The Globalization Trap of the Aluminum Extrusion Industry

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Globalization is not anymore a bet, it has become reality. It will have a decisive structural impact on the economic system of every country. Although the aluminum extrusion industry fundamentally presents the financial-based type 2 globalization characteristics, it will also experience a price-based type 1c globalization effect from low cost exporting countries. First effects are already perceivable. - What will the consequent structural changes look like? Will different patterns appear between the North American and European extrusion industries? Which actions should Western extruders undertake to face the challenge?

The paper analyzes the competitive system of the extrusion industry, and its structural changes, in the advanced economies due to the globalization impact. It develops different competition scenarios based on foreign trade models and the contingent strategies chosen by Western extruders.

INTRODUCTION

Today's value of a society is mainly based on success – success, measured by economic profit earned by doing business, and that still without really considering ecological and – even less - social repercussions. The value of a company is commonly quantified by the sum of discounted future generated cash-flows which is reflected by the share price. This means that shareholders are keen to see growth in their companies and managers are considered successful if their business results correspond to the growing profit expectations of the shareholders. The globalizing economic system is the biggest and perhaps the most complex engine able to offer immense opportunities to do business and generate profit. And these possibilities – in the light of saturating home markets in advanced economies in mature application technologies – are becoming the playground for all companies. In fact, you can take part in this globalization phenomenon either by participate actively by doing business on a global level, or passively by being confronted with the consequences of the globalization phenomenon in your home market. And exactly both will also happen to the extrusion industry. But what will the likely competition scenarios in both cases look like? Which are the winning strategies? How can we cope with management objectives and social responsibility? Should Western employees fear for their jobs?

CHARACTERISTICS OF NORTH AMERICAN AND EUROPEAN EXTRUSION MARKET

The nature of a business is largely determined by the product characteristics, the market structure, the transaction scheme, as well as the operating configuration [1][2]. The extrusion business presents a fragmented structure given by a natural action scope of approximate 500 km around the plant. This is determined by logistics as well as product considerations combined with the necessary customer-producer interaction scheme for the customization of the profiles. The result is a polypolistic market structure with a multitude of independent SME (Small Medium Enterprises) serving mainly a local market but also by an increasing network of plants belonging in most cases to MNE (Multi National Enterprises) covering a wider geographic region. This network of plants has strategic reasons: Indeed, on the one hand the advantage of managing a business by multiplying the know-how and on the other hand increasing profit by implementing a market share adding logic within a fragmented market [2]. The fragmentation degree of the extrusion industry is observable in the North American as well as the European area. Indeed, the US market is served by some 200 extrusion plants and the EU (25+) market by some 330 plants. In Europe 25%

belong to groups [3]. We can assert that in both geographic regions the extrusion industry is still mainly dominated by a family owned SME entrepreneurial structure.

Tab.1: Basic figures of extrusion market evolution in NA and EU

Extrusions (shapes, rods, tubes)	2001	2002	2003	2004	2005	2006	CAGR	in kT
Consumption NA(2)	1745	1758	1771	1956	2057	2126	4%	381
Total imports (incl. Intra-trade)	257	320	362	442	517	563	17%	305
whereof PRC	9,3	18,7	31,8	62,4	112,1	156,6	76%	147
Market share PRC	0,5%	1,1%	1,8%	3,2%	5,4%	7,4%		
Consumption EU(27)	2465	2559	2562	3071	3070	*3254*	6%	789
Total imports (incl, intra-trade)	1100	1122	1258	1289	1369	1607	8%	507
whereof PRC	6,5	6,1	5,5	8,8	22,4	34,5	40%	28
Market share PRC	0,3%	0,2%	0,2%	0,3%	0,7%	1,1%		

Source: AA, EAA, Trade statistics

Tab.1 illustrates the market evolution, the imports and relative imports from China to NA(2) and EU(27) for extrusions in the period 2001 to 2006. Extrusions for the purpose of this paper are shapes, rods and bars as well as extruded tubes and pipes. The NA area is composed, for this context, of the USA and Canada. According to statements of the relative Aluminum Associations, trade figures may be biased by wrong classification of original data. The EAA has issued a report on this remarking that billets are often mislabeled and building systems are included under the extrusion codes causing double counting of up to 300kT, representing 10% of the European market. Apart from that, the period 2001-2006 has been characterized by a positive CAGR (Compound Annual Growth Rate) for the consumption and even higher for the imports and imports from PRC (Public Republic of China) to NA and EU. Staggering has been the import growth of Chinese origins to the NA area reaching 156kT in 2006, representing 7,4% market share. Remarkable is that in 2006 China surpassed Canada in exports of shapes as well as tubes and pipes to the USA. The figures in tab.1 for total imports contain also intra-trade within the respective geographic area. For comparison, according to the American AA (Aluminum Association) trade without cross-border trade in the NA area has increased by 158kT, from 51kT in 2001 to 209kT in 2006. This corresponds to a CAGR of 33% compared to the total trade with a CAGR of 17% and shows the relative weakening of Canadian shipments to the USA and vice versa.

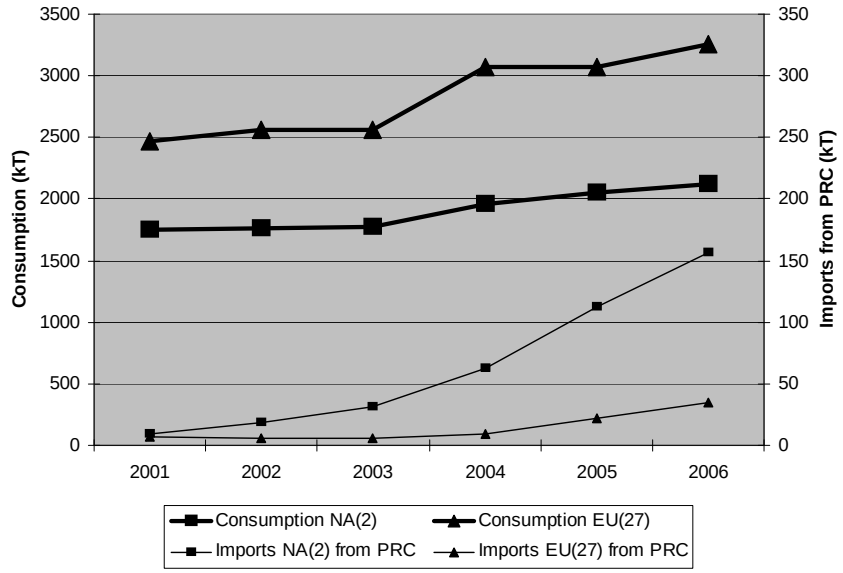

Fig.1: Evolution of extrusion market in NA and EU with relative imports from PRC

A graphical comparison between the NA and EU region is shown in fig.1. The comparison shows higher market growth in Europe than America. The reason is not only a general growth in consumption in the advanced European countries with a high export orientation but it is also attributable to the catch-up of the new EU-countries from ex-COMECON area. On the other hand, the graph shows a more pronounced evolution of imports from PRC in NA than in the EU area. The reason for this is threefold: One reason might be the difference in extrusion technology level in those two economic areas; Europe having on average more sophisticated equipment, is able to produce highly complex extrusions more efficiently. The second reason might be an effective dedicated sales organization in NA and that with only one language covering an extended geographical region supporting imports from PRC. The third reason is that Eastern Europe is ready capable of supplying at a lower price level compared to Western Europe. Therefore Western Europe will preferably source from the ex-COMECON area than from the far away PRC even if the price differences might not be the same. Indeed, Europe has an intensive intra-trade of extrusions attaining 50% of the 3,2 mio. tons consumed in 2006. According to trade statistics, in 2006 Germany alone imported from Czech Republic, Hungary, Poland, Russia, Slovenia some 97kT of extrusions which is three times the 34kT imported to the whole EU(27) from China.

