

Lecture Notes in Intelligent Transportation and Infrastructure  
Series Editor: Janusz Kacprzyk

Alberto Ochoa-Zezzatti  
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# Technological and Industrial Applications Associated with Intelligent Logistics



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# **Lecture Notes in Intelligent Transportation and Infrastructure**

## **Series Editor**

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Editors

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# Financial Analysis Over the Smartest Companies



**Sergio Ignacio Villalba, Esther Guadalupe Carmona, Blanca Lidia Márquez, and Juan Mascareñas Perez-Iñigo**

**Abstract** The companies that have better expectations of being successful are those that have higher skills to innovate; the Massachusetts Institute of Technology (MIT), every year publishes the smartest companies ranking, it's a list that includes disruptive enterprises, these companies are transforming the world and the way of doing business, MIT classifies them in 5 sectors biotechnology, transports, energy, computer and telecommunications, and finally Internet and media; so this paper is focused to analyze the profitability of those companies, moreover of evaluating their risk and generate a perspective for the future to know how attractive to invest in them. We found that the Internet and media sector has the best perspectives, the energy sector is having a lower growth and the biotechnology sector always should be tracked.

**Keywords** Innovation · Risk · Financial ratios

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## 1 Introduction

In the last century, the economy was based on mass production, most of the strategies from the managers were focused on taking advantages over fixed costs; financial managers commonly should decide if they dare to obtain high yields buying fixed assets to reach higher operative leverage, or they might decide work with variable cost avoiding the risk, that decision depends mainly on the macroeconomic situation if the economy would have a good perspective of growing, or the central bank follows an expansive policy and Chief Financial Officers (CFO) were motivated to get high profits from the operative leverage; when the economy is not in the best moment or when the central bank wants to keep a restrictive policy, CFO avoid to work with fixed assets, and they look for a more flexible strategy to cover the production [1]. Now in the new century, being part of a global world, sometimes is more important the knowledge than the money [2], the money has a constraint, it's finite and the central banks cannot be printing with no limits, the knowledge is limitless and it can be being used in the whole world, it has no restriction of place or time, a constraint that the knowledge has is that sometimes it can be expensive to generate it, but in the same way it compensates perfectly because it improves quality's life of the people. In the beginning, the cost of developing a new technology might be onerous, but in the future, it will give considerable retribution to the investors [3], in fact, for the research and development (R&D) departments, spend a good part of their budget when the project is beginning, if they do not assign enough money, the project could be more expensive when the products are in the market [4].

Investing in R&D would not be seen as a heavy charge for the finance department, these areas are becoming more than indispensables in the companies, especially because the markets and the costumers are changing in their preferences, currently, the people are less able to accept a standard product, costumers are looking for flexible products, they are buying goods that satisfy their needs no more, no less; the mass market has gone and now the enterprises must-do marketing adapted to the costumers [5]. So, what about the companies that are doing more innovations, every year the Massachusetts Institute of Technology (MIT), publishes a list of the smartest companies in the world, that list refers all the enterprises that are developing disruptive technologies and in the same way, they will be creating value for the shareholders.

## 2 Theoretical Framework

So, for innovation it can be defined something that is beyond of redesigning or improving a product, innovation means to create a new concept [6], an innovator must have the skill to solve a problem, or develop a product that satisfies entirely a needed creatively. Companies that are generating substantial value to the shareholders are, all those that are generating disruptive innovations, it means that generates new markets

and value networks that displaces to the common leader market [7]. The disruptive business initially has lower gross margins, or often they might have losses, this kind of companies begins in small markets that are not attractive to the biggest companies. Investing in small enterprises is accepting by shareholders that they can have lower returns [8], at this point we should ask ourselves, what is better, a good brand or a good innovation? Having a constant cash flows is like a law of conservation, it will keep the company in a reasonable state of peace and a comfortable brand position, therefore, what is better a good brand or a good innovation? Innovation makes the brand, not in the other way, in the middle and the long term the innovation will do the difference between being a leader or a follower.

