Methodology

Porter's critics identify three kinds of problems with the methodology chosen by Porter and thus the validity of the study. These problems concern the selection of industries, the generalizability and comparability of the results and the predictive power of the study.

Selection of industries

As the first methodological point of critique several writers mention Porter's methodology in selecting the industries to be studied.

Bellak and Weiss, Rugman and D'Cruz, Grant, and Cartwright criticize Porter's use of only export data when measuring international competitiveness. Bellak and Weiss are of the opinion that productivity might have been a better measure of competitiveness than export data. They note that also Porter emphasizes total productivity but still only uses it occasionally in his empirical research.¹⁷⁷ Rugman and D'Cruz note that Porter's methodology does not take into account the activities of MNEs outside the national borders of their home base. According to the writers small nations get relatively weaker measures when only export data are used because much of the business of smaller countries is conducted abroad through foreign direct investment, within the larger triad markets of the USA, EC and Japan.¹⁷⁸ Also the advisory

¹⁷³ Porter 1990a, 87

¹⁷⁴ McKelvey 1990, 9-10

¹⁷⁵ Pressman 1991, 215

¹⁷⁶ Thain 1990, 18

¹⁷⁷ Bellak and Weiss 1993, 115

¹⁷⁸ Rugman and D'Cruz 1993, 22

committee of the Advantage Finland study criticize the use of export data in deriving the clusters. According to the committee output data would have better enabled calculating the share of markets served.¹⁷⁹

Grant criticizes Porter's attempt to treat exports and outward direct investment as part of the same phenomenon and to ignore their complex interrelationships.¹⁸⁰ Also Cartwright criticizes Porter's methodology, although he notes that Porter's methodology includes the possibility for judgmental adjustments to take account of the results of offshore investment. But, Cartwright further writes that the mechanism for the adjustments is vague and that export data is likely to dominate industry selection. Cartwright thus concludes that the methodology used by Porter is biased towards selection of industries that export from the home base and against those industries that compete through offshore production or which export from the home base to offshore value-adding subsidiaries.¹⁸¹

Bellak and Weiss mention service industries as industries not covered by the use of SITC classification simply because services are not covered by SITC statistics. For example tourism, an industry of great importance to many countries, is not covered by this selection method.¹⁸² Cartwright mentions another shortcoming associated with the use of the SITC classification: it uses product categories to identify industries rather than competitor-based definitions. As an example he mentions the New Zealand study, where "wool" is specified as an industry but one of the arenas of competition for that product is actually carpet fibre, which should include synthetic yarns as well as wool.¹⁸³

Bellak and Weiss find further shortcomings in the use of SITC statistics. Bellak and Weiss note that the 5-digit SITC statistics may not be a suitable level for studying all industries. Different industries demand different aggregation levels. They point out that the important wintersports cluster in Austria did not emerge from the SITC-cluster analysis because "ski" and some other related product groups, as well as services, are not included in the SITC classifications.¹⁸⁴ Bellak and Weiss also note that trade data give only a rough estimate on the value added of certain product groups, for example raw materials. This is due to the limited specificity of the data in trade statistics and the fact that productivity cannot be seen in these statistics.¹⁸⁵

Rugman and D'Cruz criticize Porter's exclusion of such industries from the statistics, whose trade is almost exclusively with neighboring countries. They point out that although most of Canada's foreign trade is with the neighboring USA, the U.S. markets are still competitive and foreign to Canadian companies and therefore can be used as proof of Canadian competitiveness.¹⁸⁶

¹⁷⁹ Hernesniemi 1993, 20

¹⁸⁰ Grant 1991, 542

¹⁸¹ Cartwright 1993, 58

¹⁸² Bellak and Weiss 1993, 112

¹⁸³ Cartwright 1993, 58

¹⁸⁴ Bellak and Weiss 1993, 113 and 116-117

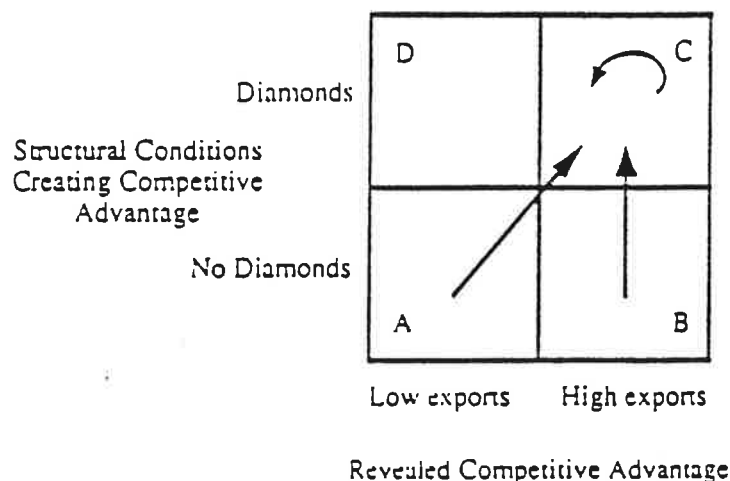
¹⁸⁵ Bellak and Weiss 1993, 116

¹⁸⁶ Rugman and D'Cruz 1993, 27

Porter's analysis aims to explain the success of successful industries.¹⁸⁷ Yetton et al. point out that the study of a successful entity suffers from validity threats. The lack of control group is one of these validity threats. In his original work Porter studied older and industrialized economies. Starting with successful exporters, and then identifying their common characteristics, namely the presence of diamonds, Porter does not use a hypothesis testing methodology. The industry sample was not representative in that it didn't include non-exporting industries. If these had been included, it would have been possible to test the hypothesis that exporting industries have strong diamonds and non-exporting industries don't.¹⁸⁸

Also Hodgetts and McKelvey find Porter's sample of countries to be studied as biased. Hodgetts writes: "Since most countries of the world do not have the same economic strength or affluence as those studied by Porter, it is highly unlikely that his model can be applied to them without modification".¹⁸⁹ McKelvey points out that Porter emphasizes successful industries. According to McKelvey Porter's emphasis on successful industries bypasses the relation between successful and less successful industries in a national economy. Even industries which are less successful at innovating can be strategically important to a nation.¹⁹⁰

Figure 6: Policy options implicit in Porter's model.



Source: Yetton et al. 1992, 20.

Yetton et al. visualize the lack of control group in Porter's study with the matrix in figure 6. Porter's study included industries already in quadrant C, not those in the other quadrants. Revealed competitive advantage, as measured by relative competitiveness of national exports in that industry forms the horizontal axis, and structural conditions creating competitive

¹⁸⁷ Porter 1990a, 76

¹⁸⁸ Yetton et al. 1992, 20-21

¹⁸⁹ Hodgetts 1993, 44

¹⁹⁰ McKelvey 1990, 10

advantage, or diamonds, form the vertical axis.¹⁹¹

Yetton et al. point out that "The industries that Porter's approach omits - those in quadrants B and D - include at a minimum all resource-based activity, and most overseas investment by firms in less traded sectors, despite Porter's admission that overseas investment is important."¹⁹²⁻¹⁹³ Yetton et al. define multidomestics as organizations which compete by locating small to medium sized production facilities in the markets in which they sell, rather than by exporting. These are omitted from Porter's theory because of his methodology based on export shares.¹⁹⁴ Yetton et al. conclude, that the theory, as conceived and applied, therefore is most relevant to mature, manufacturing-based economies.

In addition to criticizing the methodology of industry selection, Cartwright criticizes the methods of data collection for industry analysis in Porter's study. He mentions, that no theory or model of international competitiveness was explicitly used to determine the categories of data that should be obtained. He especially criticizes the lack of fieldwork in export markets or offshore investment sites. According to him international activity was studied through interviews with home base executives and data made available by them. Cartwright finds the methodology biased towards identifying sources of industry competitive advantage in the home base and against study of sources that arise from offshore operations.¹⁹⁵

The generalizability and comparability of results

The second methodological point of critique raised concerns the generalizability and comparability of the results of Porter's study.

The critics blame Porter for attempting to generalize from a few particular cases. Moreover, the cases are not described using a consistent framework and objective measures wherever possible. Yetton et al. point out that such case studies, used as the basis for drawing inductive conclusions, do not necessarily readily generalize.¹⁹⁶ Also Bellak and Weiss write that the use of case studies involves the problem of limited generalizability of results. They also point out that the strong subjective component that is introduced by employing a number of case studies makes comparisons between countries virtually impossible.¹⁹⁷

Several writers criticize the lack of quantitative measures in Porter's model. Dunning writes that Porter makes no attempt to substantiate his propositions by any formal econometric or other kind of testing.¹⁹⁸ Yetton et al. discuss the same issue as they point out that Porter's work is weakened by subjective and descriptive categorisations in the methodology. As examples they mention the ex post judgment of whether domestic demand anticipates demand in other nations, and the lack of clear or articulated measures for strength of elements of a

¹⁹¹ Yetton et al. 1992, 20-21

¹⁹² See Porter 1990b, 25 for Porter's view of FDI.

¹⁹³ Yetton et al. 1992, 21

¹⁹⁴ Yetton et al. 1992, 32

¹⁹⁵ Cartwright 1993, 58

¹⁹⁶ Yetton et al. 1992, 22

¹⁹⁷ Bellak and Weiss 1993, 116

¹⁹⁸ Dunning 1991, 10

diamond. Porter does not specify, on what basis a demand condition is judged to be strong, medium or weak. No uniform indicators or measures for the elements of the diamond are given.¹⁹⁹ Also Cartwright discusses the lack of quantitative measures in Porter's model. He designs a simplified quantitative model based on interval scales with the aim of faithfully interpreting Porter's intentions, in order to test the diamond model quantitatively.²⁰⁰ But also Cartwright is forced to give judgmental scores to the different determinants of competitive advantage in the industries he studied and therefore his testing does not seem totally reliable.

Yetton et al. discuss the accuracy of the New Zealand and Canadian studies carried out using Porter's diamond model. They note that in the Canadian case there is little evidence that the lack of diamonds has been damaging to the Canadian industry. In the New Zealand case the evidence of poor competitiveness may suggest more about the costs of isolation and size than about Porter's diamond theory.²⁰¹

Yetton et al. further note, that the connection between the case studies and the recommendations given for government policy is weak. "In a sense, they could have been written without any detailed study of or case analysis in New Zealand."²⁰² Dunning feels that Porter comes close to rationalizing his arguments and that he could have provided examples contrary to his conclusions, if he had chosen to do so.²⁰³ Also Reinikainen questions the connection between the empirical work and the derived model.²⁰⁴ Dalum et al. have similar thoughts and they criticize the lack of a clear connection between the diamond model, the presentation of competitive development of national economies in chapter 10 and the implications for government policy in chapter 12. Dalum et al. point out that according to Porter's own ideas in the first 9 chapters of the book, competitiveness is not an attribute of the nation but of the cluster. Alas, Dalum et al. imply that it is not logical to study the history of entire national economies and give policy recommendations on this level and at the same time argue that competitiveness is created on the industry, or cluster, level.²⁰⁵

According to Thain a weakness in Porter's book is that the application of the theory to specific nations does not seem as robust as the theory itself. Thain sees that the theory may cause unsupported, controversial and overstated generalizations, because the complexity of political and economic development of any nation is so great.²⁰⁶

Predictive power

As a third methodological point of critique the predictive power of the diamond model has been questioned.