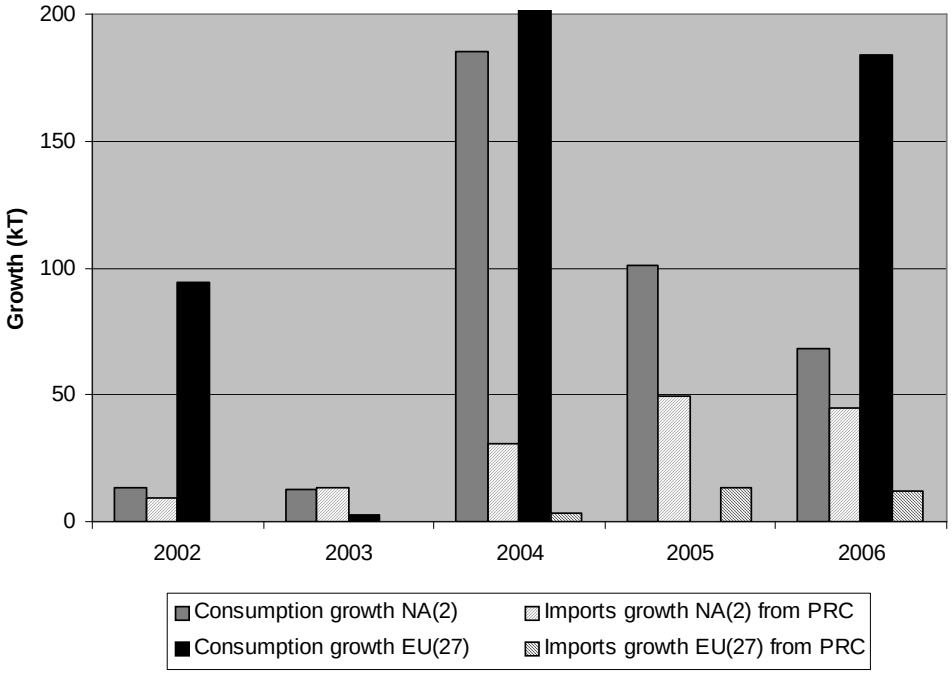

Fig.2: Comparison of market growth vs import growth from PRC to NA and EU

Fig.2 analyzes the relative market share gains. Loosing market shares to new competitors in a growing market is not dramatic; it becomes a serious concern when the increase of imports in tons is higher than the market growth in tons, meaning that own sales are shrinking. In a rising market it will rarely happen as can be seen from fig.2, but in NA the trend between 2004 and 2006 is alarming. This is not yet the case in the EU which is producing at high capacity level. If during an economic slow-down growth in consumption turns to negative, most probably the price-competitive imports will also loose their growing dynamic but not to the extent that we have seen above. On a short term basis, weak extruders may survive, but if the situation is lasting it might become tight. Indeed, the alarming trend has continued in 2007. According to AA and trade statistics, during the first six months of 2007 the NA extrusion market shrank by 16% compared to the previous year period corresponding to 176kT. On the contrary, the relative imports from China increased by 9% (7kT), attaining a 8,9% market share in June, mainly due to increased deliveries of rods and bars as well as tubes and pipes.

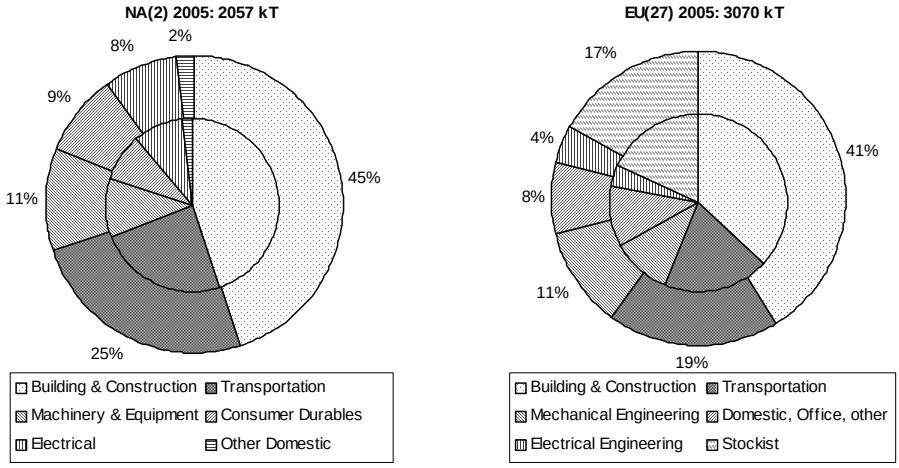

Fig.3: Comparative end-use dynamics from 2001 (inner circle) to 2005 (outer circle) – Source AA and EAA

The final destination of extrusion applications for the year 2005 compared to 2001 is shown in fig.3 for NA(2) and EU(27) demand. Apart from the different classification, also the structural composition is slightly different between the NA area and Europe. Especially the transportation application is much higher than in Europe. The application composition for these two geographic areas remained relatively stable between 2001 and 2005 limited to a shift in the European market towards more building application. From the stockists, about 50% can be attributed also to the building application. It has to be mentioned that every country in Europe has a different composition according to the domestic industry structure and the way of designing and manufacturing products. The fact that the composition remains quiet stable can be considered reassuring, i.e. no surprises from the final markets and relative customers. A sound degree of customer orientation will help to keep the customer base.

Let us sum-up. The extrusion market is still a very dynamic market also in the advanced economies. The imports, especially from China, have a higher growth rate than the market growth rate. In the period 2001 to 2006 this has not been critical due to the absolute figures in tons being relevant. During an economic slow-down it might become an issue for domestic plants in the advanced economies seeing their workload shrink. Indeed, considering the fact that during a bear market situation customers are looking to source cheaper than in a bull market to let play relative elasticity of demand, imports from low-cost countries will most probably not grow but keep their supplies or decline less. This is for the immediate short term. And what will be the macroeconomic consequences in a mid-term perspective? For that analysis we have to consider some basic economic theory to understand the peculiarity of the business, its constraints and the underlying rational governing the evolution of globalization.

INTERPRETATION OF GLOBALIZATION PATTERNS IN THE EXTRUSION BUSINESS

According to scholastic textbooks, the social wealth of nations will increase by trading by focusing on best efficiency of factor transformation and so maximizing exploitation of input factors. Classic foreign trade theory is still mainly based on Pareto optimality using Ricardian comparative cost advantages of heterogeneous non-differentiated products. The underlying simplifications are hardly sufficient to explain today's evolution of economic globalization in an individual profit driven management logic and therefore not suitable for our industry systems analysis. The more modern Heckscher-Ohlin Theory based on factors availability to explain foreign trade and market shares is also of non-immediate applicability due to lack of consideration of demand related characteristics. The New Trade Theory is based on geographic differences but at a political economy level not apt for our business analysis. It is hard to find textbooks coping with

the need of modeling the real globalization of economics. Therefore let us take a more product and industry system suitable model such as the Model of Business and Globalization Types [2] to perform an analysis of the extrusion markets.

