

Global Trends – Classification and Assessment

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IN A NUTSHELL - For the busy reader: This document describes the significance of global trends by assessing WHEN they will become relevant and by describing their magnitude in relation to the gross world product as well as other trends. The predictions make it possible for business and product developers to assess when new market entries are feasible.

1 Purpose of This Document

This document represents the status of an mqs.at-project which continuously provides an overview of global trends and makes predictions on the change effects. Particular interest is paid to the economic developments resulting from these trends. Should you find any value questionable or to be updated, please contact us at office@mqs.at.

As the project evolved over time we are not deleting the older findings and assessments but we are updating them. Thus allowing a quality control of our publications.

2 How to use knowledge about trends

Trends can be exploited for economic benefit by different ways. We just mention a few of the obvious examples:

Participate in growth of a sector (or country): if a company or national economy grows above average compared to a reference group, it is advisable to invest into this company or national economy – see e.g. Chapter 4.

Participate in price increase due to limited supply: the limited availability of fossil energies and Van Goghs lead to the same effect. Prices increase dramatically. Of course we need to stress that there are subtle differences. While the Van Goghs will remain constant for many more centuries and beyond, this global society will learn how to deal with decreasing contributions of fossil energies rather soon.



Participate in technologies replacing each other: we think the best self-explaining examples are the replacement of magnetic audio-records by CDs and further on by the MP3-based technology again. Ironically the latter is again based on magnetic data storage. The obvious conclusion is to invest in the right data technology at the right time.

3 Methodology of this Project – Status 2008

Within this project we provide the following key indicators for all trends and then collect them in a summary Table:

Trend descriptor: a number which can be used to measure the trends (e.g. per capita income and gross domestic product in China).

Economic consequence: out of the described trend there will be economic consequences (e.g. new cell phones or cars purchased in China annually until saturation – this can then be converted into a sales volume).

Relative size compared to the size of the global economy: For this project we use the number given in [2]

44,645,437 million \$,
or 44.6 trillion \$
or $44.6 \cdot 10^{12}$ \$
or 44.6 T\$ (Tera\$)

With China producing roughly 2T\$ per year, the relative size at present is $2/45 =$ approx. 4% of the world economy. If estimates made in Chapter 4 are correct, the size of the Chinese economy will be well past 30T\$ in the long run. This means the effect in 2005 numbers is $30/45 = 67\%$.

4 National economies - growth! Status 2008.

When we look at the present per capita income of different countries it is clear that sooner or later they will start to move closer and closer. This effect is much more dramatic than the population changes we will see. With the “per capita income levels” approaching each other, enormous changes in the GDPs will be observed

Let's start by the size of the global economy in 2005: 44,645,437 million \$, or 44.6 trillion \$, or $44.6 \cdot 10^{12}$ \$ or for the scientists 44.6 T\$ [2]. This economic power was distributed among the different nations as described in Figure 1.

If we now assume that there will be modest growth in developed countries but much more rapid developments in emerging markets while we leave the population constant, then we get a distribution of GDPs for 2020 as shown in Figures 2 and 3. Figure 2 compares the state in 2005 to a scenario for 2020 while Figure 3 only shows the 2020 scenario. **When looking at the major expected changes, countries like China, India, Brazil, Mexico, Turkey, Indonesia, and Russia show the highest gaps** in Figure 2. Hence these are the most attractive candidates for investment into national economies. And indeed there are several investment funds, offering to participate in the economic development of these countries. The numbers for the 2020 scenario are shown in Table 2.