¹⁹⁹ Yetton et al. 1992, 22-23

²⁰⁰ See Cartwright 1993, 61-65

²⁰¹ For a more thorough discussion on the relevance of Porter's framework for smaller, resource-based economies, see Yetton et al. 1992.

²⁰² Yetton et al. 1992, 27

²⁰³ Dunning 1991, 10

²⁰⁴ Reinikainen 1991, 43

²⁰⁵ Dalum et al. 1991, 36

²⁰⁶ Thain 1990, 18

The predictive power of Porter's study has been criticized by Bellak and Weiss, Thurow, and Grant. Bellak and Weiss write that because trade data contain ex-post information, extrapolations into the future are uncertain.²⁰⁷ Thurow writes: "In the end, Mr. Porter fails exactly where everyone else has failed. Why do some countries grow? Why do other countries decline?" Thurow also criticizes Porter's four stages of national growth as having no predictive power. "When productivity ceases to rise rapidly, the wealth-driven stage is said to exist. Calling decline the wealth-driven stage, however, does not help us to better predict, understand, or reverse decline."²⁰⁸ According to Grant the key weakness of the diamond theory is in its inability to give clear predictions. The empirical findings of the study haven't been rigorously tested of predictive validity. Grant explains this weakness with the ambiguity over the signs of relationships, the complexity of interactions, and dual causation in the model.²⁰⁹

4.7 Macro variables

Porter's lack of attention on macro variables typical for traditional economics has been criticized by Daly and Reinikainen. Daly identifies three key characteristics of Porter's study. First, Porter has a heavy micro orientation, which can provide detail that is absent in the aggregates. But according to Daly it is still an open question, whether the additional detail is worth the extra cost. Second, Porter emphasizes merchandise exports and world market share in assessing competitiveness. Third, Porter plays down the importance of exchange rates and wage rates in the determination of competitiveness.²¹⁰

According to Daly three ideas from economics and management are relevant to competitiveness, namely efficiency, economy, and effectiveness. *Efficiency* is the extent to which high output is achieved from a given combination of inputs, such as labor, capital (and perhaps purchased materials and services); *Economy* is the degree to which a given product (or group of products) can be produced at low cost per unit; and *Effectiveness* is the degree to which the production process or the product produced by a country (and the companies in it) corresponds to long-term shifts in technology and/or market demand.²¹¹

Porter states "Managing industry wage rates is irrelevant in industries where labor content is small."²¹² Daly points out that Porter makes the elementary error of not considering the labor content in the related and supporting industries that are emphasized in his own model. According to Daly the diamond model recognizes the efficiency and effectiveness parts of the three concepts related to competitiveness distinguished above but systematically excludes and plays down the criterion economy and the relative costs of producing similar manufactured products in different countries.

²⁰⁷ Bellak and Weiss 1993, 116

²⁰⁸ Thurow 1990, 95-96

²⁰⁹ Grant 1991, 542

²¹⁰ Daly 1993, 120-121

²¹¹ Daly 1993, 120

²¹² Porter 1990b, 16

Daly tests whether the levels of unit labor costs (reflecting the combined effects of compensation per hour, real output per hour and the exchange rate) in manufacturing in different countries affect the gains and losses in export shares for six of the countries covered in Porter's study. The correlation coefficient was 0,869, a very high value for such a comparison. Daly writes that "Porter's own data for his countries and for his time period are thus inconsistent with the hypothesis that wage rates and exchange rates do not matter for the range of competitive industries and their share of the world market."²¹³

Daly notes that unit labor cost can be looked at as the net result of two separate factors: output per hour (which is emphasized by Porter and by him named productivity) and compensation per hour (which is downplayed by Porter). Daly compares the relative influence of these factors on unit labor cost (for the same six countries he used earlier) between 1978 and 1985 and finds, that the relative influence of differences in levels of compensation per hour was relatively greater than in differences in output per hour, both in relation to unit labor costs. So the output per hour, which Porter emphasizes and calls productivity, has in fact had a smaller influence on the changes of world export share than compensation per hour, which Porter rejects.²¹⁴

Daly takes further evidence from years not covered by Porter's study and notes that the Japanese share of world export fell from 11.9 to 10.0 between 1985 and 1990, even though productivity (a variable emphasized by Porter) in Japanese manufacturing grew more than in other countries. According to Daly the reason for this and many similar examples are not to be found in productivity, as Porter thinks, but in exchange rates, or compensation per hour. According to Daly all factors of unit labor costs, output per hour (productivity), compensation per hour and exchange rates have to be studied simultaneously to assess competitiveness.²¹⁵

According to Reinikainen the underestimation of price competitiveness cannot be argued for. He notes that devaluations and underestimation of the value of currency have often led to the rise of competitiveness of nations. As examples he mentions Japan, Germany, Finland and the so called Asian Tigers. On the other hand, Reinikainen states that overestimation of currency leads to decline of real competitiveness.²¹⁶

Porter and Armstrong answer the critique presented by Daly by simply stating that increasing value of currency and high interest rates may exacerbate competitiveness problems but they are not the cause of them.²¹⁷

4.8 Dynamism

Porter's study has been criticized for concentrating on existing clusters and not explaining how to create new industries. Yetton et al. point out, that Porter has no theory of firm

²¹³ Daly 1993, 122

²¹⁴ Daly 1993, 122-124

²¹⁵ Daly 1993, 123

²¹⁶ Reinikainen 1991, 42

²¹⁷ Porter and Armstrong 1992, 7

development. Porter's work say little about either the dynamics of creating a diamond, or which type of firms might seed it, how they might emerge, or their subsequent pattern of growth, and the factors vital for that. Porter does not address how to ensure that more new firms emerge in those upgrading industries, or deal with how to ensure that more of those emergent firms become strategic exporters.²¹⁸ Also Dunning criticizes the lack of dynamism and writes that Porter does not attempt to measure whether clusters become more or less important or what conditions make for successful clusters.²¹⁹

Porter answers this critique by stating that competitiveness is most easily established building on areas of established strength, and drawing on specialized skills, resources, and technologies that are already present in the economy to enter related fields, rather than creating *de novo* industries.²²⁰

The four stages of national growth (or industrial development) have been criticized by Narula, Bellak and Weiss and Hodgetts. According to Narula Porter's model is essentially a static one. Especially, in Narula's view, the importance of technology as a dynamic and incremental process has not been addressed appropriately by Porter. Narula finds four shortcomings in Porter's four stages of national competitive development.

First, because Porter's study is based on the subjective analysis of a few industrialized countries, Porter's model cannot be extended to explain developing countries or development. Second, almost all developing countries are consigned to the factor driven stage due to their dependence on natural resources as the primary source of export earnings. It seems to Narula that the model ignores gradual evolution and the third world MNE. Third, by dismissing government intervention especially in industrialized countries, Porter fails to address the economic integration between countries, which is so important at the moment. Fourth, Porter does not examine what brings about the shift between the stages (i.e. dynamics), and why some countries can manage to make the transition sooner than others and how this can be duplicated.²²¹ Also Bellak and Weiss note that the transition process from one stage to the other and the criteria for declining or emerging stages remain unclear.²²² Hodgetts criticizes the logic that countries move from one stage to the other rather than spanning two or more of these stages, since there are likely to be industries or companies in all major economies operating at each of these stages.²²³

Narula also points out that because Porter ignores income levels, economic development, potential for economic growth, and growth rate in his classification of countries into stages, countries that in reality are very different are at the same stage in Porter's model. Canada, for example, is in the factor driven stage together with developing countries. According to Narula the model does not provide a satisfactory explanation of why growth occurs in some

²¹⁸ Yetton et al. 1992, 33

²¹⁹ Dunning 1991, 33-34

²²⁰ Porter 1993, 23

²²¹ Narula 1993, 89

²²² Bellak and Weiss 1993, 115

²²³ Hodgetts 1993, 44

countries and not in others.²²⁴

Grant sees the links between upgrading of competitive advantage (i.e., moving from the factor driven stage towards higher stages) and national economic development as tenuous. He mentions that many countries in the factor driven stage, e.g. Canada, Nauru and the United Arab Emirates, are among the most prosperous in the world.²²⁵ Steele also finds Porter's emphasis on creating higher value added and more demanding market segments as wrong. According to Steele the insistence on value added may simply ignore market and input realities. For some, especially resource-based firms, more value added means higher priced products which the customers cannot anymore afford. Also Steele points out that not all businesses are global. The appropriate market definition for many business units is still continental, regional or simply local. "This limits the opportunities for added-value products to what that market can absorb", Steele writes.²²⁶

4.9 Rigour

Many critics blaim Porter's book for not being rigorous and specific enough. Grant criticizes the lack of precision in definitions of some of the key concepts and in the specification of relationships between them. As an example Grant mentions Porter's concept of a hierarchy of sources of competitive advantage in terms of sustainability. According to Grant Porter wrongly correlates sustainability, complexity and productivity.²²⁷ Saudi Arabia's competitive advantage in crude oil is based on the very basic natural resource advantage but still seems quite sustainable. And many product innovations in the securities and financial services seem very complex but are still quickly imitated by rivals.²²⁸

Grant further writes that Porter's reliance upon broad, but ill-defined concepts reflects a more general failure to perfectly reconcile micro-level analysis of competitive advantage of firms and industries with macro-level analysis of national development and prosperity. According to Grant there is inconsistency in the definition and measurement of competitive advantage as the analysis moves from the industry to the national level. Grant notes that competitive advantage at the firm and industry level is measured in terms of exports and outbound foreign investment, while according to Porter "The only meaningful concept of competitiveness at the national level is national productivity."²²⁹ According to Grant Porter's presumption that firms' pursuit of competitive advantage automatically translates into increasing national productivity and prosperity is unwarranted.²³⁰

Grant also finds the structure of the diamond as lacking in precision. According to him the four determinants overlap to such a degree that it is not clear that the various influences would