To analyze the situation of the companies the CFO does a diagnose of the business through the financial ratios or just observing general information market; by one hand, an investor quickly can see a general performance of the company, if he sees the enterprise value, it is necessary to say that there are two kinds of values, the book value ( $V_B$ ) means the shares' price initially [9], and market value, it represents the price of the shares in the open market, the market value includes the book value of the company, plus the net cash flows that the company is expecting to earn, that cash flows must be discounted to present value [10], it can be calculated as:

$$V_M = \sum_{j=1}^N CF_j(1 + WACC)^{-j} \tag{1}$$

where  $V_M$  is the market value and  $CF_j$  represents the cash flow in  $j$ , it must be discounted at weight average cost of capital (WACC) at time  $j$ ; therefore, the differential between  $V_M$  y  $V_B$  with respect to the time will be the value creation to the company as a consequence of a good administration. Another index to monitoring the company's performance is the market capitalization, it is the result of multiply the stock's price times the number of shares outstanding [11].

In the other hand, a deeper analysis can be done through financial ratios specially if we see all of them that evaluate the profitability of the company. The Price-to-Book value ratio ( $P \rightarrow V_B$ ) measures the proportion in what the market value has exceeded to book's value; in that case as higher the result as much better. It is calculated as the quotient of dividing the market value ( $V_M$ ) between the book value ( $V_B$ ):

$$P \rightarrow V_B = \frac{V_M}{V_B} \tag{2}$$

If the quotient obtained is higher than 1, we assume that the enterprise's value is rising, but if it is lower than 1, the company has more value if it considers to itself in bankruptcy than if it continues operating.

Another profitability ratio is the Price-to-Earnings ratio ( $P_\theta \rightarrow E$ ), it is the result of dividing the price of the share in the market ( $P_\theta$ ), between the earning per share (EPS). It gives us a perspective of the expected potential of the company in the market. The higher the ratio, the higher the investors' expectations regarding earnings growth,

it can be obtained as:

$$P_{\theta} \rightarrow E = \frac{P_{\theta}}{EPS} \quad (3)$$

The PEG ratio (Price/earnings to growth), is a valuation metric for determining the relative trade-off between the price of a stock, the earnings generated per share (EPS), and the company's expected growth.

In general, the P/E ratio is higher for a company with a higher growth rate. Thus, using just the P/E ratio would make high-growth companies appear overvalued relative to others. It is assumed that by dividing the P/E ratio by the earnings growth rate, the resulting ratio is better for comparing companies with different growth rates [12], PEG ratios can be defined as:

$$PEG \text{ Ratio} = \frac{P_{\theta}}{EPS_g(E)} \quad (4)$$

where ( $P_{\theta}$ ) is the stock price in the open market,  $E$  represents the earnings in the period (usually computed annually) and ( $EPS_g$ ) means the annual earnings per share growth. Another financial ratio, one of the most important is the Return on Assets (ROA), it shows the percentage of how profitable a company's assets are in generating revenue, ROA is obtained as a quotient of dividing net profit between total assets, therefore:

$$ROA = \frac{P_N}{A_T} \quad (5)$$

where ( $P_N$ ) is the net profit and ( $A_T$ ) means the total assets. ROA is as much important as ROE, the Return on Equity (ROE) is fundamental to take assertive decisions by the CFO; ROE is a measure of the profitability of a business in relation to the book value of shareholder equity, also known as net assets or assets minus liabilities, in the same way is a measure of how well a company uses investments to generate earnings growth, ROE is computed as net profit ( $P_N$ ) between the equity from the shareholders ( $E_S$ ), so, it can be written:

$$ROE = \frac{P_N}{E_S} \quad (6)$$

The earning per share (EPS) means the profit that a shareholder earns per each share that he has bought, EPS is the quotient of dividing the net profit ( $P_N$ ) between the number of shares outstanding ( $SO$ ), in that case EPS is:

$$EPS = \frac{P_N}{SO} \quad (7)$$



A non-financial ratio is the Beta index ( $\beta$ ), it is a regression slope from the hold period return on a specific stock, with respect with the market returns, beta index might be seen as risk measure over the market, since it gives the sensitivity of stock with respect the market; beta index is useful to compute the cost of capital with the Capital Assets Pricing Model [13–16], the Beta index is computed as:

$$\beta = \frac{\frac{1}{n} \sum_{j=1}^N (R_j - \bar{R})(Rm_j - \overline{Rm})}{\frac{1}{n} \sum_{j=1}^N (Rm_j - \overline{Rm})^2} = \frac{\sigma_{jm}}{\sigma_m^2} \quad (8)$$

If ( $R_j$ ) is the return form asset in  $j$  and ( $\bar{R}$ ) is the expected value for the return of an asset in  $j$ ; ( $Rm_j$ ) is the return from the market in  $j$ , and ( $\overline{Rm}$ ) is return expected in the market; in other words, if we apply the formula and then we rewrite it, we get that ( $\beta$ ), is the quotient from the covariance ( $\sigma_{jm}$ ) from the returns of an asset in  $j$  and the market returns ( $Rm$ ), between the variance ( $\sigma_m^2$ ) from the market returns [17].