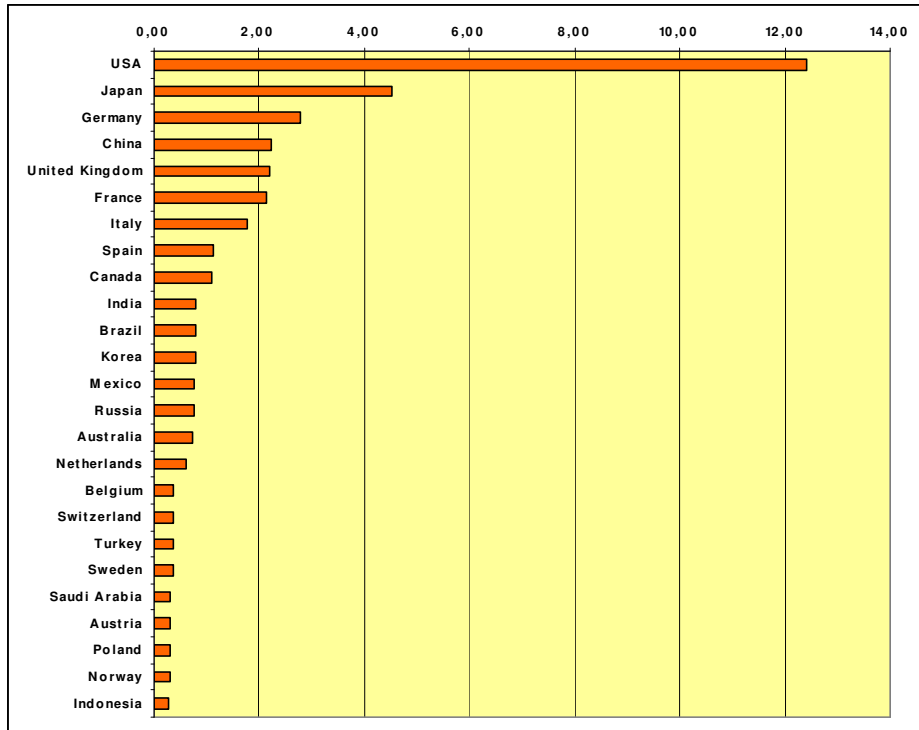


Figure 1: Gross Domestic Products (GDPs) in trillion or Tera\$ as observed for 2005 [2].

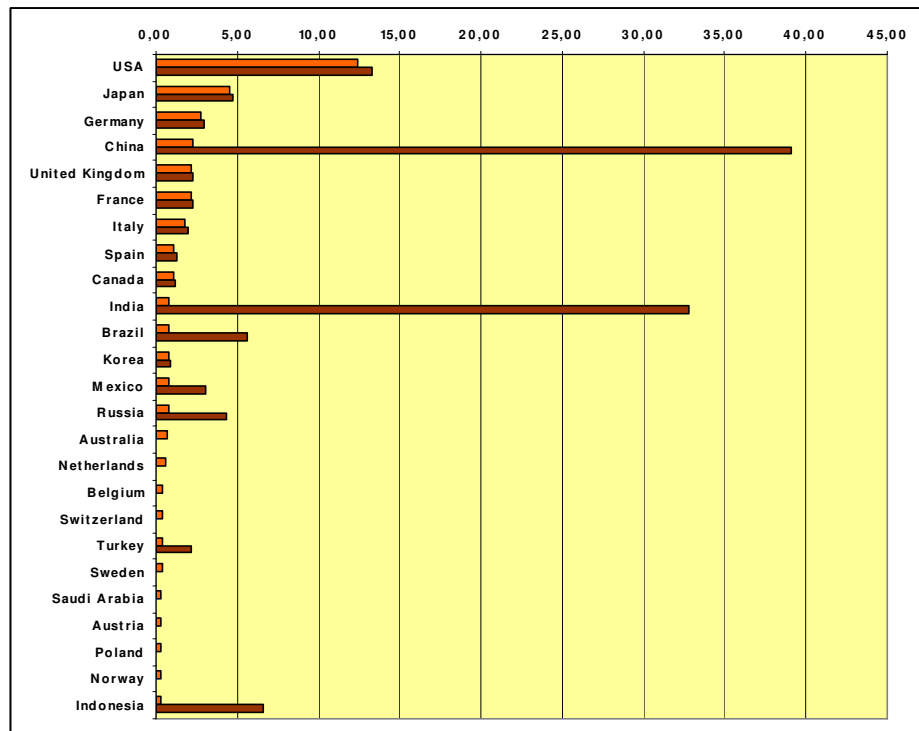


Figure 2: Gross Domestic Products (GDPs) in trillion \$ as observed for 2005 in red and forecasts for 2020 in brown. We use a model for economies of equivalent partners based on population numbers of 2005 and the scenario printed in Table [1]. Data source: [2].

