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Modelling Economic Globalization: The Five Basic Globalization Types

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Abstract
Present economics theory is not giving sufficient practical models to explain recent economic development regarding globalization. Indeed, globalization is not always the same globalization, as it is recognized through the different manifestations of this phenomenon. Based on the four basic business typologies (commodities, standards, specialties, convenience goods) a new model defines five fundamental types of economic globalization (1a, 1b, 1c, 2, and 3). Globalization type 1 and subtypes are related to physical material interchange, type 2 is related to financial participations and type 3 is related to the human factor. This distinction is necessary because each one has its own rational and performs differently from a globalization viewpoint. These basic globalization types help to model the triggering mechanism of their evolution and allow us to understanding the competitive constellation and strategic moves of companies as well as the different latent potential for unemployment. (Key words: Business Types, Globalization Types, Foreign Trade Theory)

Introduction

Economic globalization on the one hand is often seen as an obscure process that apparently yields more profit for the companies, while increasing unemployment for the working classes on the other hand. Globalization is hardly controllable, since it is not only a process but rather the phenotypical manifestation within the causal systemic world of economy and politico-social behaviour. But how can economic globalization be modelled? Many books have been written on globalization but no individual one presents an integrated theory of it. Basic concepts go still mainly back to foreign trade theory with Ricardian comparative cost advantages and Pareto optimality as well as Heckscher-Ohlin. The gravity model of Isard shows the geographic view of trade but finally did not encounter the merited success. A new view has been developed by Krugman in his "New Economic Geography". Different business and globalization patterns are observable in different industries. On the one hand we have the extraction of raw materials in particular geographic regions of the subtropics, or primary aluminium production in distant but low energy cost regions, and on the other hand, semi-fabricated products manufactured near extensively industrialized regions. Cars produced in highly automated factories in urban area and exported worldwide, fast-food chains or franchised fashion stores covering the globe to conquest market share – different concepts, but the same target: the world market. Why do so many different concepts exist? What are the rules governing the

economic structure and the competitive system? Is it possible to give a structure to globalization in order to be modelled?

The Determinants for Globalization Type

Going beyond the usual phenomenological description of globalization let us analyze the intrinsic logic of worldwide competition and the structure of the economic system. Our business system is mainly composed of:
- the transaction object , i.e. the product or service
- the supply and demand structure, with the related transaction scheme, and
- the operating configuration of supply [1].

The product is characterized by its attributes, e.g. heavy or bulky, complex or precious, perishable or durable, and its customisation degree, all this determining the transportability of the product. The transaction scheme describes how supply and demand interact determining the localization degree of the product. The market structures given by the number of market actors and relative concentration curves of supply and demand determines the competitive nature of the business. The operating configuration refers to how products are produced, at one extreme they are produced centrally within a single plant configuration and then distributed worldwide, or production facilities are spread around different geographic regions within a multi-plant configuration and products are sold locally. This leads to the induction scheme of figure 1 to classify first the business type and finally the globalization type. Indeed, globalisation is not always the same globalisation, as we will see.
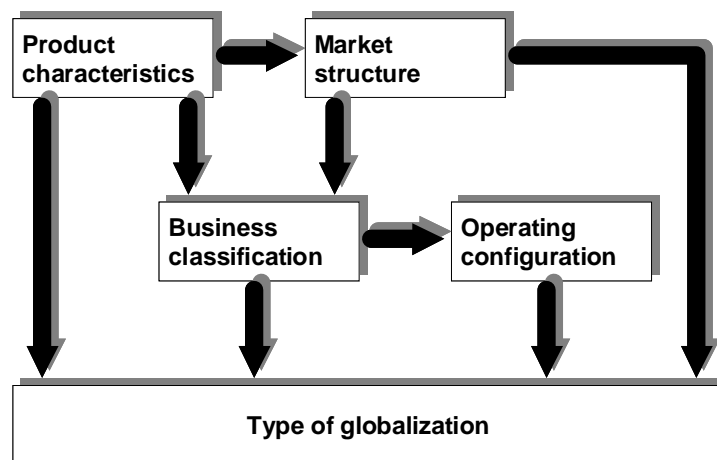

Abbildung 1: Framework of globalization types determinants

From figure 1 it is evident that the typology of globalization is largely determined by the product characteristics. The backward determinants themselves which influence product characteristics, market structure, and determine the business classification, and finally the operating configuration, are:
- value of the product
- transport cost and related range of distribution
- production factors in terms of cost drivers
- demand profile and
- supply structure [1].

The Four Basic Business Typologies

These main determinants characterise each business type within an industrial system. Certain combinations of these determinants reveal clear patterns for each business type. Figure 2 shows different businesses within the matrix of product-characteristics and market-structure which are the main drivers for business type classification [1]. The representation of product-characteristics (differentiated or not) as one axis, and market-structure (oligopolistic or fragmented) as another axis within a matrix, leads finally to the following landscape of basic business types:

- commodities
- specialties
- standards
- convenience.

