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Towards A Flexible Concept of Competitiveness

Paper

TOWARDS A FLEXIBLE CONCEPT OF COMPETITIVENESS

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Abstract

The purpose of the paper is to work out the substance of the term 'competitiveness' from a broad overview of concepts used. For most of the period theory in the field has comprised three quite separate strands, i.e. trade theory, price theory and industrial organization. Starting with the theoretical background, the substance of 'competitiveness' is derived from a classification of determinants used in theoretical and empirical studies. The main indicators are defined and explained. We conclude that a flexible rather than a generalizing concept of competitiveness should be used, because the explanatory power increases with the former. The research problem in question defines the subset of indicators to be chosen. Consequently, the subset varies from case to case and with it the concept of competitiveness.

1. Introduction

The term '(international) competitiveness' is among the most frequent used terms in economics. Yet, through the variety of concepts of competitiveness ('ROI, ROVA, RULC, RHA, RXA, RCA') the substance of the term often remains unclear. It is not joined to a clean theoretical concept but rather to a multiplicity of approaches. Many studies spend more space and effort on complaining about shortcomings of definitions than on developing new ones. (e.g. STI 1986)

The aim of this paper is to define the concept of competitiveness by a classification of its determinants. Yet, it is not the purpose of the paper to say a 'final' word on or to present a general definition of competitiveness. The next section summarizes the theoretical concepts of the analysis. Then, alternative classifications are proposed (chapter 3). The main section (chapter 4) gives an overview on most frequently used competitiveness indicators and relates them to the theoretical concepts of chapter 2. The final section redefines competitiveness in the light of the main determinants.

2. Theory

In recent years research on concepts of competitiveness emerged from three different roots. First, international competitiveness was the subject of the orthodox (neoclassical) trade theory (van Suntum 1986, Scott 1989, WIFO 1987). This approach views competitiveness as the distribution of welfare (e.g. Scott 1989) between countries. Trade flows generate national income from factor rewards because they help to allocate resources in the most efficient way within countries. Within this approach, two lines of arguments have been established, the absolute (cost, price, exchange rate) and the relative (factor proportions) advantage. It has been extended in several ways, most important to take account of technology (e.g. Dosi et al. 1983, 1990, van Hulst 1991, Lundberg 1988, OECD 1992) and

international factor movements (esp. foreign direct Investment; e.g. Jones 1979, Markusen 1986) as explanatory variables.

The second strand started from price theory, i.e. firm behavior under different market regimes. The main issue of this microeconomic approach was to explain profit maximizing behavior of the firm by analyzing output decisions (price competition), assuming perfect markets. It has been extended to market imperfections, such as different degrees of monopoly power (e.g. Haar 1989), oligopolistic market structure etc.

The abstract concept of the firm, the static nature of the general equilibrium model and the price as the only parameter led to widespread criticism (e.g. Borner 1986) and a more realistic view of the behavior of firms, the industrial economics approach. The introduction of economies of scale, imperfect information (risk and uncertainty), differing production functions, barriers to entry etc. was essential to explain the growth and success of firms (in oligopolistic markets). The simultaneous determination of price and output decisions under price competition became the strategic variable of competitiveness. Within this approach there has also been an effort to allow for more factors influencing competitiveness, i.e. non-price competition (e.g. Chakravarthy 1986, Koutsoyiannis 1987). Product differentiation, advertising, product cycles, product changes, innovation (Wagner 1988, Cox 1989), diversification etc. are introduced to explain firm behavior and market performance. (e.g. Adams - Klein 1983)

These three approaches have led work in the field of competitiveness in two directions. First, the microeconomic concept was extended to an international level (e.g. Durand, Giorno 1987, Borner 1984, Daniels, Bracker 1989). Second, attempts have been made to combine the microeconomic and macroeconomic approaches (e.g. Abd-el-Rahman 1991). As a result a variety of terms has emerged out of recent literature. The term competitive advantage was used in a microeconomic sense, whereas the term comparative advantage is strongly related to macroeconomic concepts. In addition, the competitive advantage of nations (van Suntum 1986, Aiginger 1987, Zinn 1989, Kneschaurek 1989, Porter 1990a, b, c) was introduced to refer to mesoeconomic (industry, cluster) performance. Each term is linked to an above mentioned theoretical approach, macroeconomic trade theory, price theory and the theory of the (international) firm, i.e. industrial economics.