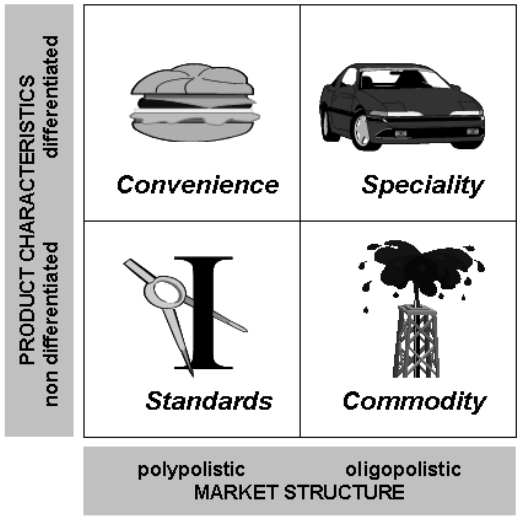

Fig.4: The four basic business types

Fig.4 shows the four basic business types within the matrix of product characteristics and market structure. The four business types are commodities, standards, specialties, and convenience. Each business type is determined by the differentiation degree of the product and the supply structure and has a different intrinsic characteristic and follows its own transaction rules [2].

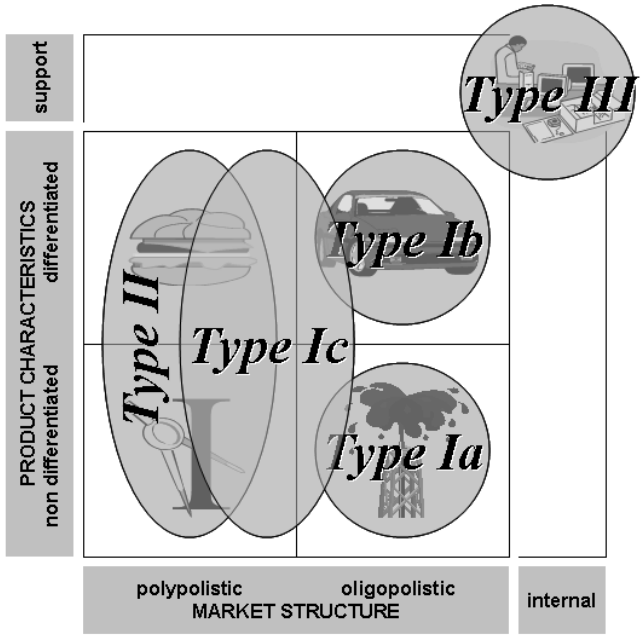

Fig.5: The globalization types matrix

The globalization types' matrix of fig.5 shows different types of globalization according to the type of underlying business [2]. Type 1 is the physical globalization with material flows mainly present in business types commodity and specialty. Type 2 the financial globalization with no material flow but FDI (Foreign Direct Investment) observable for businesses like standards and convenience. And type 3 is the human

factors globalization by outsourcing internal services to low cost countries. Another classification can be made according to the intrinsic nature of globalization. Types 1a, 1b and 2 are natural globalization types dictated by the nature of the product and industry system whereas types 1c and 3 are "temporary" - but also long lasting ones - originated from market imperfections and differentials. The type 1c is an opportunistic low-cost globalization where material flows can materialize in typical type 2 globalization markets. This happens if the cost differential between two economic areas is high enough; let us call this difference the propensity for globalization.

The extrusion business belongs from the intrinsic nature of the business, to the standard type which follows a financial type 2 globalization, if any. Indeed, the cumbrous product and still predominant interaction scheme via fax and phone determines a polypolistic offer structure with a regionally limited, so-called monopolistic or imperfect competition. Therefore, to increase market share this cannot be done simply by exporting the product. In fact, MNE are pursuing a market share adding strategy by FDI in different regions, especially in the new emerging economies, generating a financial type 2 globalization. This strategy is observable at international groups such as Norsk Hydro, Alcoa, Sapa, Alcan etc. Moreover, Alcoa and Sapa have even agreed to bring together their soft alloy extrusion businesses forming one of the biggest extrusion networks. Another example is Indalex and Easco who went beyond that logic by buying a stake in Asia Aluminum Group, one of the biggest extruders in China. But the participation in the Chinese extrusion company had also another aim. In fact, if the price difference for non-differentiated products becomes big enough, even physical material flow between two different far away regions can become possible also for products belonging normally to the type 2 globalization category. This is the opportunistic price driven type 1c globalization comparable with arbitrage in finance. The result of this material type 1c globalization is clearly reflected also in the extrusion industry by the increased imports from low-cost countries, e.g. from China as we could see from fig.1 before. And we are only at the beginning of the evolution.

Furthermore, there is another reason behind globalization – which is also valid for the extrusions industry - we can call this a sort of governing systemic law. Indeed, as already stated in the introduction, managers have the objective to maximize profits, and even more, to generate value and value is the sum of future generated profits, but growth is limited in the increasingly saturated so-called advanced markets. To comply with the objective, profits have to be earned more and more in the new emerging markets. The globalization phenomenon is therefore not the consequence of the macroeconomic Pareto optimization of nations' wealth but the strive for individual wealth. This can be considered a commonly accepted reality; but there is another implicit reason: Minimizing risk. If the portfolio of activities is more diversified also the risk of the portfolio of activities will be lower. Similar to the CAPM (Capital Asset Pricing Model) in finance but with a quiet different mathematical model grounded on entropy-based inequality [2], it is possible to minimize the risk of a business portfolio by having spread activities similar to the market composition. This Minimizing Risk Principle is a second implicit governing law [2]. We will not apply analytically this concept to the extrusion industry at this point, as this goes far beyond the scope of this paper, but we can state at least the concept of Risk Deducted Value Maximization: Globalization means extending the business scope to new geographical areas, and the aim is

- to increase the profit generation (explicit strategy of profit maximization), and at the same time
- it reduces the risk of the portfolio of activities (implicit law of risk minimization).

This corresponds to the analogy of free enthalpy of thermodynamics and explains why the extrusion business potentially also will globalize, if we want it to or not [2].

We see that the logic of globalization is built-in and globalization is a natural expression of an economic rational. The economic rational is the same for type 1 and type 2. What differs is the globalization form and therefore the kind of execution, on the one hand physical material flow and on the other hand financial FDI. Now, let us put this into the logic of a Western extruders group mainly active in the advanced economies. A strategy of growth will follow the type 2 scheme mainly oriented to the new emerging markets of China, India, Eastern Europe, Russia or South America, the so-called BRIC economies. On the other hand due to the price differential between high-price and low-price countries, extrusion plants in emerging countries will increase sales not by setting up new facilities in the advanced economies – at least not for the time being - but by exploiting their cost advantages by exporting their products to the advanced economies according to the type 1c scheme. The propensity for globalization is

even higher, the higher the added value content of theses products, as in e.g. anodized shapes. The type 1c globalization corresponds to the absolute cost advantages according to Adam Smith. And exactly these lower priced imports are causing trouble to the high-price domestic extruders competing in the same segment but with a less competitive cost structure or not enough up-to-date technology. From Western extruders the idea might emerge to combine a type 2 strategy with a type 1c strategy. Indeed, why not exploit this additional source of profit? One could say the imports will materialize anyway. And exactly this is the globalization trap fuelling the pace of "deleterious" globalization type 1c. And deleterious, because type 1c globalization could potentially create a fundamental structural change to the domestic competitive system and most probably also to the first mover. Whether this fundamental change could materialize we will analyze later. But on the other hand, the combination of type 2 and type 1c globalization scheme would allow control over imports by active price setting to the benefit of the whole domestic market. This underlines once again the importance and responsibility of the first mover who has the advantage of dictating competition rules.