Abbildung 2: Selected businesses within the product-characteristic / market-structure matrix

Abbildung 3: Basic classification of business types

Figure 3 presents a clear, systematic and structured view with which to classify roughly the businesses in types. It goes without saying that mixed types may exist. The "commodity type of business" (e.g. primary aluminium or wheat) comprises all kinds of goods listed on efficient market places, such as commodities exchanges with world market prices. The "specialty type of business" (e.g. electronics or automobile) embraces those durables and consumables goods with a distinctive brand thus creating imperfect competition. The "standards type of business" (e.g. cement or extrusions) covers the intermediate or semi-finished products with a rather polypolistic supply structure. The "convenience type of business" (e.g. hotels or clothing) embraces most products of our life sold in retail stores or offered as services in a very fragmented market to reach the final demand, representing from the supply side an imperfect or monopolistic competition.

The Five Economic Globalization Types

Having once classified the business, the question is how globalization is influenced by each business type, or rather how globalization of the business evolves in each business type and according to which pattern. Analysing the business types it emerges that the operating configuration determined by the business is a major determinant for the globalization type. The intrinsic logic reveals two main types:

- type 1 material (or physical) globalization for commodities and specialties
- type 2 immaterial (or financial) globalization for standards and convenience.

The difference is substantial. Products of businesses following type 1 globalization could be produced finally within a single plant operating configuration and shipped physically worldwide whereas products of businesses following a type 2 globalization are produced locally for the local market. MNE (Multi National Enterprises) will have in this case a network of local companies by FDI (Foreign Direct Investments) and the business idea is to exploit the know-how in doing business. In this fragmented markets they have to buy or set-up new enterprises to increase market share. But for type 1 globalization we have to distinguish between commodities and specialties (fig.4).
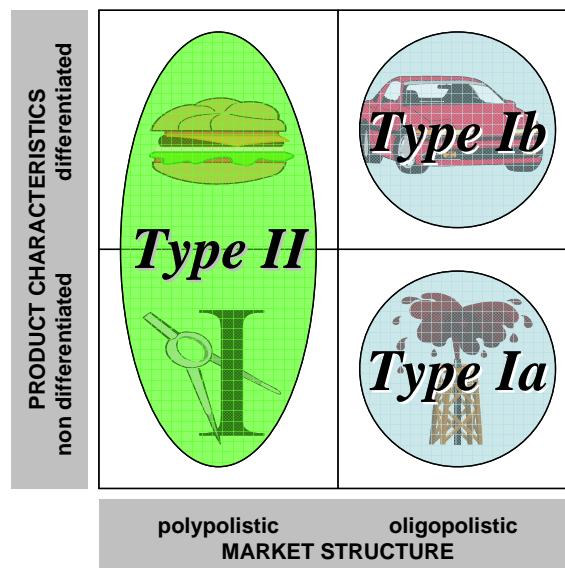

Abbildung 4: The natural types of globalization

Let us call type 1a the "globalization of commodities"; through the listing on efficient market places such as commodity exchanges, this represents the pure example of a globalization of business. Nobody can escape from this type of globalization because its effects are spreading all over the world. For the type 1b "globalization of specialties" the products characteristics are unique and therefore – to some extent - the price can be fixed by the supplier taking into account the value for the customer. This is due to the possibility of product differentiation within the competitive system. For type 2 globalization the distinction into subtypes is not necessary. Indeed, in markets not accompanied by material (physical) flows of products over a certain distance they, according to Chamberlin and Robinson, represent a local monopoly governed by imperfect competition. Therefore we need to have no distinction of globalization patterns between standards and convenience type of products. The

localisation of the business leads to a globalization pattern with a market share adding strategy by FDI in order to grow in businesses of such types.
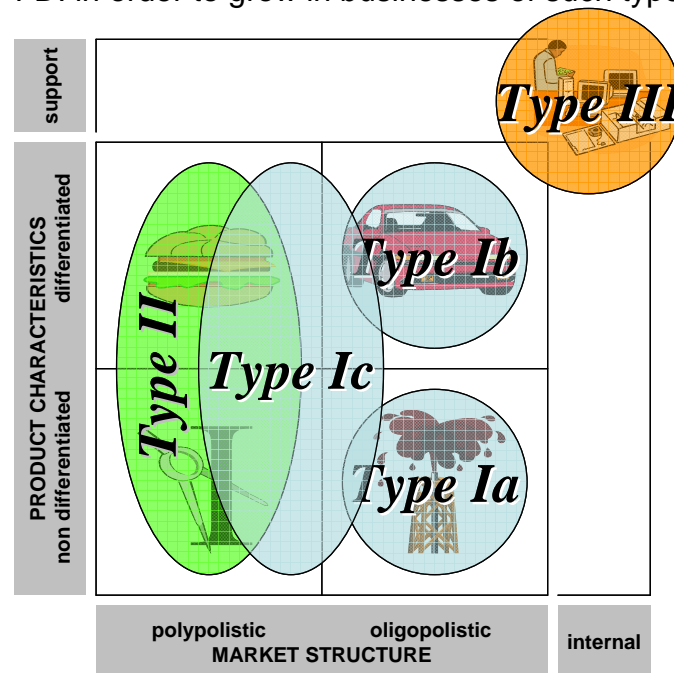