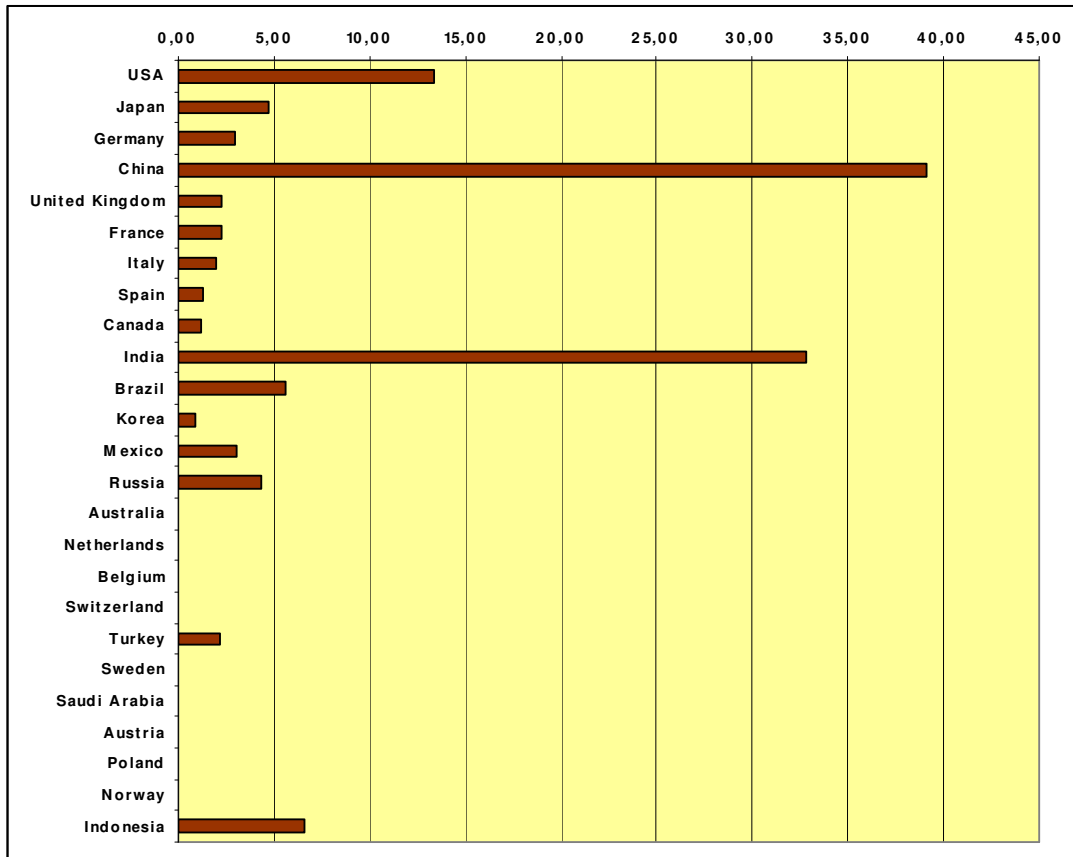


Figure 3: Forecasts in trillion \$ for Gross Domestic Products (GDPs) in 2020 for economies of equivalent partners based on Table 1.

	2005 GDP [Tera\$]	Mpeople	2005 GDP in \$ per person	2020 GDP in \$ per person	2020 GDP [Tera\$]	GDP Growth [%]	GDP Growth [Tera \$]
USA	12,42	296	41891	45000	13,34	7%	0,92
Japan	4,53	128	35477	37000	4,73	4%	0,19
Germany	2,79	83	33878	36000	2,97	6%	0,18
China	2,23	1305	1713	30000	39,14	1652%	36,90
United Kingdom	2,20	60	36525	38000	2,29	4%	0,09
France	2,13	61	34920	37000	2,25	6%	0,13
Italy	1,76	59	30077	34000	1,99	13%	0,23
India	0,81	1095	736	30000	32,84	3976%	32,03
Brazil	0,80	186	4271	30000	5,59	602%	4,80
Mexico	0,77	103	7453	30000	3,09	303%	2,32
Russia	0,76	143	5341	30000	4,29	462%	3,53
Turkey	0,36	72	5028	30000	2,16	497%	1,80
Indonesia	0,29	221	1302	30000	6,62	2204%	6,33

Table 1: Forecast scenario for Gross Domestic Products (GDPs) for economies of equivalent partners based on population numbers of 2005 [2].