Several weaknesses of each approach, as well as the subsequent theoretical variations and the extremely wide use of the term competitiveness involve problems with a clearcut, unifying definition of competitiveness. In the following sections we will disaggregate the concept further, presenting alternative classifications of the determinants of competitiveness as a starting-point.

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3. Alternative Classifications

The preceding subsection has summarized the theoretical strands of competitiveness which lead to different conceptualizations. In particular, it comprises three branches. The first concerns welfare effects of international trade under liberalization and impediments to trade, the second centers on explaining the profit maximizing behavior as a competitive strategy of the firm in perfect or imperfect markets and the third focuses on the (international) performance under price and non-price competition. This section of the article draws on these concepts trying to work out different classifications of the determinants of competitiveness.

The classification criteria are listed below (see Table 1). Since it is impossible to arrive at a single valid classification, they are overlapping in the sense that single determinants can be attributed to more than one category. Hence, the term 'alternative'.

Even if tenuous, it is not correct to draw conclusions for a certain level (e.g. nation) from another level of analysis (e.g. industries, clusters; STI 1982, Porter 1990c, van Suntum 1986, Eliasson, Lundberg 1989). Like in many other fields, simple aggregation of micro- or mesoeconomic variables does not lead to the performance of nations (Feser 1990, OECD 1992). E.g. exchange rate movements presume a macroeconomic analysis, whereas product quality as a measure of competitiveness makes sense only at the meso (structural) or micro level.

The regional reference (national - international - global) extends or limits the number of determinants of competitiveness. It should be noted, that the importance of the concept of national competitiveness is declining rapidly and must be clearly distinguished from the competitiveness of nations. As already outlined above, theory provides us well with static and dynamic concepts of competition. Yet many authors stress, that a dynamic element should be included in every definition of competitiveness (e.g. EMF 1980). Finally, the correlation of competition and competitiveness varies substantially when market imperfections are taken into account.

Absolute competitiveness refers to the performance of a single unit, while relative competitiveness (e.g. Davies, Lyons 1991) is revealed only by a comparison of different entities (firms, countries etc.).

Input - output (market related) indicators are mainly derived from the structure - conduct - performance paradigm in industrial economics. Even if the terms are sometimes similar (e.g. price, quality), they may only refer either to input or to output, but not both. The distinction of price and non-price indicators reflects the above described extensions of orthodox concepts. Classified by

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measurement criteria quantitative and qualitative determinants, as well as objective and subjective indicators can be distinguished.

Many theoretical concepts of competitiveness involve a strong element of future performance expectations. According to these approaches one must distinguish between ex-ante and ex-post determinants in order to avoid misleading interpretations. In most cases it is not justified to draw conclusions on future competitiveness on the basis of past performance.[1] Firm based (e.g. innovation) as well as environment based (e.g. wage level, exchange rate) criteria usually cannot be referred to a certain instance, but create a 'mixture' of several components which is the essence for structural competitiveness. The role of supply (e.g. innovation) and demand (e.g. buyer sophistication) driven factors may either stimulate or obstruct the development of competitiveness.

So far we have not offered any definition of competitiveness. From a short overview on theoretical contributions we have outlined the main classification items of competitiveness. The next section disaggregates the concepts further and presents a detailed discussion of the determinants of competitiveness in order to meet its multi-dimensional characteristics.