Abbildung 5: The globalization type matrix

Are there any drivers able to upset this apparently stable situation? Yes, there is one. If the difference in price (intended as absolute cost advantage according to Adam Smith) for the same goods in different economies exceeds a certain threshold, exports can temporarily become possible also for products following type 2 globalisation. We may call this "economic arbitrage". In these cases we can observe also a material flow of products within the type 2 globalisation characterised businesses; let us call this type 1c globalisation "opportunistic or low cost globalisation". Typical are the exports of low cost countries such as China. Furthermore, if a price difference also exists in different economies for the salaries of white collar jobs – and the skills are equivalent – then, thanks to today's efficient telecommunication infrastructure, it is also possible that enterprise functions as R&D, call centres or accounting are outsourced to low cost countries such as India; let us call this type 3 globalisation the "globalisation of human factor or service". Figure 5 shows all types of globalisation within a matrix allowing us to identify roughly the type of globalisation and with that the possible evolution or competitive issues to face within a certain business [1].

Does any evidence exist for this business and globalization type classification? Figure 6 shows the structure of exported goods for the year 2004. The business type symbols have been added to each product group in order to show the pertinent classification according to the business type matrix as well as the corresponding type of globalization. We see that the majority of the product groups belong to the commodities and specialties. The graph shows also a statistical significant difference between the typical type 1 globalization business types of commodities and specialties compared to the type 2 globalization businesses of standards and convenience. The reason why the type 2 globalization businesses show some trade

activity is mainly attributable to the opportunistic low price globalization type 1c. We have to keep in mind that this classification is a rough but useful model, based on economic considerations, giving practical guidelines to structure the economic globalization phenomenon and is far from being a mathematically exact model according to physic laws.
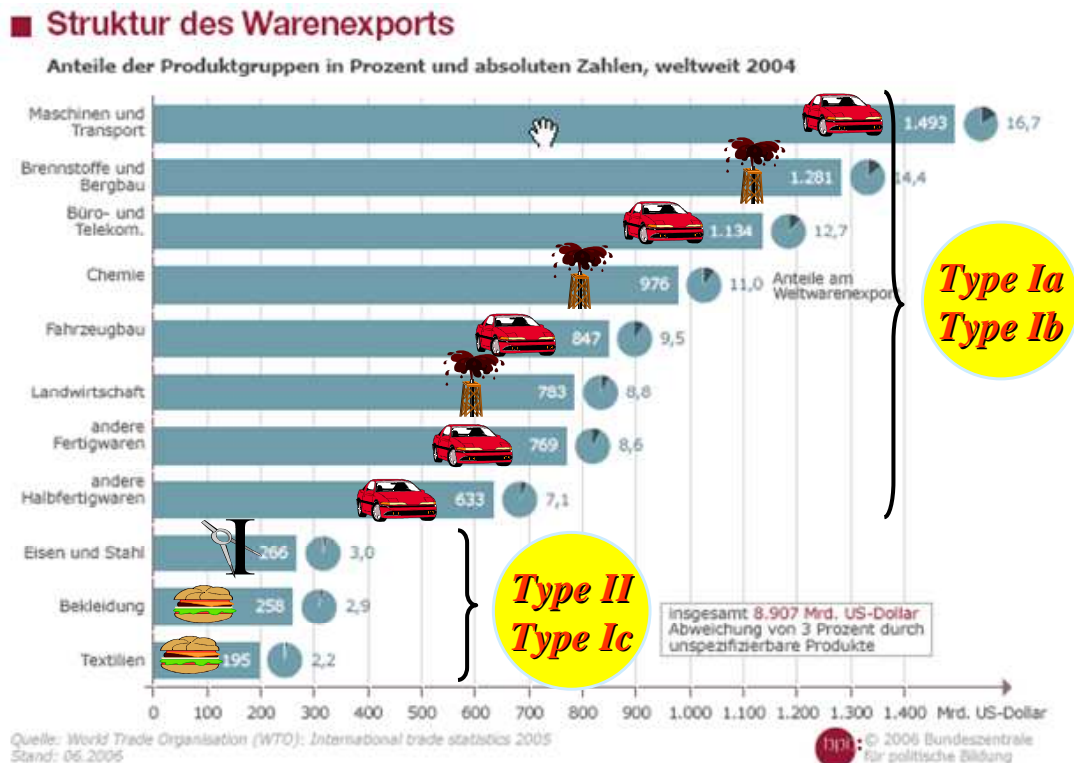