### 3 Methodology

Initially were contemplated the 50 smartest companies published by the Massachusetts Institute of Technology in its index [18], but unfortunately, 20 companies remain as private enterprises, it means, they have not done an initial public offer (IPO) to list in the stock exchange, so they keep the information confidential even though and the investors have good expectations, so the final sample was with 30 companies, they were analyzed by country and sector, to posteriorly to be compared among them. The information was retrieved from the Reuters Finance database in the currency of the country where the company belongs, then it was converted to U.S. Dollars to standardize.

#### 3.1 Companies to Analyze

Unfortunately, 40% of companies are not listing into a stock exchange, so the information was not available, in Table 1 these companies are listed and sorted by sector and country.

As we see, most of the companies are from the United States (US) and the sectors that are having more innovations are computer and telecommunications, energy and biotechnology. In Table 2 are listed the rest of the companies, all of them are public and are listed in different stock exchanges around the world.

As it is showed more than half of the companies are from the United States, almost one third belongs to biotechnology and another third is from computer and telecommunications.

**Table 1** Shows the name of the companies that are not listed in a stock exchange and maintain a private status, the country of origin from the company and the sector of which it belongs

Company	Sector	Country
Enlitic	Biotechnology	United States
Oxford Nanopore	Biotechnology	United Kingdom
RetroSense Therapeutics	Biotechnology	United States
Veritas Genetics	Biotechnology	United States
23andMe	Biotechnology	United States
Aquion Energy	Energy	United States
IDE Technologies	Energy	Israel
24 M	Energy	United States
Sonnen	Energy	Germany
Improbable	Energy	United Kingdom
Carbon	Energy	United States
Seven Bridges	Computer and telecommunications	United States
LittleBits	Computer and telecommunications	United States
Bosch	Computer and telecommunications	Germany
Slack	Computer and telecommunications	United States
Transferwise	Computer and telecommunications	United Kingdom
Didi Chuxing	Transports	China
SpaceX	Transports	United States
Coupang	Internet and digital media	South Korea

Source Own source

**Table 2** Shows the companies that are listing on the different stock exchanges around the world classified per sector

Company	Sector	Country
Bristol-Myers Squibb	Biotechnology	United States
Collectis	Biotechnology	France
Editas Medicine	Biotechnology	United States
Illumina	Biotechnology	United States
Intrexon	Biotechnology	United States
Monsato	Biotechnology	United States
Nestlé	Biotechnology	Switzerland
Spark Therapeutics	Biotechnology	United States

(continued)

**Table 2** (continued)

Company	Sector	Country
T2 Biosystems	Biotechnology	United States
Airware	Computer and telecommunications	United States
Fanuc	Computer and telecommunications	Japan
FireEye	Computer and telecommunications	United States
Huawei	Computer and telecommunications	China
IBM	Computer and telecommunications	United States
Intel	Computer and telecommunications	United States
Microsoft	Computer and telecommunications	United States
Mobileye	Computer and telecommunications	Israel
Nvidia	Computer and telecommunications	United States
First Solar	Energy	United States
Alibaba	Internet and digital media	China
Alphabet	Internet and digital media	United States
Amazon	Internet and digital media	United States
Baidu	Internet and digital media	China
Facebook	Internet and digital media	United States
Naver	Internet and digital media	Japan
Tencent	Transports	China
Tesla Motors	Transports	United States
Toyota	Transports	Japan
Snapchat	Internet and digital media	United States

Source Own source

## 4 Data Analysis

We examined the companies' data from the Yahoo Finance, Reuters Finance, and EMIS, after that we computed the financial ratios per company and were written in the Table 3, it shows the financial ratios and beta index, the enterprise value and market capitalization are in billions of dollars.