Trend descriptor: GDP of China – approx. 2 T\$ in 2005

Economic consequence: Growth of about 37 T\$/15 years = approx. 2.5 T\$/year

Relative size of the trend compared to the size of the global economy: approx. 2.5 T\$/year divided by 44.6 T\$ = approx. 5% / year.

While a similar statement can be made about India, Brazil, Mexico, Russia, Turkey and Indonesia are playing in a slightly smaller league.

Trend descriptor: GDP of China – approx. 0.5 T\$ in 2005

Economic consequence: Growth of about 3 T\$/15 years = approx. 0.2 T\$/year

Relative size of the trend compared to the size of the global economy: approx. 0.2 T\$/year divided by 44.6 T\$ = approx. 0.5% / year.

When evaluating the GDP numbers between 2005 and 2020 for China and others the following statements need to be made:

- A GDP growth of 2.5. T\$/year in China at present is totally unrealistic as it corresponds to about 100% growth per year. The absolute number will be much smaller now, but might become larger later.
- A trend of 5 % of the size of the global economy per year (!) is a HUGE one.
- India and China are showing almost the same high absolute and relative growth numbers – a growth in excess of 30 trillion \$ over 15 years and several 1000% relative growth
- Brazil, Mexico, Russia and Turkey show lower absolute growth numbers in the range of several trillion \$ but also quite high relative growth in the range of 1000 %

5 The North American Sub-prime Mortgage Crisis - Starting a Global Trend. Status 2008.

Late in 2006 housing prices in the US fell and it became more difficult to re-finance mortgages that were set at higher interest rates than the present prime rate. This led to many homeowners having to foreclose their mortgages and leave their homes. The so-called sub prime business was distributed across many banks worldwide and led to high write-offs on an international level [3], [4]. Different estimates were made about the total amount of write-offs:

- [3] estimates that 200 billion dollars were written off by end of March 2008.
- [4] estimates that 300 billion dollars were written off by end of March 2008, while an amount of 600 billion dollars might have to be written off in total. About 10% of this amount were lost by German banks [4]
- Historically in December 2007 The Economist estimated subprime defaults would reach a level between U.S. \$200-300 billion.[3]
- The total value of all US subprime mortgages was estimated to be 1.3 M USD in March 2007 [3]

Trend descriptor: Global Bank Write-offs due to foreclosures on US mortgages: 300 billion USD

Economic consequence: 300 billion USD lost in bank liquidity

Relative size of the trend compared to the size of the global economy: 0.3 T\$ divided by 44.6 T\$ = approx. 0.7% / year. (if a total of 1.3 trillion USD is affected, the percentage will quadruple to about 3 % of the Global GDP).

What can be concluded as of now (April 2008) is that about 3% of the global GDP was given to US-homeowners to buy homes which are potentially beyond their “realistic” financial reach.

5.1 The North American Sub-prime Mortgage Crisis - Starting a Global Trend. Status 2010.

When updating this Section in April 2010 the following additions need to be made:

- The crisis, that emerged late in 2006 as a US-housing prices issue still dominates the world economy.

- The write-offs on the international level that were on the order of 200 billion dollars [3] by end of March 2008 and 300 billion dollars [4] respectively, are now at a level of several trillion dollars [3]: *the International Monetary Fund estimated that large U.S. and European banks lost more than \$1 trillion on toxic assets and from bad loans from January 2007 to September 2009. These losses are expected to top \$2.8 trillion from 2007-10. U.S. banks losses were forecast to hit \$1 trillion and European bank losses will reach \$1.6 trillion. The IMF estimated that U.S. banks were about 60 percent through their losses, but British and eurozone banks only 40 percent.*

Hence the following updates need to be made:

Trend descriptor: Global Bank Write-offs due to foreclosures on US mortgages: 3 trillion USD

Economic consequence: 3 trillion USD lost in bank liquidity

Relative size of the trend compared to the size of the global economy: 3 T\$ divided by 66 T\$ (updated: see Section 6.1) = approx. 5 % from 2007 to 2010 or 2% per year.