ENABLERS FOR A GLOBALIZING EXTRUSION INDUSTRY

Let us now have a look at the basic conditions which have to be present in order that globalization can spark [2]. Indeed, we have seen the governing logic of globalization, i.e. maximizing profit net of risk, but the logic alone will not be enough to trigger globalization and the proactive management willingness is only a "conditio sine qua non". The basic enablers to trigger globalization can be divided into intrinsic to the business and extrinsic but influencing the business. We will develop them for the type 2 and type 1c globalization, which are the two basic types of globalization pertinent to the extrusion business. Fig.6 shows the enabling drivers according to the intrinsic and extrinsic factors for the two globalization types.

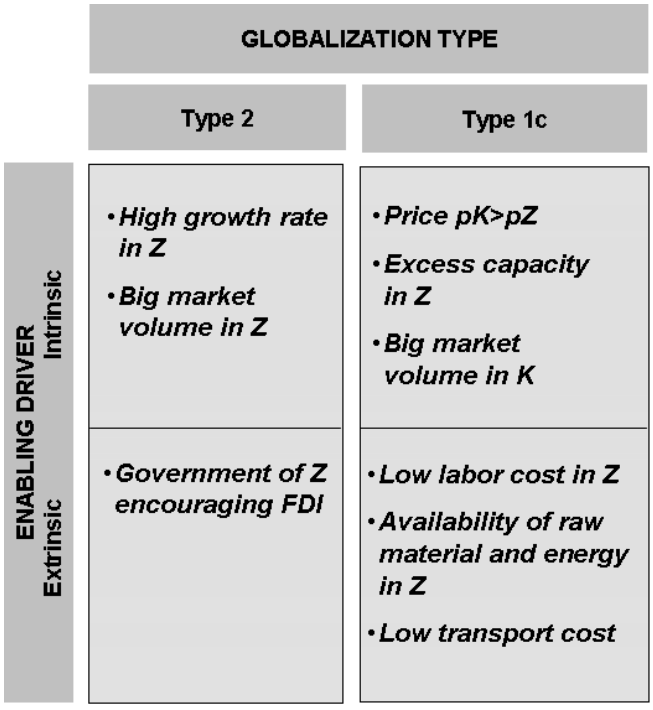

Fig.6: Drivers enabling globalization of type 2 and 1c

The intrinsic drivers for the natural globalization type 2 are a high growth rate and a potentially big market volume in the emerging low-cost country Z. Especially if the comparison to the local home market's growth rate in the advanced economy K shows a big difference this intrinsic driver will be very strong. In fact, to increase profit, MNE – but also international oriented smaller extrusion groups – will participate in these new opportunities by setting-up new facilities in economy Z. This globalization type may have a

slight taste of the imperialistic European expansion policy of the late 19th century but the underlying rational is quiet different. Today's FDI by setting-up new manufacturing plants in emerging economies helps also to accelerate growth in those countries by speeding-up their learning cycles. The extrinsic, or general, enabler for type 2 is composed only by one driver which is the easiness to invest in country Z. Due to restrictions of FDI in some countries this easiness was not always given and rather JV (Joint Ventures) with local companies were the case rather than WFOE (Wholly Foreign Owned Enterprise). Further, we take for granted that the new operations in the emerging economies will be profitable and enough skilled personnel will be available, but also this may vary from country to country and can be a major issue.

The intrinsic drivers for the opportunistic type 1c globalization are mainly a combination of excess capacity in the low-cost country Z and a higher price level in the high-cost country K compared to Z. The difference in the price level is mainly given by the cost differential in the two different economic areas. This is a very strong driver increasing the propensity to follow an export oriented strategy by companies of low-price country Z. The possibility to do additional business can even lead to the decision to build additional capacities to exploit the advantage of lower production cost. In this case a high growth rate in country K is not required because the competition logic is based on crowding out competitors by lower prices, assuming that quality level and provided ancillary services are comparable. Indeed, due to the low differentiability of the product, the lower price is the only rational to source from a far flung country. The effort of companies belonging to country Z will be mainly directed to large economies K with a big demand. The extrinsic, or general, drivers influencing type 1c globalization are the availability of raw materials and abundance of energy. If these conditions are not anymore valid the scarce resources will most probably be reallocated to the local market to satisfy the rising local demand. Also low transportation cost will remain a major driver in order to allow for shipments. Transportation in general will become an even more major concern as soon as the associated ecological cost of pollution is taken into account, especially for non-differentiated products which can be produced locally. Economy still dominates over ecology and this will most probably remain so for the next years to come. The potential consequences are left to the readers' interpretation.

The inverse situation that companies of emerging economy Z will follow a type 2 globalization strategy in high-price countries K is presently very unlikely due to the non-attractiveness to produce locally in the high-cost economy K. In industries other than extrusions it might happen that a type 2 strategy is followed by taking over a competitor but the underlying drivers are different and are more targeted to speed-up technology appropriation.

As long as the demand in high-price countries is keen to source any kind of extrusions from low-cost countries to have a competitive advantage – and the extrinsic enablers for type 1c globalization continue to exist - , the type 1c globalization will persist and extruders in high-price countries have to face the challenge of competition. Extruders in high-price countries are well advised to rethink their business model.

POSSIBLE STRATEGY MOVES OF EXTRUDERS

But how to respond effectively to this changing competition environment? Extruders have mainly two macro options to face the globalization challenge and to stay in business: "active participation" or "active defense". These two macro options are shown on the decision tree of fig.7. The first one, active participation, consists in exploiting the new opportunities given by globalization and to grow by an expansion oriented type 2 strategy mainly in the emerging BRIC economies. This type 2 strategy is more apt for MNE rather than for SME. It is a forward oriented expansion strategy, but this strategy alone will not resolve the domestic problem. Nevertheless, this forward oriented strategy potentially also allows to combine the type 2 strategy with the export oriented, price-based type 1c strategy, exporting back to advanced economies. This approach creates an additional competitive momentum to the importing market.