²²⁴ Narula 1993, 89

²²⁵ Grant 1991, 541

²²⁶ Steele 1992, 17-18

²²⁷ Porter 1990b, 49-53 and 544-545

²²⁸ Grant 1991, 541

²²⁹ Porter 1990b, 6

²³⁰ Grant 1991, 541

not be better represented by a triangle or pentagon rather than a diamond. Grant writes: "Some corners of the diamond become so allembicing that the variables included and their relationships to national competitive advantage are widely diverse." In particular, Grant sees 'strategy, structure and rivalry' as an awkward catch-all category which comprises so different variables that they don't form a coherent group nor are related in similar ways to competitive advantage. According to Porter this corner includes national differences in management practices and approaches, attitudes towards authority, social norms, the orientation of firms towards competing globally, goals and motivations, national prestige and priority, and domestic rivalry.²³¹ As examples of variables with different relationships to competitive advantage Grant mentions domestic rivalry, management training and practices, and employee attitudes and motivations. Domestic rivalry is an industry-level variable which is clearly defined and the relationship of which to pressure for improvement and innovation is precisely specified. Management training and practices, and employee attitudes and motivations on the other hand appear to be national characteristics which relate to factor conditions.²³²

Grant sums up his critique of the indeterminacy of the relationships in the diamond model into three points. First, some variables have an ambiguous impact on competitive performance. For example, Porter fails to clearly define when advantages in the supply of basic factors of production are an advantage and when they are a disadvantage. Second, the relationship between each corner of the diamond and national competitive performance is complicated by the interaction between the different variables. "Cause and effect relationships among the determinants become blurred",²³³ as Porter himself notes (p.179). And third, determinacy is further weakened by two-way relationships between each of four corners of the diamond and national competitive performance.²³⁴

Brøndum and Søndergaard write that Porter's theory is as fragmented and incomplete as was the work of Schumpeter. According to the writers Porter's idea that the cluster which is able to create technological innovations before other clusters will end up having a competitive edge is banal and philosophically modest.²³⁵ Rugman and D'Cruz write that "sloppy and unprofessional scholarly reporting is a characteristic of Porter". As one example they mention the "league tables on pages 536 and 537,²³⁶ in which a competitive industry is defined as one whose export shares are above that for the country as a whole. The United States has a world export share of 15 percent and Korea's share is 1 percent. Rugman and D'Cruz see it as obvious that Korea ends up with more industries above 1 percent than the United States with industries above 15 percent of world export share. As another example of sloppy reporting Rugman and D'Cruz mention the table on R&D spending on page 633, where Korea has been left out just because it isn't a member of OECD and therefore doesn't appear in the same source as the other countries.²³⁷

²³¹ Porter 1990b, 107-124

²³² Grant 1991, 542

²³³ Porter 1990b, 179

²³⁴ Grant 1991, 542

²³⁵ Brøndum and Søndergaard 1991, 22

²³⁶ Porter 1990b

²³⁷ Rugman and D'Cruz 1993, 22

Brøndum and Søndergaard also present an example of Porter's sloppy argumentation and generalizations. They criticize Porter's statement: "Means of stimulating research in firms vary from nation to nation. In some countries, such as Germany, Denmark, and the United Kingdom, government has provided *direct research grants or subsidies to firms*. This approach is questionable, and experience with it has been largely unsatisfactory."²³⁸

According to the Danish writers Porter's view is too one-sided and does not apply to Denmark. They highlight three points of critique. First, in Denmark the idea has been to share the risks of innovation between the firm and the government. Never has the company been entirely freed of the risk involved. Second, Porter does not explain why companies should take the whole financial risk of an innovation project themselves and why it is always bad to share the risk with somebody, e.g. the government or other companies. The writers mention a Danish example of good results in a joint technology project, which none of the participating companies could have finished themselves. Third, Brøndum and Søndergaard don't understand why Porter 17 pages later²³⁹ accepts risk sharing, when the goal is to promote demand of advanced, new products. "Why isn't risk sharing in these kinds of projects harmful to upgrading?" the writers ask.²⁴⁰

According to Pressman the diamond model is not a very satisfying explanation of national competitive advantage. On the one hand it is unsatisfying because it leaves unanswered the question of what determines whether a nation has demanding consumers, quality factors, and intense competition. According to Pressman Porter's answer is national character and cultural traits, which Pressman sees as a too easy answer. On the other hand the diamond is unsatisfying because points on the diamond are too easily evoked as an explanation for international competitive advantage. As an example Pressman states that according to Porter the problems in American industry stem from the unsophisticated American demand. Pressman's view of the issue is that Japan has prospered selling automobiles and electronic consumer goods exactly because Americans want high quality goods, but American manufacturers have failed to meet this need.²⁴¹

4.10 Summary table of main points of critique

Next a summary table of the main points of critique against Porter's study is presented. The first column of the table names the issue, the second column presents Porter's view of the issue as presented in his initial article in HBR and the book "The Competitive Advantage of Nations", the third column presents the core of the critique presented against Porter's view and the fourth column presents Porter's answer to the critique, when found in the literature.

²³⁸ Porter 1990b, 634

²³⁹ Porter 1990b, 651

²⁴⁰ Brøndum and Søndergaard 1991, 23

²⁴¹ Pressman 1991, 214-215

Table 2: Summary table of main points of critique.

Issue	Porter's view	The core of the critique	Porter's answer
1. Where is competitive advantage created?	<ul style="list-style-type: none"> ● Competitive advantage is created in a geographically limited area within the nation, where the determinants of the diamond are present. ● The MNE needs a home base. Innovation takes place in the home base and coordination of subsidiaries requires central control. 	<ul style="list-style-type: none"> ● In many industries competitive advantage is no longer created in the nation state but in a transnational environment where the determinants of the diamond are sourced all over the world. The world can be seen either as one large diamond or a system of interlinking diamonds. ● The MNE doesn't need a home base. Innovations take place all over the world and coordination of a network is possible without strong central control. 	<ul style="list-style-type: none"> ● The <i>geographic scope</i> of competition is global, but the <i>geographic locus</i> of competitive advantage is the home base, as reflected by the diamond. These two concepts must be understood as separate. ● As an exception the diamond can cross a national border where culture and institutions on both sides are similar and physical distances short.
2. FDI	<ul style="list-style-type: none"> ● Outward FDI is more valuable than inward FDI in creating competitive advantage. ● Local ownership and a local home base create greater benefits than foreign ownership and a foreign home base. 	<ul style="list-style-type: none"> ● Inward FDI is as valuable as outward FDI and foreign owned firms are as important to a nation as domestically owned firms. ● There is no capital which is loyal to the home base. 	<ul style="list-style-type: none"> ● In the case of a weak and not anymore so attractive diamond, foreign subsidiaries can more easily be drawn out of a country than domestically owned firms.
3. Small open economies	<ul style="list-style-type: none"> ● The home base diamond applies to all nations. Competitive advantage is created in a geographically limited area also in a small nation. ● Demand and rivalry have to be present in the home base diamond. The sophistication of home demand is more important than the size of it. ● Mergers and acquisitions are a threat to tough domestic rivalry and therefore bad. ● Economies of scale is not a true source of sustainable competitive advantage. 	<ul style="list-style-type: none"> ● The diamond model may suit the situation of a large country but it does not suit small nations who are highly dependent on the diamonds of other countries. ● Home demand is too small in small nations in order to gain economies of scale. ● Small nations cannot support local rivalry and still achieve economies of scale. ● In small nations mergers are needed e.g. to be able to finance R&D projects. 	<ul style="list-style-type: none"> ● Even within large countries, e.g. the USA, the creation of competitive advantage is geographically concentrated to a small area. ● Sophistication of home demand is more important than size of home demand. ● Even in smaller countries the successful industries usually have significant local rivalry.

4.Resource-based industries	<ul style="list-style-type: none"> ●The importance of basic factors such as natural resources as sources of competitive advantage has been undermined by their diminishing necessity, widening availability and ready access on global markets. ●The returns to natural resources are low. ●Competitive advantage based on natural resources is unsustainable. ●Industries highly dependent on natural resources were avoided in the selection of industries. 	<ul style="list-style-type: none"> ●Resource-based industries can also have substantial competitive advantage when the resource product is differentiated and contains intangible value added e.g. in the form of managerial and marketing skills. ●Returns on natural resources are not uniformly low. ●Also resource-based industries have sustainable competitive advantage thanks to value added. ●The diamond model does not suit resource-based industries because of the methodology used in the selection of industries. 	<ul style="list-style-type: none"> ●There <i>are</i> significant firm-specific advantages in resource industries. ●Cost positions are poor and productivity is lagging in many natural resources industries. ●Competitive advantage based on natural resources can sometimes be sustained for a time but natural resource advantages alone are unstable and vulnerable.
5.National culture	<ul style="list-style-type: none"> ●Competitive advantage grows out of national and even local circumstances in the diamond, one circumstance being culture. ●Firms should draw on and reinforce their unique national cultures. 	<ul style="list-style-type: none"> ●National culture is the base on which the national diamond rests. ●Culture is exogenous to firms and cannot be changed. 	<ul style="list-style-type: none"> ●National culture works <i>through</i> the four determinants of the diamond model. ●Culture is not necessarily exogenous to firms and it can be changed.
6.Methodology	<ul style="list-style-type: none"> ●The best indicators of competitive advantage are substantial and sustained exports and/or significant outward foreign direct investment based on skills and assets created in the home country. ●In the methodology industries were defined narrowly and based as closely as possible on strategically distinct businesses. Relevant industries were at the lowest level of aggregation for which data was available. For this purpose the SITC classification was used. ●To avoid the risk of generalizing when this is not appropriate, a wide range of nations and industries with widely differing characteristics and institutions were studied. 	<ul style="list-style-type: none"> ●Productivity would have been a better measure of international competitiveness than export data. ●The FDI activities of MNEs are not covered by the methodology. ●The use of the SITC classification causes problems, e.g. services and many other industries are not covered by this data. ●Porter's model is only valid for studying successful industries since these are the ones his model is based on. ●The generalizability of a study based on a few cases is questionable. ●Because no uniform measures exist to evaluate the diamond, comparison between countries is impossible. ●The predictive power of the model is weak. 	