Table 1 Alternative classifications

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1. Micro (Market) - Meso - Macro
2. National - Structural - International - Global
3. Static - Dynamic
4. Perfect markets - Imperfect markets
5. Absolute - Relative
6. Input - Output
7. Price - Non-price
8. Qualitative - Quantitative
9. Ex-post - Ex-ante
10. Resource based - Skill based
11. Objective - Subjective
12. Firm based - Environment based
13. Supply driven - Demand driven

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[1] E.g. Porter (1990a, b, c) asks for the competitiveness of nations but reduces his unit of analysis to specific industries and industry segments (1990a: 85). Although he stresses the point that 'the only meaningful concept of competitiveness at the national level is productivity' (Porter 1990a: 84) his analysis is mainly built on ex-post export-import data (SITC statistics).

4. Determinants of Competitiveness

Drawing on the different categories of competitiveness indicators we present an overview and definitions of the main determinants of competitiveness. (see Table 2)

Table 2 <u>Main Indicators</u>

Indicator	Definition	Example
Gross National Product per Capita	Goods and services (Output) per employee or population (at exchange rates or purchasing power parity)	Porter (1990)
Tertiarization	Share of service sector in total GDP	-
Growth of Economy	(Real) growth of GDP during a certain period	-
Concentration Measures	Number of characteristics of total population R&D: share of country, industry, firm etc. on total R&D expenditures; turnover; employees; industries: share of employees in industries with most employees on total employees.	Wiriyawit, Veendorp (1983), Curry, George (1983), Levy (1985)
Growth of Industrial Production	(Real) growth of output to meet demands in sophisticated products and reduce dependence on imports	Cox (1989)
Potential Output	Reallocation of productive resources to segments with demand potentials	WIFO (1987), Nelson (1989)
Capacity Adjustment	Speed of structural change as a reaction to market forces	Fels (1982), Hilke (1984), Liebermann (1987)
Intermediate Input Supplies	Availability of inputs and network suppliers, sophistication of domestic or foreign suppliers	-
Elasticity of Demand, Price Elasticity	Demand structure (domestic and abroad) - market power	OECD (1986), Shaked, Sutton (1987)
Clustering	Synergies between companies	Porter (1990), Slusky, Caves (1991)

Indicator	Definition	Example
Intensities	Human capital: share of researchers, technicians etc. on total labor force	Schulmeister (1990)
	Research: share of R&D expenditures in value added, turnover etc.	Anglmar (1985)
	Assets: assets per working hour	
	Labor: working hour per asset	
	Economies of scale: employed per production unit (output)	Perry (1984)
	Raw Material: share of non-processed inputs in total input or output	
	Energy: share of energy inputs in total input expenditure	
	Environment: share of environment protection investment in total investment	
	Technology: share of high-tech products in total output	Kalmbach - Kurz (1985), OECD (1986), van Hulst (1991)
	Exports: share of exports in total output (or per capita)	WIFO (1987), Vollrath (1988), Doi (1991)
	Advertising: share of advertising expenditures in value added, turnover etc. (advertising-sales ratio)	Arndt, Simon (1983), Thompson (1984), Cubbic, Domberger (1983), Dorfman, Steiner (1954)
	Value added: net output per employee	
Locational Criteria	Inward investment as indicator of competitive environment (see also 'unit labor cost')	Flassbeck (1988)
Quality Indicators	Supply and demand structure - matches, deficits	Lecraw (1984), von Weizsäcker (1985, Ross (1988), Botros, Panar (1988)
Noneconomic Determinants	Social security, political stability etc.	-
Current Account	Balance of goods and services exports and imports (see also 'terms of trade')	Aiginger (1987), Walterskirchen (1991), van Suntum (1986), Porter (1990), WIFO (1987)