Abbildung 6: Goods export and relative business types

The Intrinsic Rational of Each Globalization Type

Indeed, these different globalisation types also follow different economic laws. Type 1a, i.e. globalization of commodities, is characterised by global price building in efficient dedicated market places, and they are mainly characterised by unidirectional material flows from countries of origin to the industrialized countries of transformation (fig.7). The foreign trade t_{od} from the country of origin o to the country of destination d for the resource r can be described with the following set of causal variables
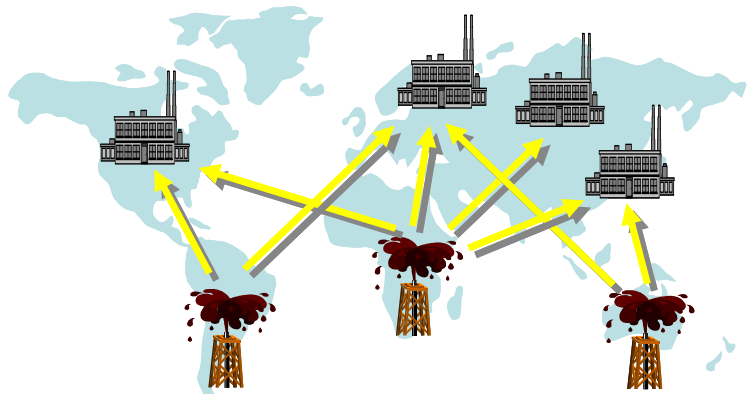
$$t_{od,r} = f\left(V_d(a_i, \frac{p_s}{p_r}), P_o(p_r), p_r(\frac{V_d}{P_o})\right)$$

where $V_d(a_i, p_s/p_r)$ is the aggregated volume demand in economies of destination d, driven by the final demand of applications a_i and from the price p_r of the resource r (if the price of the resource rises, the demand will shrink, as shown by the inverse proportionality), and p_s is the price of the substitute resource; important for the supply of resource r is therefore the relative price of resource r compared to the price of the substitute resource. $P_o(p_r)$ is the production in the economies of origin o, depending on the price of resource r, and $p_r(V_d/P_o)$ is the price of the resource, which depends on supply and demand on the commodity exchanges. Generally, $V_d=P_o$ in the medium and long term. Price p_r is established according to the level of demand V_d and supply of production P_o. If $V_d>P_o$, price p_r will rise, and if $V_d<P_o$, the price will fall. The preference for a raw material compared to another depends from the "latent value" of a specific resource compared to another substitute resource. This also takes into consideration the ecological impact or the end-of-cycle aspects. The latent value expresses the value for the customer; it explains why a more expensive resource – like aluminium versus steel – is chosen.

Globalization type 1b is characterised by bi-directional flows between different economies of the same products (fig.8). Similar but differentiated products are produced by different competitors in different countries. The preference for one product compared to another depends on the "cost-benefit" perception of the customer which can be translated to the "competitiveness factor" of differentiated products of a producer. This leads to the following causal relation for foreign trade flows between A and B
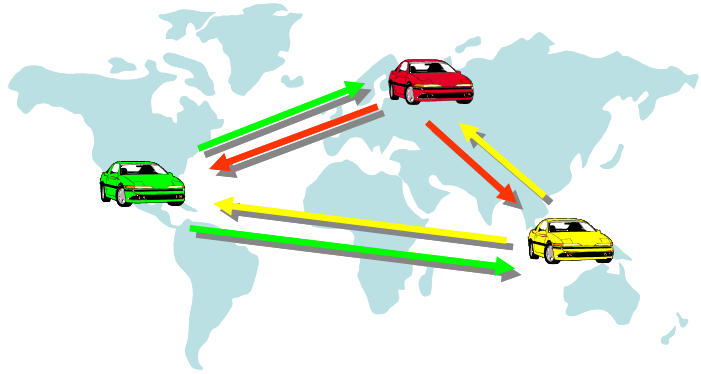
$$t_{AB} = f\left(V_B, \frac{1}{V_A}, g_B, \frac{1}{g_A}, \frac{p_{\alpha B}}{p_{\alpha A}}, \frac{p_{\beta B}}{p_{\alpha B}}, \pi_{\alpha\beta}\right)$$