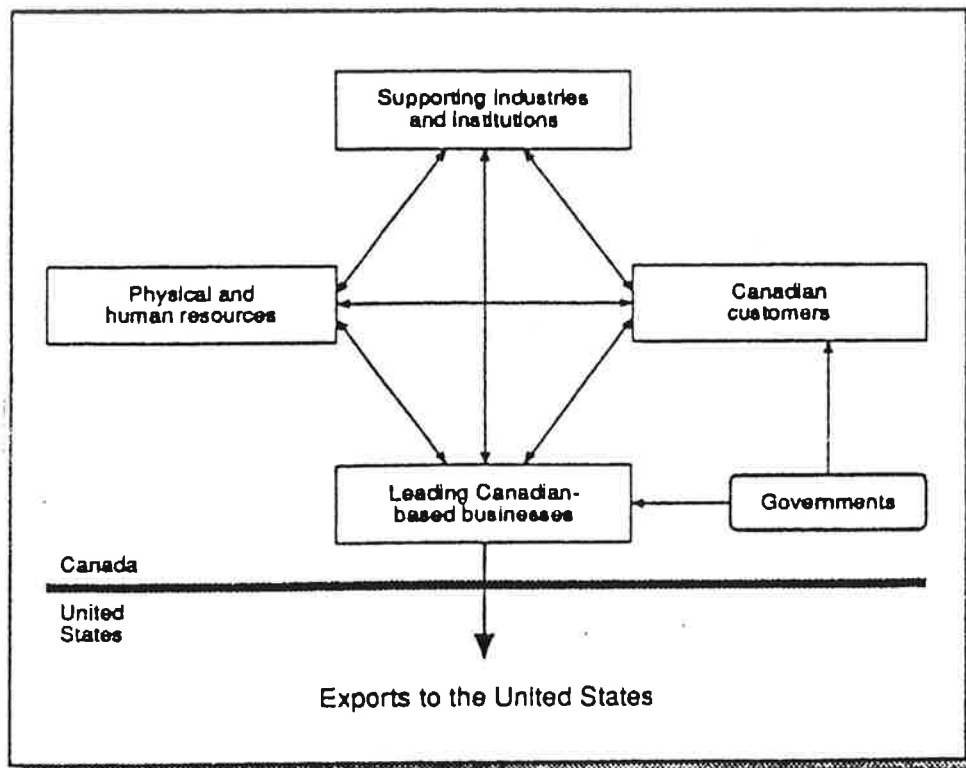
7. Macro Variables	<p>Studying macroeconomic variables like exchange rates, interest rates, and government deficits is not enough to explain the competitive advantage of industries or nations.</p> <ul style="list-style-type: none"> ● Unit labor costs can be achieved through low wages and because this is not an attractive industrial model, unit labor cost is not a good measure of competitiveness. 	<ul style="list-style-type: none"> ● Unit labor cost is a measure which is better in assessing competitiveness than only output per hour emphasized by Porter. ● Unit labor cost consists of output per hour (which is emphasized by Porter and by him named productivity) and compensation per hour (which is downplayed by Porter). Also exchange rates affect unit labor cost. 	<ul style="list-style-type: none"> ● The increasing value of currency and high interest rates may exacerbate competitiveness problems but they are not the cause of them.
8. Dynamism	<ul style="list-style-type: none"> ● The points of the diamond are self-enforcing and they create a system. The diamond promotes industry clusters. Domestic rivalry and geographical proximity are especially important in promoting the creation of clusters. ● The nature of competitive advantage of many of a nation's industries tends to evolve together. ● The four stages of economic development relate to the attributes in the nation's industry most important to rising economic prosperity. The stages don't explain everything of the nation's industry but provide a way of thinking about how nations progress in competitive terms. 	<ul style="list-style-type: none"> ● Porter's study concentrates on existing clusters and does not explain how to create a new diamond. ● It is not logical that countries move from stage to stage in the four stage model. There are likely to be industries and companies in all major economies at each of the stages. ● Porter does not explain what causes the transition from stage to stage. 	<ul style="list-style-type: none"> ● Competitive advantage is most easily established in industries with established strength, or entering related fields, rather than creating <i>de novo</i> industries.
9. Rigour		<ul style="list-style-type: none"> ● Porter's definitions lack precision and they are inconsistent e.g. when the analysis moves from the industry to the national level. ● The structure of the diamond lacks precision and the diamond cannot be operationalized, i.e. objectively measured. ● Porter's argumentation is sloppy and he uses generalizations. 	

Source: compiled by the author.

5. SUGGESTIONS FOR MODIFYING THE DIAMOND MODEL

Of the critics reviewed Dunning, Narula, Rugman and D'Cruz, Cartwright, and Daly propose actual modifications or additions to Porter's diamond model. In this section the modifications and additions are reviewed, but as a starting point it may be useful to look at the way Rugman and Verbeke see Porter's single diamond model. For them it is essentially a model based on the home country and with exports as the connection to the outside world. See figure 7.

Figure 7: Porter's Home Country Diamond.



Source: Rugman and D'Cruz 1993, 30.

5.1 Dunning's international business activity

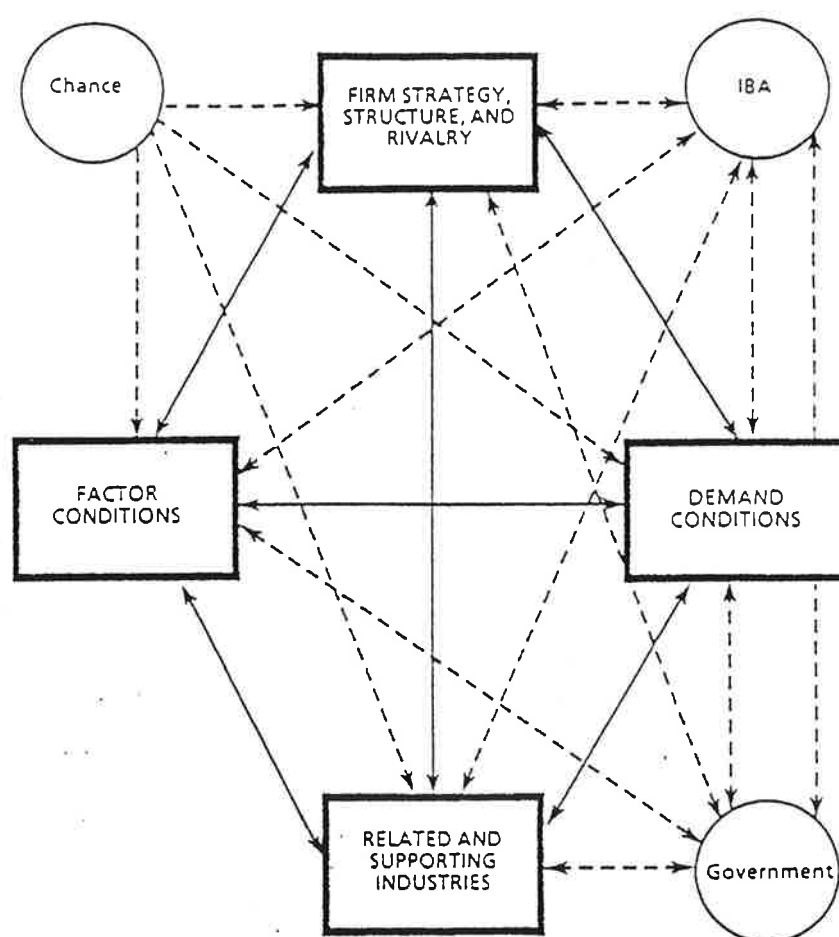
In order to incorporate the activities of modern multinational enterprises and thereby overcome maybe the most criticized lack in Porter's diamond model, Dunning adds international business activity (IBA) to Porter's model. Dunning writes that "there is ample evidence to suggest that the capabilities of MNEs may be influenced by the configuration of diamonds of the foreign countries in which they produce, and that this, in turn, may impinge upon the competitiveness of the resources and capabilities of home countries."²⁴² Dunning points out that between 30% and 40% of the sales of leading industrial MNEs are produced

²⁴² Dunning 1991, 12

outside their national boundaries.

Dunning adds a country's involvement in foreign trade and commerce, that is international business activity (IBA), to Porter's diamond as an exogenous factor along with the role of government and chance.²⁴³ According to Dunning IBA affects all the determinants in the diamond and it is therefore best depicted as a third exogenous factor and not as a fifth endogenous determinant. See figure 8.

Figure 8: The Diamond Model and IBA.



Source: Dunning 1991, 8.

According to Dunning the sourcing and marketing opportunities and the production and organizational capabilities of domestic firms and MNEs are different. Dunning argues that an MNE can acquire different resources from other diamonds, such as capital, technology, and management skills. An MNE also has access to the markets, economic systems, business rela-

²⁴³ Dunning 1991, 8

tionships, infrastructure, and forms of competition present in other diamonds. Thus the MNE can draw sources of competitive advantage from many different countries and diamonds and has a broader base than the company only producing domestically. The MNE can also use the resources differently than a domestic company thanks to transfer of resources within the MNE and spreading of risks related to environmental volatility.²⁴⁴

Dunning further argues for his addition by identifying six distinguishing features of the global economy of the 1990s. First, the value generating assets are increasingly taking the form of *created* assets, for example human capital, rather than natural assets. Second, many of the created assets are intangible and firm or ownership specific. They can be deployed in whatever domestic or foreign location that the owners consider appropriate. Third, the role of MNEs rises because firms find it in their interests to use the created assets they own or control also in foreign countries, or to generate new assets in foreign countries for example by undertaking R&D, or to acquire assets in foreign countries by acquisitions or different cooperative arrangements. Fourth, MNEs are becoming more pluralistic in their motives for global involvement, in the geographical direction of the involvement and in the mode of the involvement. Fifth, governments increasingly need to take account of the strategies of other governments. Sixth, the character of the international division of labor changes as assets become mobile and tastes, government policies, firm strategies and entire societies become increasingly similar.²⁴⁵

Dunning's addition of IBA as a third outside factor to the diamond model doesn't seem to be without problems, either. Rugman writes that "it is questionable if multinational activity can actually be added into any, or all, of the four determinants, or included as a third exogenous variable".²⁴⁶ Rugman and D'Cruz see Dunning's addition of IBA as problematic especially in the Canadian context. They write: "The role of multinationals is so widespread in Canada that it is difficult to believe that these firms can be assigned a role equal to that of chance."²⁴⁷ Rugman's and D'Cruz' view is difficult to understand, because clearly Dunning means that IBA is similar to chance and government in the sense that they all affect the diamond indirectly, through the four determinants. Dunning says nothing of the relative strengths of the three outside determinants. But in an article published after his suggestion of adding IBA as a third outside determinant to the diamond model, Dunning seems to give a little in on the double diamond framework suggested by Rugman and D'Cruz. Dunning writes: "almost all the points on Porter's domestic diamond have to be reconsidered, if not in the light of the diamond of the global economy, certainly those of the countries with which the home based consumers firms have their closest and most significant associations. This extends from the sourcing of resources through the structure of demand to the clustering of related industries and the concept of inter-firm rivalry."²⁴⁸ So Dunning doesn't seem to insist on a global diamond but a diamond which covers the most important relationships of the companies.