Indicator	Definition	Example
Balance of Trade in Technology	Net-technology exports (imports)	OECD (1986), Parry (1988), Glatz (1990), Braga, Willmore (1991)
Export (Import) ratio	Share of exports (imports) in GDP	-
Market Share in Export (Import)	Share of exports (imports) of country i in total exports (imports) of countries g	Rothschild 1975), van Suntum (1986), Schedl (1991)
Market Share in High Tech Exports	Share of exports (imports) of country i in high-tech products on total exports (imports) g	OECD (1986), Feser (1991)
Relative Market Share in Exports (Imports)	RXA-value; specialization pattern; market share of a country i compared to market share of countries g in total exports (imports)	Schumacher (1988)
Degree of Penetration	Share of imports in total domestic demand	OECD (1986)
Relative Degree of Penetration	Degree of penetration in various countries compared	-
Degree of Coverage	Total value of imports compared to value of exports of a country, industry etc.	-
Relative Degree of Coverage	Degree of coverage in various countries compared	-
Structural Degree of Coverage	Relative degree of coverage, adjusted by structure of demand	-
Terms of Trade	Price indices (imports, exports) compared; average value of imports, exports compared.	Breuss (1983)
Unit Values	Export revenue or import price per unit	Alginger (1987)
Revealed Comparative Advantage (RCA)	Degree of specialization; relative exports of good i compared to relative imports of good i; (the term 'relative' refers to share in total trade) RCA - Developing Countries: specialization against low developed countries	Dosi - Pavitt - Soete (1990), Glatz (1991), Schumacher (1988), Schulmeister (1990)
Inter-industry Trade	Share of comparable (similar) products in exports and imports (trade volume)	Norman, Dunning (1984), Gray (1988), Caves (1981)
RHA-value	(RXA_i / RXA_g) Relative export - import position of certain goods i;	Schumacher (1988)

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Indicator	Definition	Example
Structural Change of Trade	Development of share of good I in total exports (SITC)	-
Growth-potential in Trade	Development of market share of good I on total market share (constant market share analysis)	-
Degree of Internationali-zation	Share of Foreign Direct Investment (FDI)-stock in GDP (assuming constant capital-output-ratio at home and abroad)	Bellak, Luostarinen (1992)
Degree of Out -ward Inter-nationalization	Share of outward FDI in GDP	-
Degree of Inward Inter-nationalization	Share of inward FDI in GDP	-
Relative De-gree of Inter-nationalization	Outward and inward FDI compared	-
Net-direct-investment Ratio	Outward minus inward FDI compared to GDP (as a measure of the level of development of a country)	Pichl (1989)
Employment in Foreign Subsidiaries	Importance of activities abroad compared to domestic activities	Larimo (1990)
Exchange Rate	Average exchange value of currencies (measures import or export price competitiveness) Real: adjustment by difference in inflation rate Effective: value of a certain currency compared to a currency basket (e.g. ECU)	Steinherr (1985), Feinberg (1986)
Degree of Protectionism	Share of tariff or non-tariff barriers to trade, other protectionist measures (e.g. public procurement, restriction of foreign capital imports); high degree of dependence on trade with neighboring countries	Bayer (1991), OECD (div.), Clark, Kaserman, Mayo (1990)
Regional Distribution of Exports	Measure of trade sophistication (developed/developing countries)	-
Real Wage-rate	Deflated gross wage rate (per capita)	-
Real Wage-rate Gap	Growth of real wage-rate minus growth of output (adjusted by terms of trade development)	-
Labor Cost	Total wage rates, related payments, per capita, per hour or per unit of output ('unit labor cost')	van Suntum (1986) Guger (1990, 1991), Pollan (1991)