What we assessed to be a 0.7% trend in 2008 tripled to a 2% trend in early 2010. It is amazing how few percent of the global GDP lead to this crisis.

6 Methodology of this Project – Status 2010

In 2010 we made two updates to the methodology of this project. First, we are now using the GDP number of 2007 for all calculations as described in the next Section. In addition we introduce a way to characterize trends by various features which we then use for a quantitative assessment – see Section 6.2 below.

6.1 World GDP Update (2007 number)

For the assessments from 2010 onwards we use the number given in [7]: *the world GDP, also known as world gross domestic product or GWP - gross world product, calculated on a nominal basis, was estimated at \$65.61 trillion in 2007 by the CIA World Factbook.*

65,610,000 million \$,
or 65.6 trillion \$
or $65.6 \cdot 10^{12}$ \$
or 65.6 T\$ (Tera\$)

6.2 Trend Impact Assessment

Moreover we have extended our methodology to assess trends that are based on new technologies, ideas, etc. In order to quantify the impact of emerging concepts we rely on the following parameters:

1. (S) Stage of the Trend
2. (T) How much time left to broad application
3. (D) Direct Impact
4. (E) Enabler Status
5. (I) Degree of Innovation
6. (A) Acceptance

We then assess the overall impact (OI) of the trend by calculating the following value:

$$OI = S \times (D + E) \times I \times A / T$$

With the previous letters representing the following values:

S: the stage of the trend in numbers of 1 - 5

- 1 – idea (there is an idea without a comprehensive concept and/or a prototype)
- 2 – concept (the idea has matured but no prototype exists)
- 3 – prototype (a working prototype of the process, product, service etc. is available)
- 4 – ready for broad application (the process, product, service etc. is mature but not introduced on the market yet)
- 5 – established in the market (the process, product, service etc. is established in the market)

D: the direct annual market in million \$

This describes the annual revenue that will be generated by the trend.

E: the enabled annual market in million \$

This describes the annual revenue that will be **enabled** by the trend. E.g. the internet technology enabled new businesses previously not possible, e.g. social networks, software-as-a-service etc.)

I: the degree of innovation of the trend in numbers of 1 and 3

- 1 – incremental significant improvement
- 2 – fundamentally new way of doing something

Note: whenever fundamentally new fields are explored it is hard to predict all implications. Hence we assess the impact of such cases much higher.

A: acceptance in numbers of 1 - 3

- 1 – severe acceptance issues expected
- 2 – no issues with broad acceptance
- 3 – the trend is even seen as highly beneficial for mankind in general

Taking into account the units in the equation we use and the values for S, I and A we modify the calculation of OI to:

$$OI = \{ S \times (D + E) \times I \times A \} / (T \times 5 \times 2 \times 3 \times 10^9)$$

With these modifications we can ascribe a clear meaning to OI: *OI is a value in b€ per year – it represents the average linear growth of the market associated with this trend between now and the time the trend has reached a stable market (+ enabled market).* For the results see Table 2 and Figure 4.

When multiplying OI by T we also get an important entity: *OI x T is a value in b€ – it represents the average stable market (+ enabled market) of the trend.* For the results see Table 2 and Figure 5.

For now, we have applied the method to the 15 trends listed in [8]