Rugman and D'Cruz conclude that "serious tensions arise in Porter's model as soon as a

²⁴⁴ Dunning 1991, 13-15

²⁴⁵ Dunning 1993, 8-11

²⁴⁶ Rugman 1991, 63

²⁴⁷ Rugman and D'Cruz 1993, 25

²⁴⁸ Dunning 1993, 11

serious effort is made to incorporate the true significance of multinational activity". According to Rugman and D'Cruz the weakness represented by the lack of attention to MNEs apply to all small open economies. The writers, in fact, mention Finland as a country with MNEs based on a small home diamond, and thus a nation which potentially cannot be modelled by the Porter diamond.²⁴⁹

5.2 Narula's dynamic competitive development model

Narula modifies Porter's diamond model in order to better incorporate technology as a variable.²⁵⁰ According to Narula Porter's analysis of the relationship between development, FDI and innovation is not specific enough. Narula writes that these three issues are bound by a common variable: technology. Narula defines innovation as *the knowledge and ability to produce goods and services of higher or better quality per unit price*, and technology as *the cumulative sum of these innovations*.²⁵¹

According to Narula technology affects the variables of the diamond as much as it is affected by them. The exogenous variables government, chance and international business activity influence accumulated technology only indirectly through the four endogenous variables. Narula criticizes Porter's diamond model extended with Dunning's international business activity for only considering technology in two determinants, or rather parts of determinants: advanced factor conditions and market structure. Narula designs a more comprehensive model illustrating the development of national technological advantage, illustrated in figure 8. Narula's model focuses on accumulated technology on the country level and one by one he explains the relationship between the determinants in the model and accumulated technology. These relationships are next briefly summarized.

According to Narula Porter's *advanced factor conditions* contain the sum of technology in the traditional sense and *market structure* includes the knowledge inherent in the industry and country specific structure of markets that relate to the organization of efficient transactions. These two determinants are according to Narula directly overlapping with accumulated technology, as he illustrates in figure 9.

The effect of the other determinants on technology accumulation remains more unclear in the diamond model. According to Narula the development of technology is often a direct result of either *demand* for a particular product or the *demand* for a product of a particular price. Demand does not affect national technological advantage per se. Instead it affects technology development on the firm level. *Support and related industries* in the clusters tend to innovate in areas that are closely related to the main industry and may through incremental improvements provide major innovations to the primary industry. The nature of technology in a particular industry affects the nature and type of support industry that develops around it and the innovations in the support industry have an effect on the technology of the primary

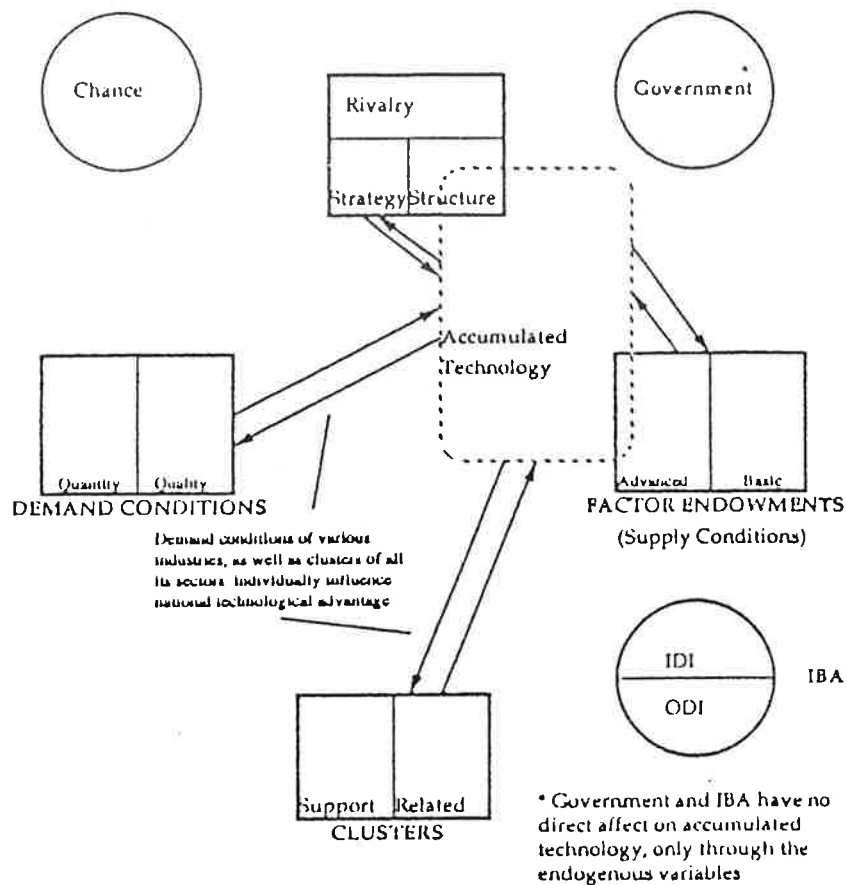
²⁴⁹ Rugman and D'Cruz 1993, 26

²⁵⁰ Narula 1991 and 1993

²⁵¹ Narula 1993, 90

industry.

Figure 9: The Role of Accumulated Technology.



Source: Narula 1993, 92.

The exogenous determinants of the Porter/Dunning model, international business activity (IBA) and government, influence the technology accumulation of a country through the four initial, endogenous determinants. Narula divides IBA into inward direct investment (IDI) and outward direct investment (ODI). Narula states that whether IDI proves to be beneficial to the technology accumulation of the host country depends on what part of the value added is done locally as well as what the quality of the determinant is in the host country compared to that produced by the MNE. If the quality of the MNE output is lower than the technology present in the host country, the MNE may try to acquire technology and the impact on technology accumulation is probably small. But if the technological capabilities of the MNE are complementary to the existing technology in the host country, IDI will probably have a positive effect on technology accumulation. The situation is similar in the case of ODI. The role of the *government* on technology accumulation is also through the four endogenous determinants. For example, technical standards set up by the government may improve the demand conditions as the manufacturers now have to provide a higher quality product and the

consumers will expect a higher quality also in related and supporting industries.²⁵²

Narula's development model has five stages, in which the roles of the different determinants of the diamond model change from stage to stage. For example, the role of basic factor endowments is high in the early stages but declines as the economy develops. According to Narula stage five represents the stage which industrialized countries in the triad are presently entering. In this stage the economic growth is slowing and the diamonds of the different countries have converged. This convergence means similar competitive advantages in technology, homogeneity of social and demand conditions and market structures. There is an increasing propensity for cross-border transactions to exploit relative differences in factor conditions and similarity in markets. There is increasing merger and acquisition activity and strategic alliances among firms in different countries and the national diamond of one country is heavily affected by the diamonds of other countries. Differences in national technological advantages will narrow and firm level technological advantages will become more important as MNEs exploit the variables from the most appropriate location.²⁵³ This is in line with Cartwright's multiple linked diamond, see 5.4.

5.3 Rugman's and D'Cruz' double diamond model

Rugman and D'Cruz develop a double diamond model where the Canadian and US diamonds are gradually more and more interlinked until, in fact, a single North American diamond is created. See figure 10. As proof of the accuracy of their model the writers mention the NAFTA (North American Free Trade Agreement) and the many business linkages between the two countries already existing today.²⁵⁴ According to Rugman and D'Cruz each country needs to set its own home country diamond against the relevant "triad diamond". "European nations such as Finland and Poland, outside the EC, will set theirs against the EC."²⁵⁵

According to Hodgetts the primary advantage of the double diamond is that it forces business and government leaders to think about management strategy and public policy in a different way. "No longer is the domestic diamond the unit of analysis, as in Porter's single diamond framework. The proper perspective now becomes that of identifying successful and potentially viable 'strategic clusters' of industries within the nation and to examine their linkages and performance across the double diamond", Hodgetts writes.²⁵⁶

Thain criticizes the double diamond framework. He doesn't understand why the Rugman/D'Cruz North American diamond doesn't include Mexico. According to Thain the double diamond framework would be wrong even if Mexico was included because Canada cannot have final jurisdiction over the US diamond. According to Thain it is important to have a much larger perspective than North America. But this perspective is one of understanding, not of control. Thain writes: "What we really need to understand is that all national diamonds

²⁵² Narula 1993, 90-94

²⁵³ Narula 1993, 103

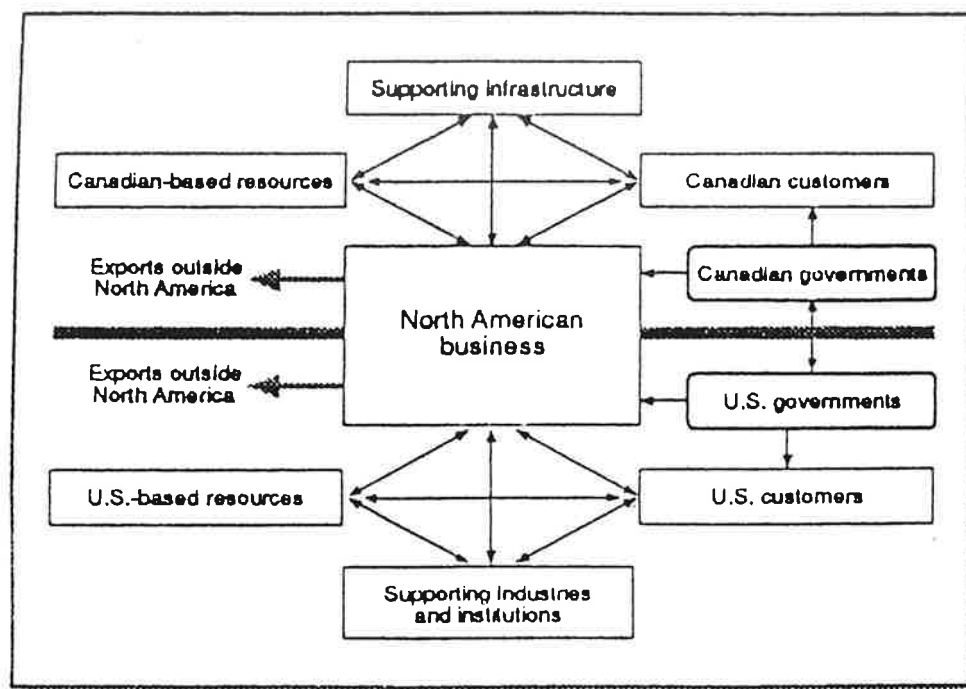
²⁵⁴ Rugman and D'Cruz 1993, 29-33

²⁵⁵ Rugman and D'Cruz 1993, 19

²⁵⁶ Hodgetts 1993, 48

overlap more or less, and are inextricably linked in a global trading system that is a cumulative, integrated set of all component, sub-unit diamonds."²⁵⁷ Thus, contrary to Rugman and D'Cruz, Thain sees a diamond as restricted to one country and the world consisting of many diamonds, not one in common for several countries.