where the main variables cover the market size and its growth, comparative product prices and product advantages. V_A and V_B denote the demand of the product in question in economy A and B respectively, g_A and g_B the growth rates of the markets in A and B, i.e. the comparative volume and growth of geographic markets. The fraction $p_{\alpha B}/p_{\alpha A}$ represents the price ratio of the prices of a product α produced in economy A and sold in economy B compared to the same product α produced in A and sold in A, and $p_{\beta B}/p_{\alpha B}$ the price ratio of a product β produced and sold in economy B compared to a product α produced in A but sold in B. Let us now

introduce a new variable, the comparative product characteristic π [1]. $\pi_{\alpha\beta}$ is the comparative product or performance advantage of the product α of economy A as compared to similar products β of economy B, where $\pi_{\alpha\beta} = \pi_\alpha / \pi_\beta$. The comparative characteristic performance advantage could be production speed, flexibility and functionality of equipment, general product performance, or service of the goods in question. This means that if the underlying structure tends to be polypolistic rather than oligopolistic, we have the so-called imperfect competition or monopolistic competition according to J. Robinson and E. Chamberlin, the two products being slightly different, i.e. the general theory of comparative relative advantages remains, but is extended beyond the cost view in oligopolistic markets or near-monopolistic competition markets. Let us call

$$\frac{p_{\beta B}}{p_{\alpha B}} \cdot \pi_{\alpha\beta} = k_{\alpha\beta}$$

the competitiveness factor from the point of view of the supply side or the "cost-benefit" factor from point of view of the demand side [1]. This competitiveness factor describes a comparative competitive advantage allowing us to model the behavior of economic actors for differentiated products. The higher the competitiveness factor the higher the market share of the producer. This can be seen as the modern interpretation of the Heckscher-Ohlin factors proportion theory.
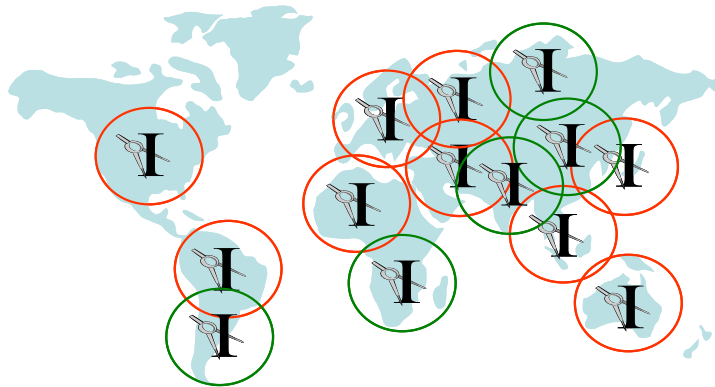
Type 2 globalization products depend on the "intrinsic market fragmentation" of the business (fig.9). This market fragmentation is given by the characteristic of the product and the related transaction mechanism as well as its transportation cost. The fragmentation is determined as follows:

For simplicity, let us assume that all the companies are the same size in the market; due to the fragmentation of the market, this approximation is valid for most companies in the market. Let us call N the number of all companies in this fragmented market and try to find the drivers for the fractal market structure. The number N will be according to

$$N = f\left(\frac{\lambda}{\omega}, \pi, D \right)$$

where λ represents the logistic cost to transport the product and ω represents the value of the product under consideration, i.e. the ratio λ/ω is an indication of the intrinsic market fragmentation for the product under investigation (the higher the ratio, the higher the fragmentation) and π represents the characteristic of a product (bulky,

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small, perishable, etc.), i.e. a sort of localization index (as opposed to concentration) for production. D represents the demand, i.e. the number of actors co-determining the fragmentation; the higher the demand, the more supplying companies a fragmented market requires. The market share in a fragmented market is fairly irrelevant. The demand is uniformly fragmented in the market and therefore the supply, due to the characteristics of the product, is also uniformly fragmented. The market structure is the driving element within this simplified analytical view. The reason for entering this market, besides the desire to exert control, is to increase one's own added value within the value chain. This reasoning is especially valid for the intermediate products (standards). The reasoning for convenience such as services (hotels) or fast-food is similar, but through the differentiation of the product and the end customers' behavior, the causal relation has to be reconsidered, taking expressly into account the comparative characteristics of the product or service offered. Indeed, combined with the fragmentation of the final demand, type 2 fragmentation is an indicator for the necessary polypolistic offer structure to reach the next transformation stage of the value add chain or to be distributed to the final customer.