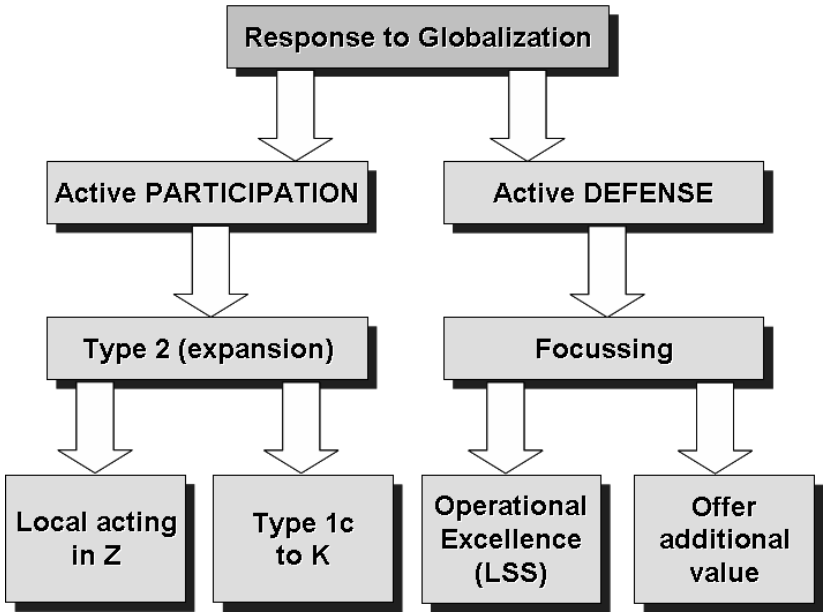

Fig.7: Strategy options for Western extruders

Indeed, on the one hand, it increases the offering spectrum of this competitor adding low-priced extrusions to its portfolio. In addition, it could also allow to use these imported quantities as a variable production capacity. During an economic slow-down phase it becomes possible to shift customer orders to domestic plants and to keep production running at optimal level. It goes without saying that the products have to be suitable for that operation and several circumstances – not only the cost - have to match. On the other hand, it might allow the possibility to control – to some extent – the imported quantities by appropriate price setting to avoid deteriorating the market price. Within a polypolistic market this possibility might be an illusion. But through the globalization of information and due to parallel trade channels of intercontinental type 1c trading the micro monopolistic competition model may loose its significance. Despite extrusion market structure remaining polypolistic and therefore favoring a locally monopolistic competition pricing, the price level might become uniform and we could see the creation of a new eclectic market type. Within this context, the remaining extruders may have to face hard times, and this will be the case if they stay passive. But we have not to forget the basic concept of a FDI strategy which applies to type 2 globalization business present primarily in fragmented markets. A type 2 strategy allows the shareholders to implement a growth oriented strategy by investing in new plants in emerging economies. The synergy consists of brand image as well as BPS (Best Practice Sharing) and through this BPS also MNE extrusion groups can compete in this industry characterized mainly by SME's with limited overhead costs.

The second possibility to remain in the business is "active defense" which consists of focusing according to the intrinsic nature of the extrusion business on excellent service. In fact, extruders only apparently sell a product - in reality they sell a service [4]. This becomes evident analyzing the transaction scheme. Basically the customer asks three questions: Can you produce this shape (technological issue)? When can you deliver it (service issue)? What's the price (cost issue)? By segmenting the market and focusing on these customers looking for a 100% quality conform, product supplied 100% right on agreed time and that to an acceptable price, there is enough space left also for local SME extruders to defend their business in advanced economies. In addition the service content can be increased by offering also required machining operation helping to streamline the supply chain. The local extruders have to leverage the advantage of being near to the customer. To increase further competitiveness, the LSS (Lean and Six Sigma) approach of continuous improvement is the right answer to face today's globalization challenge [5]. It focuses on the quality aspect combining the power of lean transformation. The same as the ISO9001 quality system of some years ago, the LSS will also become a "conditio sine qua non" to do business tomorrow. Generally, the competitive focus has to be put on those critical success factors where the type 1c competitors cannot compete, such as small orders production and short lead times [6]. The higher cost has to be compensated by higher productivity which means having modern up-to-date equipment.

A third option, which exists always, is the “passive incurring” and consists of doing nothing, i.e. wait and see and continue to do business as usual, but this is a risky option. Indeed, if competition does increase, a shakeout of such non excellence-based extruders cannot be excluded.

Instead of remaining in the original business a shift of technology and product mix by focusing on certain larger niches e.g. hard alloys or large profiles, is also an option. This more technological extrusion could mean a change to a new type of customer segment with different industry logic and requiring different know-how as well as equipment. But also these niches are already characterized by their own competition system and it is unlikely that these niches will be spared from type 1c globalization.

POSSIBLE SCENARIOS AND RESULTING EVOLUTION OF GLOBALIZATION

How will globalization in the extrusion industry most likely evolve? What scenarios can we expect? These questions are pertinent and are of utmost importance to define the strategy for the beginning new globalization era. Forecasting is always accompanied by uncertainty also due to the probability of change in the underlying assumptions to the model and therefore the projected figures are always fuzzy. The longer the forecast period, the less precise the statements and projected figures. We will therefore conduct the analysis with different techniques for the short/medium and medium/long term. In the following we will concentrate on globalization type 1c which might have bigger consequences on the market than type 2 globalization.

A) The Short/Medium Term Perspective

We can assert for the time being that all drivers of the intrinsic and extrinsic enablers are favorable for globalization type 1c. Indeed, as we have seen in fig.1 the imports from emerging economies, in this case China, are rapidly increasing in the US but also in Europe. This is due to the fact that importing markets are large enough and interested in sourcing at a lower price level to gain competitive advantage. The emerging countries can satisfy this request by their considerable lower cost structure and have enough capacity to satisfy the demand. Raw material and energy are still not a critical issue and the governments of emerging economies are now favoring exports of semi fabricated products instead of raw materials. Now, how long will these favorable drivers last? How much market share will be lost to low priced imports? How fast will the evolution be? For a time frame of some years a mathematical forecast model is appropriate to simulate the possible evolution. We will base our projections on a growth curve. Although a growth curve is intrinsically generated out of the population, whereas in economics we have rather a functional extrinsic relationship, from a phenotypical curve shape the black box modeling approach is fully acceptable. In economics you find this type of model in combination with market penetration or of life cycle modeling. Let us call T_{ZK} the trade flow from economy Z to economy K, i.e. the globalization volume corresponding to imports of economy K according to the type 1c. The growth of material globalization can be represented by the following differential equation

$$\frac{dT_{ZK}}{dt} = p \cdot T_{ZK} \cdot \left(1 - \frac{T_{ZK}}{V_{ZK}}\right)$$

where p is a constant forming the shape of the curve representing the dynamics based partly on the propensity and V_{ZK} is the natural globalization level depending on the competitiveness factor k, which we will not go further into detail on [2]. Integrating former equation we obtain

$$T_{ZK}(t) = \frac{V_{ZK}}{1 + \frac{1}{b} \cdot e^{-p \cdot t}}$$

where b is the integrating constant representing some kind of delay. We see that

$$\lim_{t \to \infty} T_{ZK}(t) = V_{ZK}$$

which means that in the long term the imports will attain the natural globalization volume corresponding to the equilibrium in country K for the imports of Z. The model's parameters will be computed based on the one hand by fitting the past figures with the technique of least squares and on the other hand based on assumptions regarding economic growth for the projection period. The main assumption is an estimation of the attainable market share in the medium/long term corresponding to V_{ZK} which can be considered the most difficult step of this modeling. The rapidity of the evolution is also based partly on past figures but this might not maintain the same pace of dynamics. It goes without saying that as soon as the basic assumptions change the model looses its significance and should be adapted. We will therefore simulate a min-max funnel within which the imports will most probably perform.

To determine the possible globalization equilibrium V_{ZK} for the NA(2) imports from China we can base our considerations on the existence of an established import organization as well as the still weak imports from the Latin America area. To benefit from a low-cost extrusion source, the well established imports from PRC offer exactly that without many short-term alternatives. The situation remains therefore favorable for Chinese exports to NA. In fig.1 an inflection point seems perceivable in 2005. The cause might be the weakening market dynamics or the first sign of saturation for Chinese extrusion in NA. Taking it as a fact and extrapolating on the "ceteris paribus" assumption we can estimate a V_{ZK} of 250kT. This 250kT would correspond – referred to the 2006 market level – to more than 10% market share only for imports from PRC. If the weakening in 2006 would not have happened, an upper limit model could attain a V_{ZK}(max) of 300kT. In the case of a steady state market we could assume a V_{ZK}(min) of approximate 200kT. To determine then the optimal parameters we minimize the sum of squares error (fig.8) considering the import figures under a "ceteris paribus" condition of the market evolution.