Figure 10: The double diamond model.



Source: Rugman and D'Cruz 1993, 34.

Also Stewart criticizes the double diamond framework and notes that it only replaces one unnecessarily rigid concept with another. Stewart argues for finding rivals and demanding buyers all over the world, not just in the North American context.²⁵⁸

Porter and Armstrong comment on the double diamond framework and state that Rugman fails to distinguish between the geographic scope of competition (for example, North American or global) and the geographic locus of competitive advantage, as reflected in the diamond. Even if competition in many businesses is global, this does not mean there is a 'world diamond' for these businesses. The source of competitive advantage is still very local and it is reflected by the determinants of the diamond in the local home base. The writers mention the large differences in per capita income, and thus competitive advantage, even between states in the US as proof of their view.²⁵⁹

²⁵⁷ Thain 1992, 12

²⁵⁸ Stewart 1992, 14

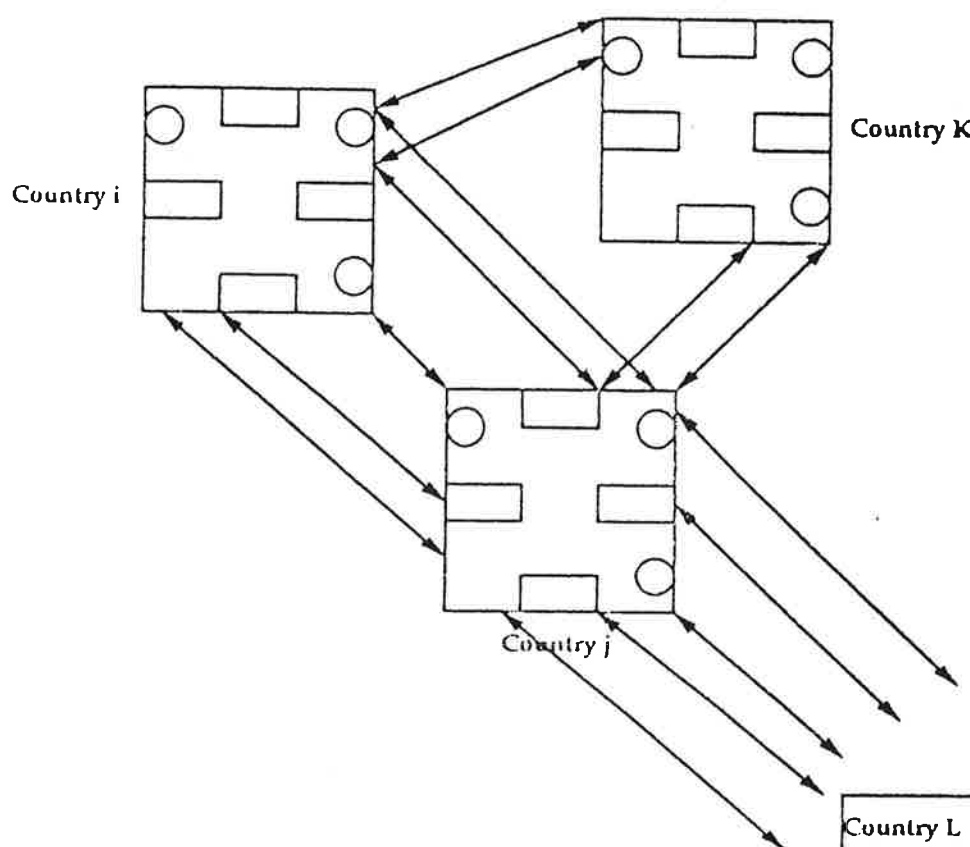
²⁵⁹ Porter and Armstrong 1992, 8

According to Daly the restatement by Porter of a preference for a single diamond is weak and does not address the problem of attaining low costs in manufactured products with important economies of scale in a small market. Daly argues for the double diamond model especially in the case of small countries. According to him the double diamond is better than the single diamond because it includes the diamond of a trading partner or trading partners,²⁶⁰ and thus also the sales in foreign currencies often so important for companies from small countries. Daly argues that companies from small countries have to specialize in a narrow range of products and sell these to international markets in order to gain product specific economies of scale.²⁶¹

5.4 Cartwright's multiple linked diamond

Cartwright writes that the home base diamond model is inadequate because it omits variables that explain international competitiveness. Cartwright constructs a multiple linked diamond, which he himself explains essentially to be a generalized version of the Rugman/D'Cruz for

Figure 11: The multiple linked diamond.



Source: Narula 1993, 104.

²⁶⁰ Here it should be noted that Daly in fact speaks for a multiple linked diamond, which includes the diamonds of several countries. In this paper this kind of a model is discussed next under "Cartwright's multiple linked diamond".

²⁶¹ Daly 1993, 125-126

innovation and learning inherent in Porter's theory, but extends opportunities to multiple offshore environments where the advantages are derived, defended and captured with the aid of supportive organizational forms".²⁶² Cartwright does two alterations to Porter's initial diamond model. First, he creates interval scales to the different parts of the diamond model in order to make the model quantitative. Second, he extends Porter's model to include five off-shore variables, with similar interval scales as he created for the initial model. The off-shore variables are: capture of off-shore factor creation, linkage to related and supporting industries in the off-shore environment, access to demanding customers in the off-shore environment, access to rivalry in the off-shore environment, and the extent to which the industry has international goals or structures.

Cartwright gives judgmental values to the determinants of the diamonds in different industries and then tests the initial diamond model, his extended model, and a model with only the off-shore variables. Cartwright finds that his model and the off-shore only model predict the competitiveness of certain industries better than Porter's initial home diamond based model.²⁶³ Cartwright's findings, however, must be considered carefully due to the high content of judgment involved.

5.5 Macro variables

Based on his critique and testing reviewed in section 4.7 in this paper, Daly suggests combination of macro variables related to competitiveness with the micro factors related to the diamond model. The macro variables suggested by Daly include for example purchasing power parity, prices and wage rates, interest rates, exchange rates and unit labor costs. After the analysis of macro variables the diamond model could be used to identify the additional variables relevant at the level of the firm and industry. "Such an eclectic combination of macro and micro variables would be preferable to the neglect of the macro variables as Porter has done", Daly writes.²⁶⁴

Also Bellak and Weiss suggest incorporation of macro variables into the diamond model. They write that it would be easy and fruitful to introduce country-specific characteristics into the diamond and depending on the availability of data also into the empirical part. They suggest also input-output analysis and the use of IO-statistics.²⁶⁵

²⁶² Cartwright 1992, 12

²⁶³ Cartwright 1993, 55-70

²⁶⁴ Daly 1993, 129-133

²⁶⁵ Bellak and Weiss 1993, 117

6. CONCLUSIONS

The conclusions of this paper consist of three main parts. First some remarks about the benefits of the diamond model in general are made. Then the relevance of each of the nine points of critique to the Finnish paper and board machine industry is discussed. Finally the suggestions for modifying the diamond model are discussed, also in the light of the Finnish paper and board machine industry.

6.1 The benefits of the diamond model

Despite the partly heavy critique against Porter's diamond model, the framework itself, together with some necessary modifications, seems to be useful in assessing international competitive advantage in an industry. Dunning sees Porter's contribution as "a paradigm within which the determinants of national competitiveness may be identified, and the way in which they interrelate with each other; and second to offer some hypotheses on the reasons why the significance of these parameters may vary between countries and sectors."²⁶⁶ Rugman gives thanks to "the brilliant concept of the diamond, the identification of clusters and the four stages of economic development". "While there is a certain lack of originality in the components of Porter's diamond model, it has exactly the correct perspective by its focus on the strategies of firms rather than nations." "To the extent that he (Porter) brings together the firm-specific linkages between the four determinants and the two outside forces, his model is useful and, potentially, predictive" Rugman writes.²⁶⁷ McKelvey writes that even if the four determinants are familiar from other theoretical approaches to national differences, Porter does synthesize them in a coherent manner.²⁶⁸ Brøndum and Søndergaard praise Porter's holistic approach and emphasis on the indirect role of the government.²⁶⁹

The views above are shared by most critics. Porter seems to have been able to capture many important determinants affecting the creation of a successful industry cluster in a country. But, as Darroch and Litvak point out, there is a danger of seeing Porter's model as static and timeless.²⁷⁰ Dunning writes that the pattern of the diamonds will differ according to the extent and form of the involvement of the country in question in the global economy.²⁷¹ Rugman²⁷² and Hodgetts²⁷³ argue for the necessity of modifications to the diamond model. So it seems that the diamond model is not a general model which would suit all industries in all countries at all points of time without modifications. In order to be useful the model has to be considered in the context of the specific industry and environment and modified accordingly.

Thus, the first conclusion, even if it was not one of the questions this paper aimed to answer,

²⁶⁶ Dunning 1991, 10

²⁶⁷ Rugman 1991, 61-62

²⁶⁸ McKelvey 1990, 8

²⁶⁹ Brøndum and Søndergaard 1991

²⁷⁰ Darroch and Litvak 1992, 71

²⁷¹ Dunning 1993, 12

²⁷² Rugman 1993, 6

²⁷³ Hodgetts 1993, 44

is: Porter's model can indeed be used to study the competitive advantage of an industry, but before this can be done, the modifications necessary for the specific industry in the specific country have to be made.

6.2 Discussion of the critique

Where is competitive advantage created?

The main disagreement between Porter and the critics seems to be about the nature of business. Porter, on the one hand, believes that a company cannot innovate rapidly if it constantly has to coordinate among many different autonomous units. Porter sees the forces of localization of competitive advantage as very powerful and they will persist and even be stronger where there are no artificial distortions of trade. According to him the emergence of the European trading bloc will eliminate the barriers that have protected companies with no reason to exist except for artificial distortions within the European market. The companies based in the most fertile environments for innovation will prevail.²⁷⁴

The argument of the critics is that the proximate or relevant environment for an MNE or industry may include more than one diamond. The critics, especially Reinert, Rugman and Dunning, believe that the development is towards larger and larger clusters crossing national boundaries. Examples are the North American and European integration processes. It may even be the case that the diamond in some other country is as important as or more important than the diamond in the home base. Tryggestad's point about a more abstract understanding of space than mere geographic space seems well-founded. Companies or other parts of a cluster may have closer cultural or economic relations to companies or parts located far away than to companies or parts located nearby, and vice versa.