Type 1c is based on the price differential of the same product with low differentiation properties between two economies. Type 1c globalization is an example par excellence to explain the classic foreign trade theory based on absolute cost advantages. Let us have some additional thoughts to

expand on this theory. The trade export from low cost country Z to high price country K is
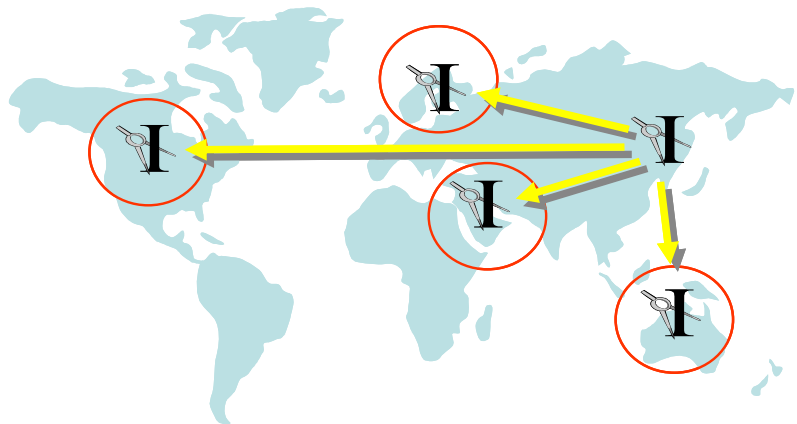
$$t_{ZK} = t\left(V_K, \Delta p_{ZK}, s_{ZK}, \frac{p_K}{p_Z}, \frac{P_Z}{V_Z}\right)$$

where V_k is the demand in the high price country K, s_{ZK} considers the transaction costs between Z and K, p_K and p_Z are the respective prices in the high and low price economies and V_Z and P_Z are the demand and production in the low price economy. It is interesting to note that propensity of type 1c globalization is based not on volume and growth but first on price difference and secondly on capacity utilization. From causal relation we can further assume that if $p_K/p_Z > 1$, i.e. absolute price advantage is assumed, then the entire capacity will be dedicated at first primarily to exports (if the demand side quality and service requirement can be fulfilled), i.e. the company in the low price economy will act according to the rational economic law of maximizing profit. If $p_K/p_Z < 1$ (which is unlikely to happen at this point), then of course t_{ZK} will

remain zero because most probably no export will materialize. Let us have a look at the capacity situation. When

$$\lim_{V_Z \to P_Z} \frac{P_Z}{V_Z} = 1$$

then no export seems to materialize because the capacity is fully absorbed in the short term by domestic demand in Z. The reasons can be that prices in economy K are not attractive, the demand in economy Z has priority, or allocation of capacity is controlled. When $P_Z/V_Z \gg 1$, then the remaining capacity (P_Z-V_Z) can be filled by exports. When

$$\lim_{V_Z \to 0} \frac{P_Z}{V_Z} = \infty$$

we have a very strong propensity from the supply side to export in order to fill the capacities. In the extreme case, the supply propensity is given only by the price difference Δp_{ZK}. If the price difference is high enough, production will be converted for export and the price will rise in economy Z; in the medium term, new capacities will become established. In the extreme case of over-capacity, strong export propensity will set in, reducing world price level. If $p_K/p_Z=1$, then a residual capacity may still be allocated to export. Generally, if the production capacity of economy Z is for profit reasons dedicated to exports rather than the domestic demand, prices in economy Z will rise in order to be supplied and new capacities will be installed. The system will regulate itself. The absolute cost advantage is the most evident driving factor for the type 1c globalization. We may call the resulting driver the "propensity for globalization" (fig.10). The higher this difference is, the higher the material flows of these products from countries of emerging economies to countries of advanced economies, although - from the intrinsic nature of the business - it would follow a type 2 globalization.

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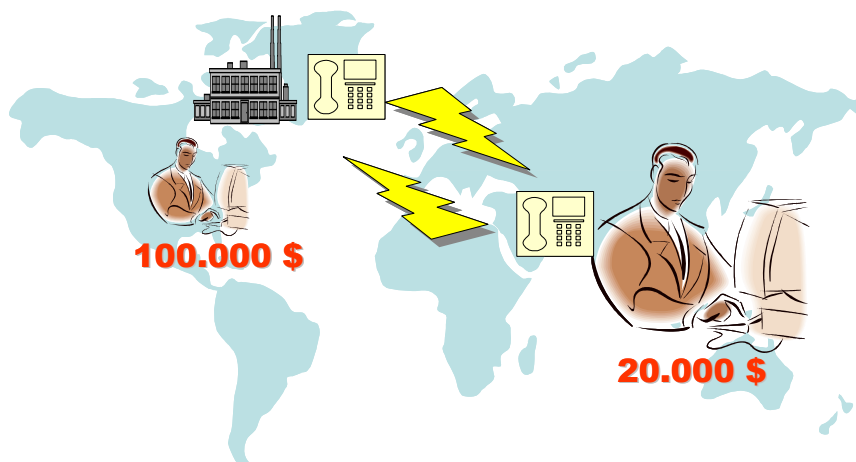
Type 3 globalization is modelled by the "comparative skill of labour", i.e. the level of skills available and the respective cost as well as the cost to transfer the service in question to the economy with lower cost (fig.11). The theory of factor allocation, in this particular case labor, follows the same theory valid for economic goods. But let us enlarge on the concept and analyze also the comparative skills of labor. In this