Indicator	Definition	Example
Relative Unit Labor Cost	Development of unit labor cost compared to productivity gains or losses	Guger (1991), Fagerberg (1988)
Labor Productivity	Output per labor input (employee, hour)	Dosi-Soete (1983)
Qualification Level of Employees	Share of qualified employees on total labor force (human capital)	-
Labor Mobility	Measure for adjustment cost from structural change	-
Investment Ratio	Share of gross (net-) Investment in GDP or value added (measure of future competitive capacity)	-
Investment in Machinery & Equipment	Future innovation potential	Schiefer (1982)
Equity-ratio	Share of equity in total assets, influences risk aversion of firms; dividend payments	-
Capital Productivity	Output per capital input	Porter (1990), Davies, Lyons (1991)
Capital Mobility	Measures inter-national vs. intra-national, but inter-sectoral structural adjustment of firms and industries	Borner (1984)
R&D-ratio	Share of R&D expenditure per capita (employee); per industry; per output (GDP, gross value added: 'research coefficient'); sectoral (private - public - defence)	Schiefer (1982), OECD (1987), Lundberg (1988), Passweg (1989), Kneschaurek (1989), OECD (1986), Kraft (1989)
R&D-personnel	Researchers per 1000 employees etc.	Passweg (1989)
Scientific Publications	Number of publications compared	-
Patent Applications	Share of patent applications of country i in total international patent applications (international patent classification groups: structural; foreign; 'key patents': at least 15 patent applications abroad annually etc.)	Schedl (1991), Häußer (1989), OECD (1986), Harris, Vickers (1985), Delbono (1989)
Innovation Potential	Measure of future competitiveness Product: share of goods newly introduced into the market in total turnover Process: share of firms with development of process innovations	Wagner (1988), Dosi - Pavitt - Soete (1990), Dosi - Soete (1983), Gerosky, Pomroy (1990)

Indicator	Definition	Example
Diffusion	Rate of imitation or technology transfer which lowers competitive advantages resulting from innovative activity	Davidson, McFetridge (1984), Mansfield (1985)
Life-cycle	State of technological development (innovative - mature) of products, processes, industries	Vernon (1966)
Return on Investment	Market performance measure	Jacobson (1987), Daniels, Bracker (1989)
Relative Cash-flow	Share of cash-flow in total turnover	-
Gross Profit	Pre-tax profits	-
Diversification	Regional or structural distribution of activities	Wolinsky (1986)
Degree of Monopoly Power	Difference of market price and marginal cost (perfect competition = 0) indicates market power (imperfect competition)	Benson (1984), Odogiri, Yamashita (1987), Hiebert (1989), Conyon, Machin (1991)
Competitive Price Level	Prices charged by firm i vis a vis prices of close competitors g (export prices: adjusted by unit cost differences)	OECD (1987)
Price Enforcement	Development of nominal and real market shares compared (price taking vs. price setting)	Aiginger (1987), Ginburgh, Michel (1988)
Value-added	Macro: gross value added minus intermediate inputs Micro: wages, interest payments, net profits (after tax) Gross: pre tax Net: after tax	-
Total Unit Cost	Capital cost (interest) plus labor cost (wages) plus intermediate input cost ('cost competitiveness')	Guger (1989, 1990)
Profit Margins	(Export) price compared to production cost	Kumar (1990)
Total Factor Productivity	Gross value added per unit of inputs (labor, capital, technology)	Bayer (1983), Chew (1988)

Other classifications can be found in e.g. EMF (1980), Cox (1989), Larimo (1990), Durand, Giorno (1987), WIFO (1987), Schiefer (1982), Feser (1990), Schedl (1991). From the preceding sections we now ask what indicators can be joined to the main theoretical concepts? (see Table 3)

Table 3 joins each theoretical approach with alternative classifications. To illustrate Table 3 a few examples seem to be useful.

International trade theory requires - among others - indicators related to comparative advantage, i.e. cost indicators, degree of protectionism (trade distortion), factor proportions etc. On the other hand, certain indicators do not fit to this approach, e.g. entirely microeconomic indicators, economies of scale or scope, advertising expenditures. On the other hand, certain assumptions of the traditional model have been relaxed recently. E.g. factor mobility and the role of innovation for economic growth have been introduced into the model, leading to the application of a wide range of indicators such as foreign direct investment, migration, R&D-GDP ratio.

Another example on this issue is the switch from price to non-price indicators in the course of the development of the modern theory of the firm. This has brought about an enormous extension of the number of indicators (e.g. market share, R&D intensity, product quality, limit pricing, concentration ratios) compared to price and quantity adjustments in orthodox models.