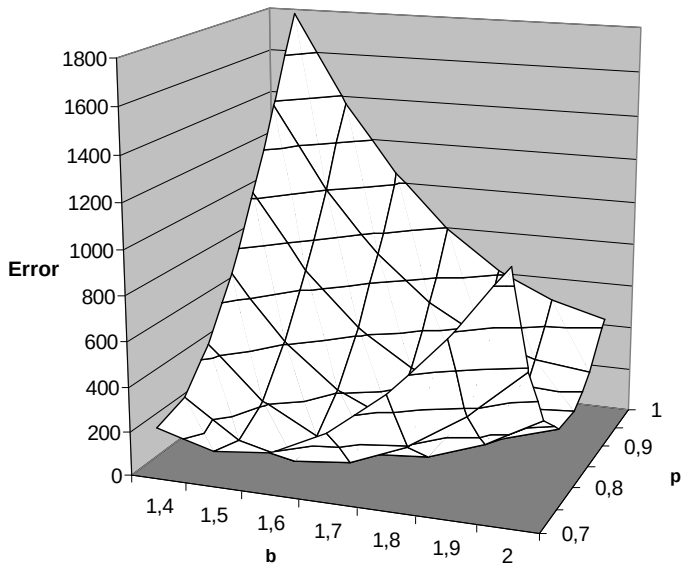

Fig.8: Error surface of different parameter combination
(here the NA model giving best fit for p=0,8 and b=1,7)

In fig.8 we see a sort of channel of the error surface allowing a robust design of the model for several combinations by changing both parameters simultaneously with a best fit for p=0,8 and b=1,7 being the minimum of the error surface. Fig.9 shows the resulting import model as well as the extrapolation for the next four years. The fit of the model during the period 2001 to 2006 is remarkable. It has to be explicitly mentioned that the model is based on a growing market assumption and that a negative growth in consumption for the years to come could even mean that imports in the period 2007-2010 will fall below the minimum model.

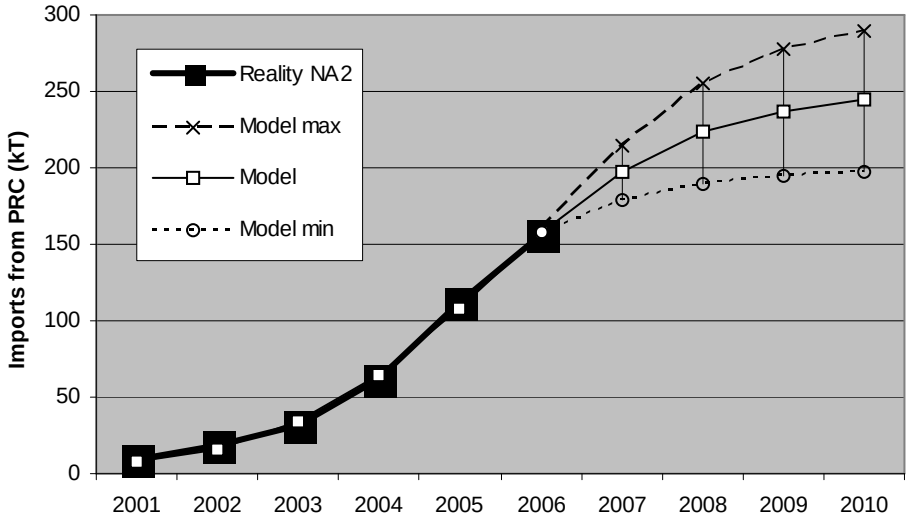

Fig.9: Evolution of exports from PRC to NA(2) based on a "ceteris paribus" condition

Different is the situation in the EU(27). There are not many favorable factors boosting the imports from China to Europe. The high European export oriented industry needs right priced semi material which can also be sourced nearby. The competitive Eastern Europe cost region works as a sort of hindrance for extrusions of Chinese origin. Fig.1 showed a take-off of imports only in 2005 after a rather reluctant period. Also the dynamic was rather limited in 2006 compared to the market growth. Due to this fact, it is rather difficult to match a simple import model to these figures. We will limit the modeling to a min and max funnel with the same technique used for the NA model. Taking the 2005 as inflection point we can estimate V_{ZK}(min) to 50kT. In a high end scenario V_{ZK}(max) could attain 100kT. The potential evolution of Chinese exports to Europe is shown in fig.10.

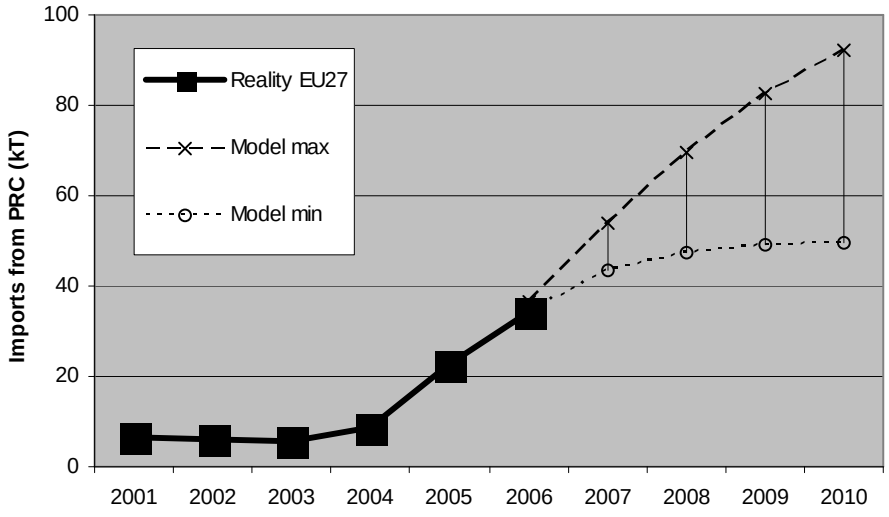

Fig.10: Evolution of exports from PRC to EU(27) based on a "ceteris paribus" condition

These models illustrate the evolution on a "ceteris paribus" base and are therefore static but reality is dynamic because of changing market volume which also entails the adaptation of attainable V_{ZK} for the imports from country Z. Another general problem linked to a type of model with changing fundamentals is the degree of market penetration, i.e. the stage in which the process stands. In a dynamic changing

environment this opens space for discretional interpretation. Instead of using dynamic models, alternative models are based on functional relationship linking imports to causal variables [2]. But that is another story.

In this case, the just developed import market model looses its applicability considering the first conjectured input data for 2007, but it gives an idea where the imports will be under a favorable economic cycle. To bypass the issue of V_{ZK} variability due to economic cycles, let us model the import market share which is more robust compared to physical supplies measured in tons. Fig.11 shows the NA(2) import market share from PRC origin taking into consideration also the figures for the 1st half-year of 2007. The market share curve strengthens the impression of a slowing-down in dynamics for Chinese extrusion exports into the NA market but the penetration process is still under strong expansion. According to the model and based upon the present underlying dynamics, the attainable market share seems to stabilize between 10%-13% during the next years. In macroeconomic terms, this level corresponds to the competitiveness factor k from a supply point of view which reflects the cost-benefit evaluation made by the demand [2]. Translated into a managerial language, it corresponds to the market share satisfying the needs of a precise market segment.