context labor is intended rather as white collars. Type 3 globalization deals with the supporting function within a company. The main driver for the transfer of service functions to low cost countries is the cost of salaries including the social contributions for white collar workers. Of course the transfer is subject to the availability of skilled manpower in economy Z for the service to be outsourced. This relation is formalized in the following causal relation

$$ N_{Si} = f\left(\frac{L_K}{L_Z}, \frac{\sigma_{iZ}}{\sigma_{iK}}, \frac{1}{\xi} \right) $$

where N_{Si} is the number of companies having outsourced the service s_i to a low cost country Z. L_Z are the white collar salaries in low cost economies and L_K in high cost economies. The σ_{iZ} and σ_{iK} are the level of skills held by service s_i in economy Z or K respectively. It is assumed that the necessary infrastructure exists. Variable ξ represents the transaction cost in relation to the transaction difficulties encountered with the outsourcing operation. Changes in considerations according to experiences made can even overweight the labor cost advantage and lead to outsourcing being reconsidered. This type of globalization is increasing not only for the supporting functions but also for every service based on human skills where the service can be supported by the new telecommunication possibilities.

Each business follows its own globalization type. Nevertheless, mixed types are observable. Especially type 2 globalization is also observable in superposition to 1a and 1b globalization from MNE to increase market share. These imperialistic expansion strategies are often denounced also due to the latent fear of unemployment. But the natural types of globalization (i.e. 1a, 1b, 2) are not responsible for the negative social consequences such as unemployment; the socio-political consequences are mainly caused by the types 1c and 3. But this is another story. The here presented phenomenological modelling of economic globalization is further accompanied by a common denominator for the intrinsic reason of macroeconomic globalization evolution. The rationale behind this will lead to: The Central Theorem of Globalization [1].

<u>The Aluminium Industry</u>
Big structural changes are occurring in the aluminium industry [2]. These changes have been analysed extensively [3] and the results were presented during the closing keynote speech at the Aluminium 2008 World Trade Fair and Conference in Essen last September. The here presented globalization types help us to understand the ongoing fundamental changes in the global industry logic. Let us therefore try to put the aluminium technologies into the business type matrix and then derive the pertinent globalization type. Bauxite mining belongs to the ore extracting operation often performed by big vertically integrated aluminium companies or multi national mining groups, characterised by a clear oligopolistic market structure. Per definition, the differentiation aspect of a commodity is not existent, may be with the exception of the ore content. The same is valid for the calcined alumina. The outcome of the smelting process is primary aluminium, traded as ingots on commodity exchanges mainly in the quality 99,7%. Also for primary aluminium we have the same

oligopolistic structure composed of MNE with some independent SME (Small Medium Enterprises) as exceptions. We can classify all these goods as belonging to the commodity type of business, goods flowing from their natural origin to the big conversion centres and where low cost operations are essential (fig.12). The world of semi-fabricated products is mainly composed of the technologies rolling, extrusion, castings, forgings, and thin foil rolling. Although often these plants belong to MNE, the operating configuration has a fragmented structure in order to be near to their customers; MNE try to serve a wider geographical extension by setting-up a network of plants (e.g. SAPA, Hydro Aluminium, Novelis). The reasons of the fragmentation originate from the cumbrous shape of the products but also the need to interact with customers resulting therefore in a more regional oriented business, but also the availability of technology and the nonsense of long transportation distances for non-differentiated products. The fragmentation of the business favours the concomitance of SME mainly in the extrusions, castings and forgings technologies. In extrusions e.g., the SME make up 50% of the plants [4]. All these technologies can be classified as belonging to the standards type business. These are intermediate goods with a low differentiation degree of the product. We can even classify the transaction object rather to be a service than only a physical product. Indeed, the customer asks primarily three questions: Can you manufacture this product? When can you supply it? How much does it cost? I.e., extrusion companies are not supplying a product but performing a service by putting their production capacities to the service of their customers and trying to give the shortest delivery time, accurate punctuality and specification-conform quality [5]. In the aluminium industry we can observe sometimes also the downstream integration in the value-add chain right to ready-to-be-assembled components or systems for the building industry. These products have already a quiet advanced differentiation degree for the solution proposed. On the other hand the concentration degree from the supply point of view may vary. Nevertheless, we can classify it as belonging to in-between of specialties type of business and convenience.
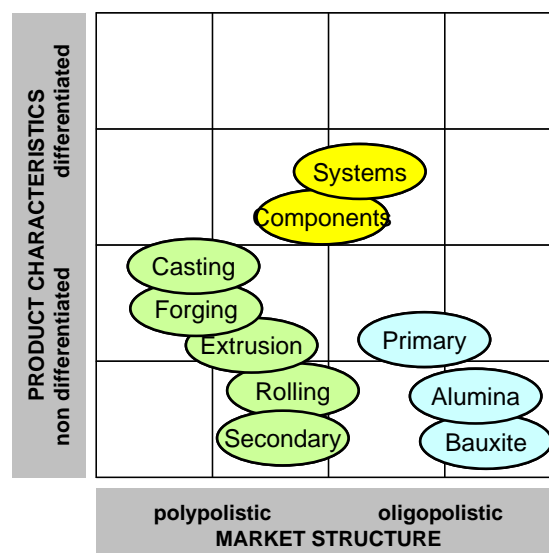