Put in a different way, the choice of a certain theory is only one factor to establish the set of indicators to be used in a certain instance. Only the match with a certain classification allows us to limit further the set of indicators to be used. (see Table 3) E.g. input (labor intensity, R&D personnel) and output (GDP, concentration ratio) indicators vary with the theoretical concept applied.

The resulting subsets of indicators are by no means definite. On the one hand, certain indicators may be used in different subsets. On the other hand, the explanatory power of the model does not necessarily increase with the number of indicators applied. This may be so, because the coverage of each subset is limited in its scope to embrace the whole concept of competitiveness developed by the theories. Thus, for example, numerous output indicators (profit, market share etc.) may be used excluding input determinants from the analysis, cost-related determinants may lead to a lack of skill-based indicators etc.

Although it is not the main topic of the article one should not forget the numerous problems related to the various competitiveness evaluation criteria mentioned above. They are manyfold and thus often may lead to misleading interpretation and an overestimation of the explanatory power of the concepts.

Table 3 Theory and Classification: Selected Indicators

Theories Classifications	Trade Theory	Price Theory	Industrial Economics (Theory of the Firm)
Micro Meso Macro	- Structural Change Current Account Equilibrium	Competitive Price - -	Profits Minimum Efficiency Scale -
National Structural International Global	Degree of Penetration Cost Advantage Terms of Trade Welfare Effects	- - - -	Innovation Potential Concentration Inter-Industry Trade Technology Transfer
Static Dynamic	Degree of Specialization Balance of Trade of Technology	Unit Cost Capacity Adjustment	Market Share Diffusion of Technology
Perfect Markets Imperfect Markets	Capital Mobility Trade Distortions	Output Decisions Welfare Measures (Rents)	- R&D-intensity
Absolute Relative	Economic Growth Relative Degree of Coverage	Capital Productivity Relative Unit Labor Cost	Profit-margins R&D-ratio
Input Output	Labor Intensity GDP	Labor Intensity Market Power	R&D-personnel Concentration Ratio
Price Non-price	Factor Rewards RHA-value	Competitive Price -	Limit Price Advertising Sales Ratio
Qualitative Quantitative	Degree of Protectionism Market Share	- Unit Values	Product Quality Economies of Scale
Ex-ante Ex-post	Factor Proportions Comparative Advantage	Life-cycle Productivity	Process Innovations Market Share
Resource-based Skill-based	Degree of Specialization Transfer of Technology	Labor Intensity -	Raw Material Intensity Economies of Scope
Firm based Environment based	Productivity Labor Cost	Quantity Subsidies	Innovation Subsidies .
Supply driven Demand driven	Capital Intensity Market Share	Quantity Concentration	R&D-expenditure buyer sophistication
Objective Subjective	Tertiarization -	Monopoly price -	Turnover Ratio Innovation Potential

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5. Conclusions

We have described competitiveness as a multi-dimensional concept throughout this article. Our arguments were based on the consideration that no consensus exists on its definition. We conclude that this situation will continue for a long time. Hence we do not propose any generalizing definitions.

Yet on the other hand we do not regard the lack of a generalizing concept as a problem as many other studies (e.g. STI 1986) do. Rather, on the basis of the diversified theories we suggest a flexible concept of competitiveness, meaning that a definition is replaced by a certain subset ('tableaus', Feser 1990) of indicators. We admit that none of these subsets is fully satisfactory to realize the complex nature of competitiveness. These subsets can be built on the classification developed in section 3 or may consist of an even smaller array of indicators. The choice of the indicators used is subjective by nature and is determined by the research problem in question. (e.g. Hofer 1983) Thus, the substance of competitiveness developed here is variable and built on objective indicators and does not involve any subjective criteria. Another advantage of a flexible definition on the basis of determinants stems from the fact, that the explanatory power for a certain real issue is increased compared to general approaches. In general, only a wide range of relative indicators of various classifications seem to meet the demands of the theories of competitiveness developed so far.

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