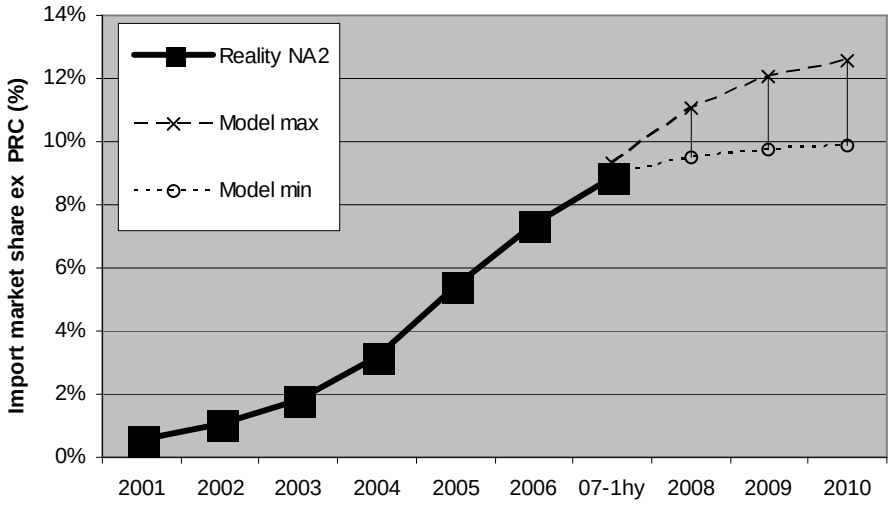

Fig.11: Market share evolution of PRC in NA(2)

This will be the reality to be faced by the NA extruders. Indeed, with a Chinese market share in NA presently not far away from the 10% mark and a highly asymmetric volatility, managers have to become inventive to get their company through hard times. We will see if a "Beta factor" below 1 in a shrinking extrusion market and a "Beta factor" above 1 in a growing market will be sustainable also in future.

Now, instead of modeling imports based on "chart-reading" let us perform some complementary fundamental analysis regarding globalization to see how globalization evolves if the identified underlying driving factors change.

B) The Medium/Long Term Perspective

How long the globalization-enabling drivers will remain favorable is difficult to say and an estimation of the duration is out of the scope of this paper. That the drivers for type 1c globalization at some point will be less favorable that is for sure. Let us therefore turn our attention to which factors influencing globalization type 1c could change. In fig.12 we counterpose the intrinsic and extrinsic enablers of fig.6 for globalization type 1c to analyze if the drivers are enabling globalization or not. The matrix reveals four boxes each one representing a macro scenario of globalization intensity. We can imagine that the intrinsic driver is the predominant one for globalization but also the extrinsic ones have their affects. Presently, in the actual era of globalization, we can state that both driver categories are favorable for globalization type

1c. The possible micro scenarios of the mixed configurations (favorable and not favorable) of enablers have to be analyzed closer in order to gain insights going into details of each single driver. If both enablers are not favorable, no globalization type 1c will materialize or will stop existing. This state is the long term scenario at which we will arrive for the transient type 1c globalization.

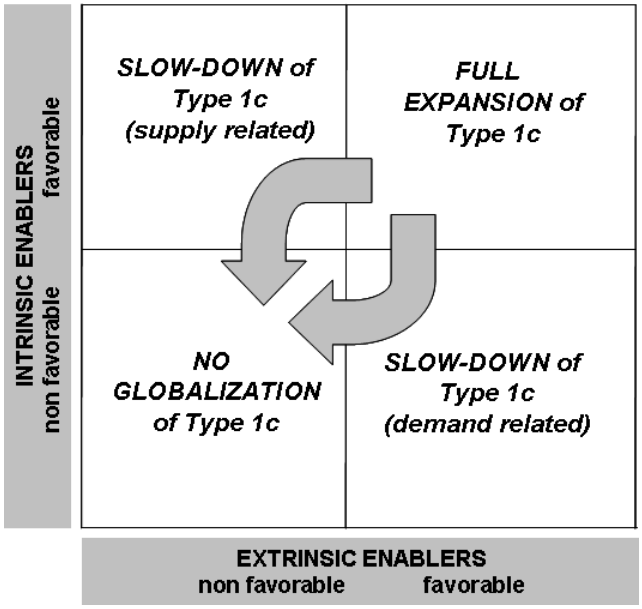

Fig.12: Enablers and relative macro-scenario for type 1c globalization

What happens if the intrinsic drivers become less favorable? The biggest driver for type 1c is the "propensity for globalization"[1][2], i.e. the price difference between high-price p_K of high-cost economy K and low-price p_Z of low-cost economy Z , which is directly linked to the labor cost and considers also the transaction cost. As soon as the price difference of the imported extrusions vanishes, the demand in the high-price economy for imports will shrink because there no longer exists any advantage to source undifferentiated products from far away. In this case also the capacity excess in the emerging economy will most probably no longer exist because it will have been absorbed by the local demand in the emerging economy [2]. In this case, as it has been simulated [2][7], it will last longer than expected, far more than 20 years, depending of course on the initial state. From this point of view we have to be prepared to live with this. Lower prices will also increase demand for extrusions by enabling new market segments for aluminum extrusions. Only in the case that a shortage of capacity in the advanced economy occurs, could it lead to a continuation of sourcing temporarily from the emerging economy even at the same price level, always provided the same quality is given. We see that this case of globalization slow-down is mainly demand originated, as soon as the principal demand-driver of price advantage shrinks.

And what happens if the extrinsic drivers become less favorable, while the intrinsic ones remain favorable? In this case the slow-down will be more likely supply originated. Indeed, if the physical availability of raw material, or energy, should become a problem the allocation of resources could be controlled by government through high export taxes to guarantee internal use. Different from local hydro power energy, rising raw material prices affect all economies which would leave the propensity for globalization intact but less pronounced. What could be affected is the application becoming too expensive with the consequent search for substitute materials different from aluminum. Another driver which has not to be trivialized is the transportation cost especially with consideration of the ecological impact. It sounds irresponsible but the economic advantage derived from type 1c globalization – not only for aluminum extrusions – is still preferred and sacrifices ecological aspects for identical products which could easily be sourced from local suppliers. Indeed, globalization stops not at the economic level. The search for non-polluting transportation forms will be a necessary condition for the globalization era.

It is difficult to say if the demand or supply-driven slow-down will be first; in either case I do not bet that this will occur in the near future and therefore Western companies should to do something in order to survive. There might be other drivers not explicitly mentioned which can emerge and will be contingent to the future state. One thing is for sure, if both enabling driver categories are not favorable, globalization type 1c will cease to exist.

INCREASING IMPORTANCE OF MANAGEMENT ETHICS

Globalization is not equal to globalization. The different types of globalization have different effects on the structure of the industry system and therefore we have to be careful not to denounce globalization as a whole, but neither should we be too euphemistic. Let us perform a quick and neutral analysis of the social aspects.