Fig. 12: The aluminium technologies within the Business Typology Matrix

From figure12 we can see that the products (or technologies) of the aluminium industry belong mostly to the commodities and standards type of business; this seems to be reasonable due to the fact that the transaction type is rather a B2B than a B2C.

The aluminium industry has been mainly composed of fully vertically integrated concerns covering the bauxite extracting, alumina refinery, primary aluminium smelting, different semis production technologies, and sometimes through to the manufacturing of components for the automotive, aerospace or electro-technical industries (fig.13). Interesting is to see the apparently neat cut between the upstream operations (bauxite, alumina and primary) from the so-called downstream technologies (rolling, extrusions, castings, and forgings). Indeed, the basic aluminium production supplys the common basic raw material to all the other aluminium semis operations. Figure 13 shows the relative business typology as well as the related globalization type on each level of the value-added chain. It shows clearly the co-existence of different globalization typologies within the aluminium industry. Therefore, we cannot simply say that we can observe a general globalization tendency in the aluminium industry but we can also assert it will perform differently along the added-value chain according to the different industry logics with different effects on the competitive system as well as the social system of employment.
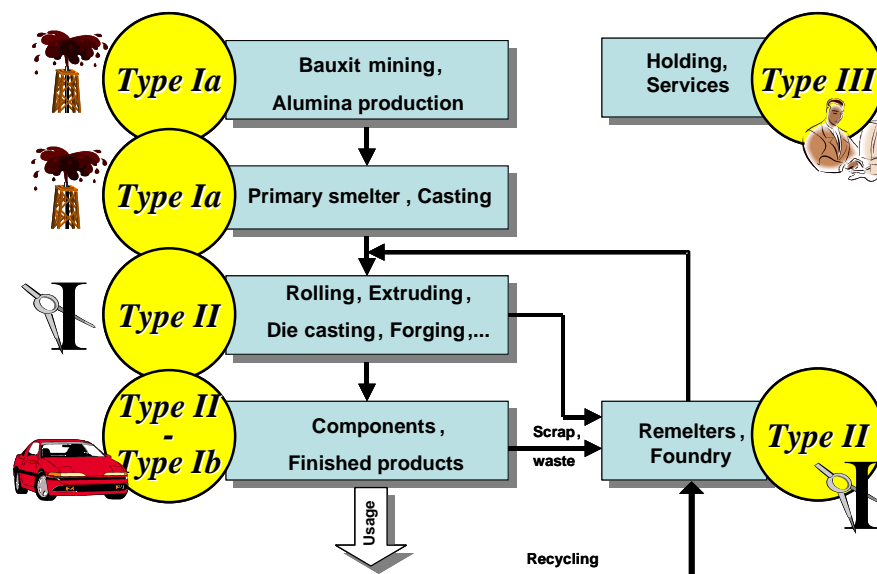

Fig.13: The value-add chain of the aluminium industry

In addition to the predominant globalization type of each value added stage, secondary globalization types may overlap. In fact, globalization type 2 will mainly face additional competition in the form of opportunistic low price globalization type 1c. This has been especially the case of North American extrusion imports from China during the last years [6]. Further, in case of MNE, markets with natural physical globalization types 1a and 1b will also be overlapped by the financial globalization type 2 with the logic of adding market shares for global growth. This shows that the present disintegration of integrated aluminium companies is also related to the

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difference in the basic globalization types with different industry logics. Indeed, for globalization type 1 the CSF (Critical Success Factor) is cost, the price being determined by LME (London Metal Exchange) whereas for globalization type 2 the CSF is mainly service. Moreover, despite the fact that the semis operation such as extrusion or rolling have the same globalization type, we find that between the different semis operations there are no relevant synergies observable from management point of view [3] (except contingent situations). This is underlined by the fact that the alloys are often quiet different even with separate recycling loops, and the products out of the different technologies are only partly, if ever, substitutable needing different conceptual engineering design. The reason for backward integration is more related historically as well as to have direct access to the aluminium metal, securing the supply side.

Therefore, are fully integrated aluminium concerns a run-out model? This depends largely on the business model adopted by the parent company and will be a key issue questioning the survival logic of today's remaining aluminium companies. But this is another problem in the making [7].

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