Porter's model of MNE activity to create competitive advantage is called the home based model and the model advocated by the critics has been called the "transnational"²⁷⁵. The real underlying difference in the two models of the MNE is the view about coordination, control and information flows. Porter does not seem to believe in the possibilities of modern information technology to aid the coordination and control of the dispersed assets in a global web. According to him the forces of localization in a subsidiary are too strong in order to be coordinated and controlled effectively in the good of the whole organization. Therefore he argues for the central home base with all strategic decision making, R&D and production of core products and of subsidiaries closely tied to the headquarters. The critics, on the other hand, believe in the possibilities of coordination and control. In addition to the traditional control mechanisms like reports and information systems, the critics advocate more subtle control and coordination mechanisms to prevent the transnational or heterarchical MNE from dissolving into anarchy. These include a strong corporate culture, management styles which enhance trust and a feeling of integration, and human resource management like long term

²⁷⁴ A Conversation with Michael Porter, 356

²⁷⁵ In addition to the transnational company the same kind of model can also be called the heterarchical MNE, as done by Sölvell and Zander in their comparative article "Strategies for Global Competitive Advantage. The Home Based MNE vs the Heterarchical MNE" from 1991.

employment, personnel rotation and global project teams and meetings.²⁷⁶

The view of the critics seems correct. It seems logical to think that clusters are part of a development towards increasing internationalization and integration of geographical areas. The reason for this process is the development of communication and transportation technology, which make possible also the more subtle forms of coordination and control. So the critics seem to implicitly believe that communication and transportation technology make it possible to coordinate the operations of a multinational corporation with units located geographically wide apart, contrary to Porter.

Tryggestad makes a good point by noting that Porter's notion of a national home base is *normative*. With it Porter argues for what firms should do in a globalized economy, and less why they do what they really do. Tryggestad also points out that it is difficult to find capital loyal to some nation state as the transfer of capital has become increasingly free. MNEs internalize cross-border markets and also the ownership of the companies becomes international. It is increasingly difficult to state the nationality of a company.

In respect to the Finnish paper and board machine industry it is difficult to draw any absolutely correct conclusions from the discussion in 4.1 as there are no uniform measures of the issues discussed. The outcome of the debate is very much a question of interpretation. Porter's main argument against the critique is that a global strategy is not the same as the location of competitive advantage. In spite of global competition top management, core product and process innovation and a critical mass of sophisticated production are all situated in the home base. But how should these be measured? And if they can be measured, what if *some* top managers are located abroad, *some* core innovation and *some* important production takes place outside the so called home base? Is that still a case of a home based company or cluster or is it a cluster moving in the direction of a transnational one?

Four arguments seem to speak for the addition of international business activity to the diamond model. First, the determinants of the Finnish industry seem to be of increasingly global nature. Valmet Paper Machinery Inc. and Valmet-Tampella Inc. have *production* plants in Finland, Sweden, Italy, France, Canada, and the USA, and Valmet Paper Machinery Inc. is co-owner in a paper machine factory in China.²⁷⁷ In addition, there are R&D centers in Finland, Sweden and the USA.²⁷⁸ Probably innovations do flow from different units in different countries to other units in other countries, and the foreign units are not only "tapped into", as Porter advocates. If this is the case, the competitive advantage of Valmet Paper Machinery Inc. and Valmet Tampella Inc. is at least to some extent based on national systems of innovation in many countries and not only the Finnish diamond.

Second, the *customers* of Valmet Paper Machinery Inc. and Valmet-Tampella Inc. are located all over the world. Service and sales units are located in several countries. Of Valmet Paper Machinery Inc.'s sales in 1992 37% came from Finland, 8% from other Nordic countries, 18% from Western Europe, 1% from Eastern Europe, 29% from North America and 7%

²⁷⁶ Sölvell and Zander 1991, 12-20

²⁷⁷ Valmet Paper Machinery 1992, 11

²⁷⁸ Rautpohja 1991

from other countries, mainly Asia. Valmet-Tampella was even less tied to Finland in its customers. Of Valmet-Tampella's sales only 14 % came from Finland, 12 % from other Nordic countries, 13 % from Western Europe, 1 % from Eastern Europe, 27 % from North America and 33 % from other countries, mainly Asia.²⁷⁹

Third, the addition of international business activity to the diamond model suits the case in question because the diamond model is used to evaluate the competitive advantage of the Finnish paper and board machine industry in the future, when Finland may be linked to the EU with even stronger ties than presently. There are grounds for believing that the development towards transnational diamonds will continue, as several free-trade areas around the world are emerging, the EU and NAFTA being the best known ones.

Fourth, the addition of international business activity to the diamond model seems well-founded also when the origins of the industry are studied. It was technology from foreign diamonds that first was used to upgrade the forest related machine industries in Finland. Many Finnish companies in forest related machine industries started internationalization with inward operations, like raw material and machinery imports, at a very early stage in their lives. Later they went on to inward licensing. When the Finnish companies learned the technology in the forest related machinery, they gradually started exporting, in some cases they even exported their products manufactured by license. For example, Kone ja Silta acquired a license to manufacture and sell British Walmsley paper machines for the Eastern markets.²⁸⁰ It can be concluded that internationalization, especially through import operations, has been an important factor in the growth and development of the Finnish forest related machine industries, and thus also this point speaks for the addition of international business activity to the diamond model.

FDI

The issue of foreign direct investment is closely linked to the discussion of 4.1 about where competitive advantage is created, as it is usually through FDI that the "corporate web" of an MNE is built.

Porter's strong emphasis on the home base is contradictory to much recent research and discussion²⁸¹ and this is reflected in the views of the critics. Rugman states that Porter doesn't specify the nature of benefit the domestic owned home base is supposed to have relative to the foreign owned company. Later Porter and Armstrong, and Thain argue that a foreign owned subsidiary can easily be drawn out and thereby wouldn't be as desirable for a country as a domestically owned company. However, it is not an undisputed truth that a domestically owned company should in some way be a better "corporate citizen" than a foreign owned one. In Finland there are several examples of foreign acquisitions from the last few years. In cases

²⁷⁹ Valmet Annual Report 1992, 34-36

²⁸⁰ Raumolin 1992. Note that these steps are in accordance with the theory on import operations. Among the first steps in inward operations are machinery import operations, raw material/component inward operations and know-how import operations, e.g. licensing. See Luostarinen and Welch 1990, 183-184.

²⁸¹ See for example Bartlett and Ghoshal 1989, Ghoshal and Bartlett 1990, Bartlett and Ghoshal 1992, Reich 1991, and International Business Week May 14, 1990.

like Masa-Yards, ABB Industry, or ICL foreign ownership doesn't seem to have harmed the previously Finnish owned companies. On the contrary, there seems to be an increasing competition for foreign capital in order to sustain old and create new jobs and also the policy of the Finnish government in this respect has become more favourable towards freer inward foreign direct investment. It should also be remembered that FDIs to a country can have pressure effects, like lower prices and new technologies, on the domestic industry and may thus increase investments and efficiency in an industry.

The argument presented by the critics especially in the tables of 4.2, seems well-founded. The critics show that Porter's diamond model does not take into account all kinds of FDI. At least in theory, subsidiaries linked to the "corporate web" of the transnational or the heterarchic organization have stronger roles than those assigned to foreign units by Porter's home based model. "In theory", because probably no perfect examples of a transnational exist. Most MNEs are probably somewhere between a home based company and a transnational company. So the transnational can be viewed as an ideal, towards which some companies, e.g. ABB, are consciously struggling.

As to FDI of the Finnish paper and board machine industry, see the discussion above in "Where is competitive advantage created?".

Small open economies

The export/GDP ratio of Finland has been around 20% in recent years, e.g. 22,6% in 1992.²⁸² The outward FDI/GDP ratio of Finland was 1,9% in 1992, but 2,8% in 1989 and 1990.²⁸³ Of the critics Rugman and D'Cruz and Hodgetts mention Finland as a small open economy.

The arguments that the diamond model does not take into account the special nature of industries in a small economy seem to suit at least some industries in Finland well. In a small and open economy like Finland there is a high pressure towards internationalization in an early stage of the lives of firms. Domestic demand may not be sufficient in many industries even during the first period of their development. "The smallness of domestic markets restricts essentially the usability of growth alternatives domestically leading the company to consider international growth possibilities at a much earlier stage of growth than would be the case if domestic markets were large."²⁸⁴

The essential factor impeding the development of industry in Finland in the late 19th century may have been the insufficient markets. This impediment was gradually removed with the liberalization of international trade and the simultaneous growth of the domestic market.²⁸⁵ But Finland may still be too little a country for several manufacturers of large industrial products, such as paper and board machines. The four big producers of paper and board machinery in

²⁸² Data obtained from Tilastokeskus, National Accounts 1985-1992, page 6 and Tullihallitus, Ulkomaankauppa 1992, part 3, page 5.

²⁸³ Data obtained from Tilastokeskus, National Accounts 1985-1992, page 6 and Bank of Finland, Notification 28.1.1993.

²⁸⁴ Luostarinen 1989, 66

²⁸⁵ Heikkinen and Hoffman 1982

Finland, Valmet, Wärtsilä, Tampella and Ahlström, tried several times to remove domestic competition through restructuring because of bitter price competition. The industry needs profits with which to finance the necessary investments in R&D and it was seen as necessary to join forces in order to prevent price competition between the Finnish companies and better be able to finance R&D. In May 1992 the development in the industry reached a stage with only one Finnish company, namely Valmet. Since May 1992 Tampella Papertech is included as Valmet-Tampella in the Valmet corporation. This development has given reason to a discussion about the possible negative effects of Valmet's actual monopoly position in the Finnish industry.

As Valmet has emerged as the only company producing paper and board machines in Finland, its main competition comes from rivals in Germany and the USA. Competition in most markets has become truly global. Valmet's former and present managers are of the opinion that because of this global nature of competition in the industry, only one paper machine company is viable in Finland.

Porter's views about the applicability of his model to small countries cannot be judged by the size of home demand alone, however. Porter sees the size of domestic demand as less important than the sophistication of domestic demand, and in Finland the sophistication of domestic demand in the forest industries has been high.²⁸⁶ So it could well be the case that the Finnish paper and board machine industry has created competitive advantage even without a large domestic demand.

In addition to being small, the Finnish markets in general are relatively open to foreign competition. Luostarinen notes that "openness, or more exactly competition caused by the openness of domestic markets, is, in addition to the small size, the other push factor for the Finnish companies to start to internationalize their activities."²⁸⁷ However, in the paper and board machine industry the Finnish market may not be very open in real life, even if no actual protectionistic measures exist. In the last 20 years only minor purchases of paper and board machinery have been made from abroad. Therefore the fears of a monopoly situation for Valmet are well-founded and the discussion of domestic versus global rivalry is topical and important and it is too early to say, whether Porter's views or those of the critics are better suited to the Finnish paper and board machine industry.