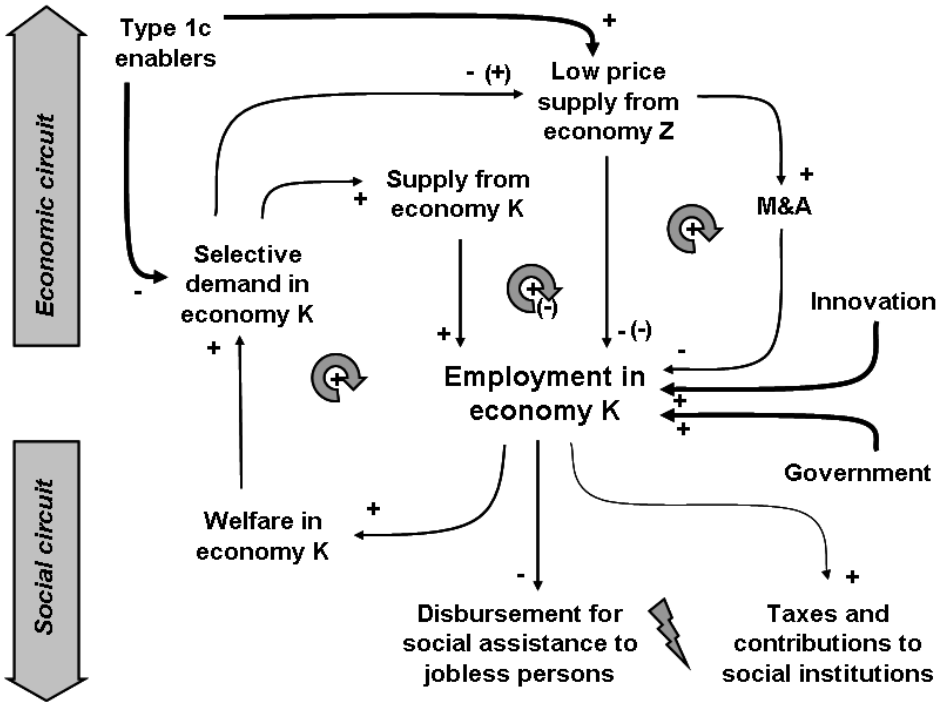

Fig.13: Systemic interaction between economic and social circuit

Fig.13 shows the systemic interaction between the economic and social circuit. The central variable in which we are interested now is the repercussion on employment in the high-price economy K through opportunistic globalization type 1c. After the Second World War – especially the European economy – grew steadily. The growing demand allowed local enterprises to increase supplies, generating full employment thereby creating wealth of society. This was a self-enhancing feedback loop. High employment allowed paying contributions for social institutions and conversely the disbursement for social assistance was at a very low level. The petrol crisis and slow-down of final demand during the eighties changed the parameters arriving at today's saturated Western European economies with low growth rates, increased competition and rising unemployment. Customers – at all stages of the value chain - begin much more to buy selectively, paying attention to the price, having an advantage by sourcing from low cost economies with self-enhancing repercussion on the employment level. The consequence, unemployment costs are rising and contributions are shrinking. This loop is even further enhanced by M&A usually leading to restructuring of the newly created group with consequences for the employees. This is a system of three self-enhancing positive (destabilizing) circuits. But growing welfare in economy K – with a growing economy in general – can also increase supply from economy Z without drastic consequences for

the employment in economy K forming a negative (stabilizing) loop. The reason is the growing market volume, ideally leaving space for all suppliers, also the local less competitive ones. Which circuit, with positive or negative feedback, will finally dominate is difficult to forecast by qualitative analysis. These vicious circles of this dynamic system can only be interrupted by external variables. As already stated, the system is mainly driven by the enablers for type 1c globalization. If these are no longer favorable the system will again source more from the domestic economy. But I would not rely on non-influenceable external variables, there are also proactive influenceable external variables. The government is one variable interfering with taxes to protect employment or intelligent job creation programs. A second one is innovation by launching new products to be produced locally. Therefore, governments - and shareholders – have a big social responsibility that globalization type 1c does not take the upper hand.

And the type 2 globalization? On the one hand, type 2 globalization is not deleterious for workplaces directly, deleterious is globalization type 1c and 3 which endanger domestic workplaces. Type 2 globalization is a feasible way for shareholders to continue to invest money where economic growth takes place; indeed, the factor capital is mobile in today's world. On the other hand, what happens to the industry in the home market which most probably has to face type 1c and 3 globalization is another story. Presently, the European Euro area has some 10 Million unemployed, not temporarily but structurally, i.e. also during a favorable economic situation; the fate of these workers and employees does not bother shareholders but it is becoming a considerable social burden to assist them and this has to be carried by all citizen paying fiscal contributions and unfortunately not only by the shareholders and mangers having mainly caused this misery. What to do? Without pretending to solve this problem, here are three actions which may be considered ethically correct to face the globalization issue:

- produce locally for the local market those products which are interchangeable such as intermediate or semi-finished products, e.g. extrusions
- if either way some low-cost extruders export to high-price countries to facilitate their start-up, allow them and use this as a challenge to improve ones own performance
- but if domestic extruders let produce in low-cost countries and import for profit, consider this at the edge of political correctness; the induced social damage may not justify the short-term profit

If these rules are applied no distorting protection tolls have to be levied by governments. The preoccupation and anxiety of the population is omnipresent and can become a serious problem. This is also underlined by the criticism addressed by some leading economists towards the IMF (International Monetary Fund), World Bank or WTO (World Trade Organization) [8]. Perhaps it might be an illusion to think that social and ecological oriented behavioral rules are enough to govern a system in which the governing mindset is still mainly profit driven. On all accounts, we have to be determined: Sustainable growth has to include not only ecological but also social aspects and therefore commonly accepted business ethics should comply with ecological and social responsibility. Which degree of deregulation the world economy needs is left to each reader's interpretation.

From an economic and social point of view what imperatively must be observed is not to loose added value by transferring this added value out of country if the induced added value of this action does not generate a higher value for the country, i.e. the country's systemic added value has to increase. This should become one of the guiding principles for a sustainable globalization of the economy. In other words, avoid the trap. Yes, the social responsibility of the entrepreneurs, and especially of the MNE, is very high and goes far beyond maximizing profits for the shareholders – remember, the problem of unemployment (and not only this) concerns all of us, directly or indirectly.

The time may come when the values of our society – the so-called mission for a company given by their shareholders – will have changed and the first MNE claims proudly not to have yet again generated higher profit (by dismissing 10% of its employees) but announcing in the newspaper "Increased global revenues in 2025 by maintaining ROE and hiring additional 1000 workers".

N.B.: ROE is Return on Equity and is one of the profitability measures used by mangers and shareholders

CONCLUSIONS

Globalization will further grow as long as the enabling drivers remain favorable and it will have its effects on the competitive system. We have not to fear cost-based type 1c globalization if the extrusion market grows further. In the worst case, domestic extruders keep their present volume and growth will be satisfied through imports from low-cost competitors following a type 1c strategy. A fundamental change seems not to occur but if the domestic accessible market volume should shrink and the economic slow-down cycles persist, then a certain shakeout of less competitive extrusion plants has to be expected. A carefully customer-focused reorientation of the plant, based on the extrusion's key success factors supported by a Lean Six Sigma transformation of the plant will be the winning strategy to survive. There is enough space left for well performing domestic extruders to face the type 1c globalization issue. Nevertheless, it has become apparent that there is a fundamental difference between the NA and EU market regarding imports from PRC. Due to the near-by Eastern European low-cost countries, the EU market will be less receptive than NA to Chinese imports. For the more international oriented extrusion groups the financial-based type 2 globalization strategy in the new emerging economies is the best way to participate with a growth-based market share adding strategy at the globalization opportunity. Within this globalization challenge the management and shareholders should remember not only their ecological but also their social responsibility to implement an ethically sustainable growth in order that everybody – shareholders and employees – can participate at the opportunity offered by the new globalization wave.

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