	Source	Stage	Direct	Enabler	Degree	Acceptance	Time	OI	OI * Time
		1-5	in €	in €	1-2	1-3	yrs	b€/yrs	b€
Grown Organs	[8]	3	2,0E+11		2	3	5	24,0	120
In vitro steak	[8]	3	3,0E+11		2	2	7	17,1	120
Solar Paint	[8]	3	2,0E+11		1	2	7	5,7	40
Biogas	[8]	4	6,0E+10		1	2	3	5,3	16
Farm in Skyscraper	[8]	2	2,0E+11		1	3	10	4,0	40
Fusion Energy	[8]	2	6,0E+11		2	2	50	3,2	160
Private Pill	[8]	3	4,0E+10		1	3	4	3,0	12
Networked Newspapers	[8]	4	1,0E+10		1	2	2	1,3	3
Anti Dependency Shot	[8]	3	2,0E+10		1	3	5	1,2	6
Body Videogames	[8]	3	1,0E+10		1	2	2	1,0	2
Social Pill	[8]	4	1,0E+10		1	2	3	0,9	3
Nanofood	[8]	5	1,0E+10		1	2	5	0,7	3
Electronic Translator	[8]	2	6,0E+09		1	3	3	0,4	1
Advertisement via Eye Contact	[8]	3	1,0E+09		2	2	3	0,1	0
Artificial Leaf	[8]	3	1,0E+09		1	3	20	0,0	0

Table 2: Trends as listed in [8] and their characteristics as derived in this chapter.

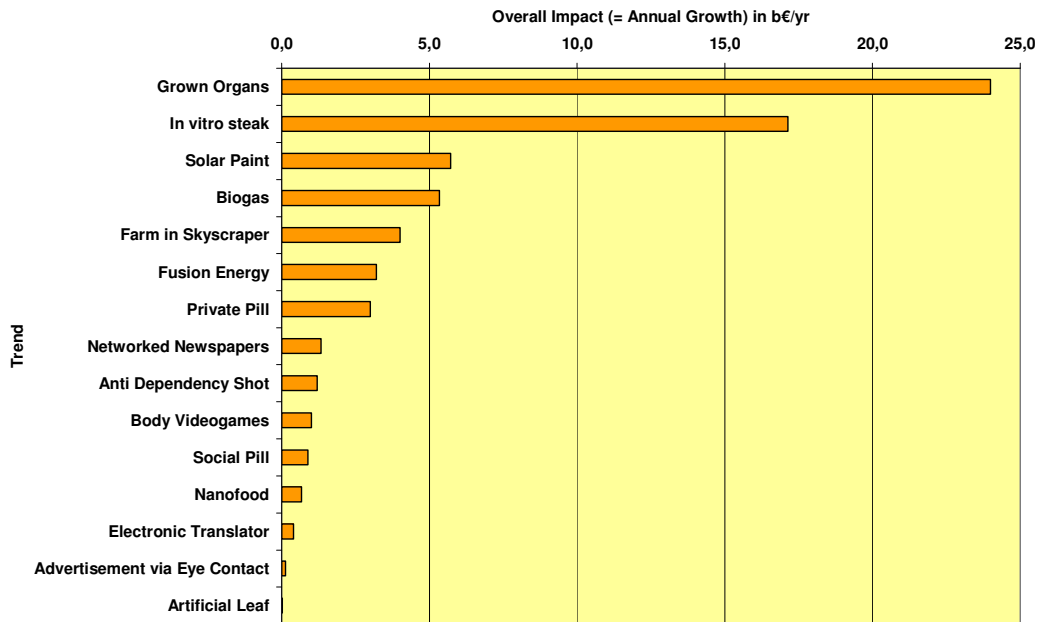


Figure 4: Overall impact values from Table 2 in b€/year. The value represents the linear growth of the market in b€/yr until the trend reaches its plateau.