Despite the open question regarding the paper and board machine industry, it can be noted as a final comment on the issue of a small and open economy, that a company in a small country *in general* has larger incentives to internationalize than companies from large countries. And as a part of the internationalization process,²⁸⁸ the company from a small country probably also has incentives to establish a network of foreign units to utilize the diamonds of other countries and thereby overcome shortages at home. Thus Porter's home based diamond model may not be as valid for studying companies and industries from small open economies than companies from the USA or Japan, for example.

²⁸⁶ See for example Lilja et al. 1992.

²⁸⁷ Luostarinen 1989, 75

²⁸⁸ As presented by Luostarinen 1979.

Resource-based industries

It is important to note that Porter avoided natural resource-based industries in his study, as he himself notes. Therefore the concern of the critics about the applicability of the diamond to resource-based industries is valid.

It is of course true that competitive advantage also in the resource-based industries is based on upgrading and innovation. But why should this innovation necessarily be such, that the industry moves to become less resource-based? As the critics point out, it seems logical that there can also be substantial intangible value added in resource-based industries, for example in the form of differentiation of the product and managerial and marketing skills. The advanced technology advocated by Porter does not necessarily have to be in the product itself. Also the technology used in the process of extracting or making the resource-based product can be highly sophisticated, as is the case in the Finnish forest and mining industries.

The arguments presented by the critics that many resource-based industries have small home markets and therefore need global markets, and that resource-based industries are often exported by coordinated exporting strategies, are good and speak against Porter's arguments of the importance of the home market and intense rivalry.

National culture

Van den Bosch and van Prooijen stress the importance of national culture and find that the diamond model doesn't emphasize it enough. Porter disagrees about neglecting national culture and his arguments seem well-founded. The home based diamond model emphasizes national culture in creating the necessary linkages for innovation in an industry²⁸⁹ and Porter in fact sees national culture as an important variable in creating and sustaining competitive advantage in an industry.

On the other hand, the other point taken up by van den Bosch and van Prooijen related to national culture seems better founded. It seems that to some extent Porter may be blinded by his own culture and the characteristics of his home country. Porter strongly emphasizes competition and other values which according to Hofstede are characteristic to a masculine society, e.g. the USA. For example Porter's attitude towards partnerships between companies seems to be very negative. To him companies should only see each other as rivals. But in the Finnish paper and board machine industry Tampella, Valmet and Wärtsilä formed a long-lasting partnership, which was widely considered successful and supporting the international competitiveness of the Finnish industry. Moreover, monopolies are banned by Porter, but the local Finnish electricity production has been able to provide the Finnish industry with cheap electricity thanks to monopoly position. Also other critics blame Porter for seeing things too much from the viewpoint of the USA, a country with a large home market and companies with traditionally relatively small incentives to internationalize.

Methodology

Many critics see Porter's method of selecting industries to his study as wrong. The arguments of the critics seem well-founded. First, export data dominate when Porter measures the

²⁸⁹ Sölvell and Zander 1991, 15

international competitiveness of industries. The FDI activities of MNEs are not taken properly into account of. Second, use of SITC-statistics causes problems for some industries, because the 5-digit statistics is not a suitable level for studying all industries. Different industries demand different aggregation levels. Third, productivity cannot be directly seen in the SITC-statistics, even if Porter himself emphasizes productivity as the ultimate goal of an industry. Fourth, Porter excludes industries with extensive trade with neighboring countries. But as Rugman and D'Cruz point out, trade with neighboring countries is also trade with foreign countries and doesn't have to be any easier. Fifth, Porter uses successful industries to create and test a model for explaining industry success. This methodology suffers from validity threats. It would have been better to use also less successful industries as a control group to test the model with.

But a problem with the critique is, that it is difficult to name better ways to have conducted the study. For example, SITC-statistics are found from all major countries and industries and can therefore easily be used for comparisons. Also, data on productivity that could be compared between nations and industries is probably hard to find. It can be noted that the level of the SITC 5-digit statistics suits the industry in question well, SITC rev.2 code 72512 is namely "machinery for making and finishing paper and paperboard".²⁹⁰ But, on the other hand, the OECD export shares do not give a very accurate picture of the real market shares of the major companies producing paper and board machines. For example, USAs OECD export share is too little, because Beloit has the world's largest market of paper and board machines at home so by dominating its home market it in reality also has a major share of the world markets. This is not apparent in the OECD export statistics. Furthermore, the OECD export shares of Italy, Great Britain and Sweden are quite high, even if these countries in reality don't any more have important domestically owned paper and board machine producers.

Most of the critique concerning the generalizability and comparability of the results seems well-founded. Because of the methodological draw-backs in the selection of industries, also the generalizability of the results suffers. It is difficult to generalize from a few industry cases and especially, when the cases are not described using a consistent framework and objective measures, but subjective reasoning. Also the point taken up that Porter's conclusions could have been made without such a detailed study, seems correct. Porter's conclusions in the case studies, even in the separate country studies made after the initial study, seem very similar. His thinking is normative. He makes his conclusions drawing from what he sees as the generally valid rules for achieving sustained competitive advantage.

The predictive power of Porter's study has also been criticized. But here the arguments of the critics are not so strong as in the other methodological points. As is usual with case studies, the diamond model cannot be numerically tested for predictive power. For example the attempt of Cartwright to construct a quantitative model by giving judgmental scores to the determinants of the diamond doesn't seem very convincing due to the large amount of judgment involved. But Porter's model, even if it has drawbacks in its methodology, may provide a useful framework for improving the understanding of industry success and therefore

²⁹⁰ Rouvinen 1993, 55

also to predict the future success of industries. Of course, no accurate predictions can be made with the diamond model, but its aid in predicting the future success of an industry cannot be completely denied, either.

Macro variables

According to Daly all factors of unit labor cost, output per hour, compensation per hour and exchange rates have to be studied simultaneously to assess competitiveness. According to Daly Porter only takes into account output per hour, which he calls productivity. Daly's point seems reasonable, since little could be lost even if an analysis of macro variables would be added to the model. This is comparatively easy to accomplish and adds value to the analysis.

As pointed out by the critics, competitiveness in many countries and industries is still based on price competitiveness. Therefore, also prices should be analyzed in an industry study.

Dynamism

The critics blame Porter for concentrating on existing clusters and not explaining how a new cluster is created. Porter answers the critique by stating that competitiveness is most easily established based on areas of established strength. This answer is in line with the ideas of the diamond model and it is evident that the model is not designed for the purposes of developing countries but rather those of established industrial nations with already some competitive strengths. Also, Porter does show the historical development of some actual clusters in his study and thus it cannot be said that he doesn't give any direction as to how a successful cluster is created.

It is true that the four stages of national growth or industrial development are not suited to be a policy guideline for creating successful clusters. But they are not meant to be, either. They are merely a framework for understanding long-term, large-scale shifts in the industrial characteristics of countries. Porter does not state that *all* industries in a country should be in the same stage simultaneously. According to him *most* industries are in the same stage. The point Grant makes about Canada, Nauru and the Arab Emirates as prosperous countries in the factor driven stage is a good one. Porter's four-stage model is not without flaws.

Rigour

Grant's critique of the lack of rigour in Porter's diamond model seems at least partly justifiable. For example, the strategy, structure and rivalry determinant does seem to be a catch-all category which comprises so many different categories that they don't form a coherent group. Grant gives a good example: domestic rivalry is an industry-level variable which is clearly defined and the relationship of which to pressure for improvement and innovation is precisely specified. Management training and practices, and employee attitudes and motivations on the other hand seem to be national characteristics which relate to factor conditions.

Grant's three points of critique all seem to be true. Some variables seem to have an ambiguous impact on competitive performance, it is for example not clear when advantages in the supply of basic factors of production are an advantage and when they are a disadvantage. The cause and effect relationships between the four corners and national competitive performance are not quite clear, and the determinacy is weakened by two-way

relationships between the corners and national competitive performance. But here it is worth noting that reality is complex and any model trying to capture all determinants affecting competitive advantage must be rather complex, too.

Rugman and D'Cruz, and Brøndum and Søndergaard take examples of generalizations and omissions in Porter's book. These are of course not desirable, but to Porter's defence can be said that his book is a lengthy one and it would be an almost impossible task to write it completely without errors of this type.

Based on the discussion of the nine points of critique of the diamond model, the second conclusion can be made: *In order to be able to properly explain the competitive advantage of the Finnish paper and board machine industry, first, the model has to be modified to contain international business activity in some form, and second, also macroeconomic data should be analyzed when assessing the success of the industry.*

6.3 Discussion of the modifications

Adding international business activity and thereby the influence of other diamonds to the home base diamond model in the case of the Finnish paper and board machine industry seems well-founded, as concluded in 6.1. It remains to find the model which best suits the Finnish paper and board machine industry.

The double diamond model suggested by Rugman and D'Cruz is an alternative way to that of Dunning's of incorporating IBA into Porter's model. A Finland/EC double diamond model could be argued for in the case of the average Finnish industry, because for example in 1992 47,2% of imports were from the EC and 53,2% of exports were to the EC, compared with only 5,5% and 1,3% for Japan and 6,1% and 5,9% for the USA.²⁹¹ But because the paper and board machine industry is dominated by Valmet, a MNE with sales all over the world, the restriction to an EC diamond doesn't seem suitable. The competition in the industry is truly global with three main competitors, Valmet, Voith and Beloit. All are MNEs with global sales and subsidiaries in several countries.

The multiple linked diamond presented by Cartwright thus seems better than the double-diamond model. Cartwright's idea that the diamonds which are the most important for the industry or company in question should be analysed, seems correct. With subsidiaries and large sales both in Europe and the USA and a strong emphasis on development in Asia, for example production of Valmet paper machines under license in Japan, large sales and a joint-venture project in China, Valmet seems to have a triple-diamond organization. This is taken as the starting point for the analysis of the competitive advantage of the Finnish paper and board machine industry.

However, the limited resources of the study are recognized and therefore it must be noted already at this point that the triple-diamond model is an ideal, towards which the study will

²⁹¹ Tullihallitus 1993, 2-8

struggle. In reality, because field-work in the different foreign diamonds is impossible, the option is left open that Dunning's IBA as a third outside determinant will eventually be used as the basis for the study. This is because Dunning's IBA contains the determinants of the other diamonds as an aggregate and this is seen requiring less exact knowledge of the different foreign diamonds.

Daly's point about macro variables seems reasonable and the study of some macro variables, especially those related to metal industries, should be included in the study to give a broader picture of the industry. As Dahmén notice, the two types of analyses should be complementary.

Thus, the third conclusion of this paper is: *The best way to study the Finnish paper and board machine industry would be to study the diamonds of all the main geographical areas of Valmet's business using a multiple linked diamond. But because of limited resources international business activity is studied as an aggregate, i.e. as a third outside determinant to the diamond model. Also, macro variables should to some extent be studied in addition to the diamond model.*

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