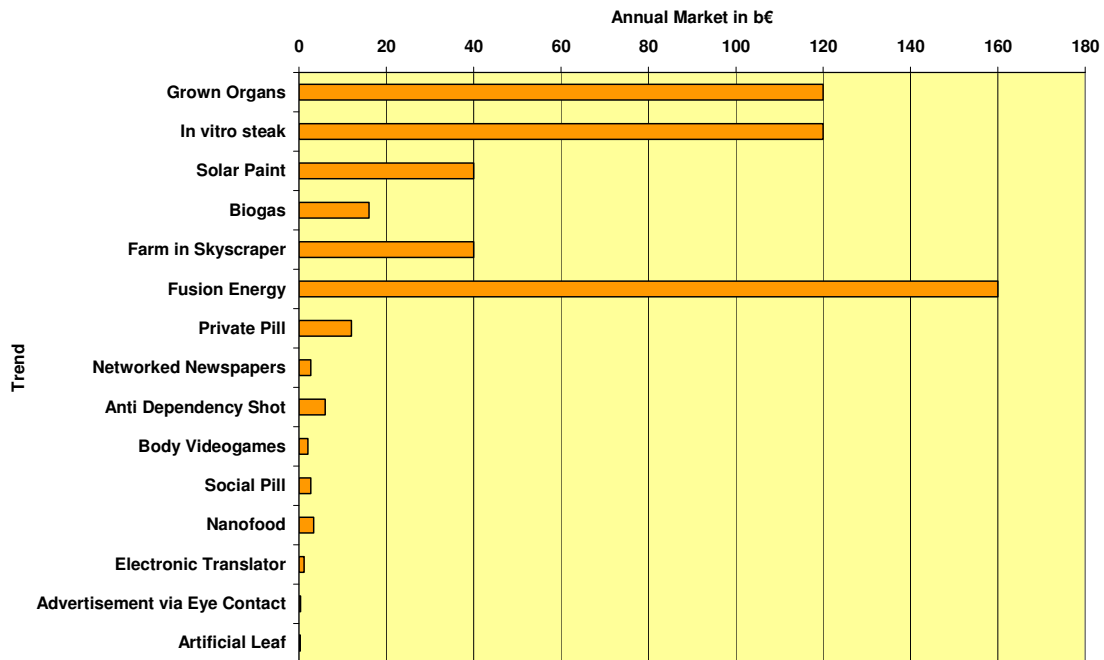


Figure 5: Overall impact values multiplied by the time the trends will take to hit. The value represents the annual market in b€. Data are from Table 2. Ranking is following Figure 4.

7 Conclusions – Status 2008

We are providing the status of our project to assess global trends on a quantitative base. We are describing the trends and their effects in a methodology that relies on three columns:

Trend descriptor: a number which can be used to measure the trend.

Economic consequence: out of the described trend there will be quantifiable economic consequences.

Relative size of the trend compared to the size of the global economy.

- **Economic Growth (2008):** For China and India annual growth values of about 5 % of the size of the global economy per year can be expected – this relates to a growth in excess of 30 trillion \$ per economy over 15 years and several 1000% relative growth in the same time-period. Brazil, Mexico, Russia and Turkey show lower absolute growth numbers in the range of several trillion \$ but also quite high relative growth in the range of 1000 %.
- **Subprime crisis (2008):** Global bank write-offs due to foreclosures on US mortgages of 300 billion USD have taken place until March 2008 – this correlates to about 0.7 % of the global GDP. If the total of all subprime loans of 1.3 trillion USD is affected, the percentage will quadruple to about 3 % of the Global GDP.

8 Conclusions – Status 2010

As we have added a methodology to rank trends by their economic importance, we can conclude the following:

- We have established a methodology for assessing trends quantitatively via several features – the development stage of the trend, the time it takes to broad application on the market, the direct impact (or revenue size) of the market created by this trend, the indirect revenues or market size enabled by the trend, the degree of innovation of the trend and finally the expected acceptance by the users.
- We have verified the approach in assessing the trends listed in Reference [8] in spring 2010.
- The quantitative results show that
 - Values of about 1 to 25 billion € per year characterize the average annual growth of these markets worldwide.
 - The global annual revenues for these trends are between 1 and 160 billion €. Hence these trends are on the order of 0.1% of the global GDP or lower (when using the value from Section 6.1).

Subprime crisis (2010): Global bank write-offs exploded to about 3 trillion USD over 2007 – 2010 - this correlates to about 2 % per year of the global GDP.

Updates of this document will appear whenever relevant progress was made on the project. If you should find Sections not clear enough or if information, you expected, was missing, please contact us at office@mqs.at.

9 References

- [1] For training, consulting, project management and part-time engineers/managers please contact us under office@mqs.at.
- [2] <http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf>
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- [8] Die Zeit Wissen, Nr. 3, April/May 2010, 15 Ideen, die unsere Welt verändern (<http://www.zeit.de/zeit-wissen/2010/03/Bauernhof-im-Hochhaus>).