To do a better data analysis the companies were classified by sector, to correct the skewness generated by the missing data, they were replaced for the average of the industry. Graph 1 shows the market value of the companies and the capitalization of the enterprise.

The Internet and media sector followed by transport includes the companies that are more valuables; the energy sector is the most lagged, so it could represent an excellent deal since the shares are not so expensive right now. Graph 2 shows the financial ratios per sector.

As we can appreciate in Graph 2 the P/E ratio in the sector of internet and media is extremely high, it was because of Amazon and Alphabet, the expectations of the value

**Table 3** Shows the different ratios and relevant financial information per company

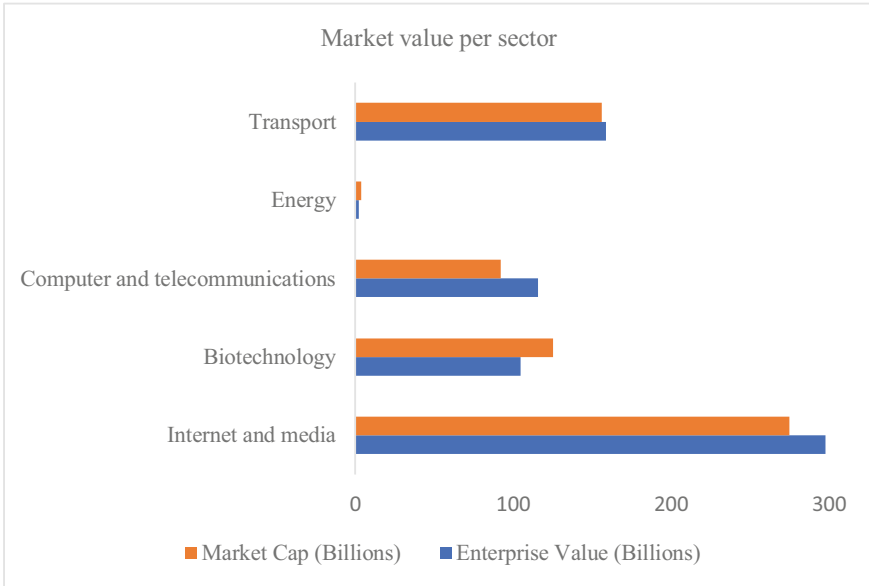
Company	Enterprise value	Market cap	P → VB	P/E ratio	PEG ratio	ROA (%)	ROE(%)	β	EPS
Alphabet	470.14	540.82	4.23	30.49	1.27	9.13	15.01	0.98	26.30
Microsoft	388.47	447.52	6.23	27.35	2.32	7.23	22.09	1.36	2.10
Amazon	383.30	381.99	23.09	200.3	2.74	4.12	13.64	1.64	N/A
Facebook	344.17	367.46	7.27	61.17	0.92	11.15	13.41	N/A	2.09
Editas Medicine	316.97	517.67	2.73	-4.03	N/A	-23.73	-56.42	N/A	(1.91)
Toyota	286.31	177.16	1.12	8.47	0.32	3.67	13.33	0.72	14.55
Alibaba	264.43	266.37	7.89	38.15	52.74	6.00	21.51	N/A	2.82
Nestlé	262.64	239.01	4.08	27.53	N/A	6.21	13.75	0.73	2.79
Intel	186.98	175.95	2.87	18.04	1.44	8.85	16.96	1.15	2.07
IBM	182.04	148.14	9.42	12.60	4.02	7.54	80.35	0.79	12.31
T2 Biosystems	177.06	192.48	8.49	-3.48	N/A	-47.00	-180.38	N/A	(2.27)
Bristol-Myers Squibb	96.46	94.37	6.33	33.03	1.10	9.27	19.34	1.01	1.71
Baidu	60.95	66.45	5.22	14.11	-167.13	4.94	41.02	1.90	13.91
Monsato	54.66	45.29	8.86	45.55	3.47	8.56	14.93	1.24	2.38
Nvidia	31.32	34.77	7.76	42.70	1.48	10.24	40.48	1.37	1.52
Tesla Motors	31.26	30.71	12.18	-24.55	-6.21	-6.34	-69.57	0.94	(8.45)
Illumina	25.90	26.29	12.79	61.41	3.18	9.35	25.28	0.75	2.91
Airware	9.73	6.45	N/A	-1.33	N/A	-216	N/A	-0.18	(0.06)

(continued)

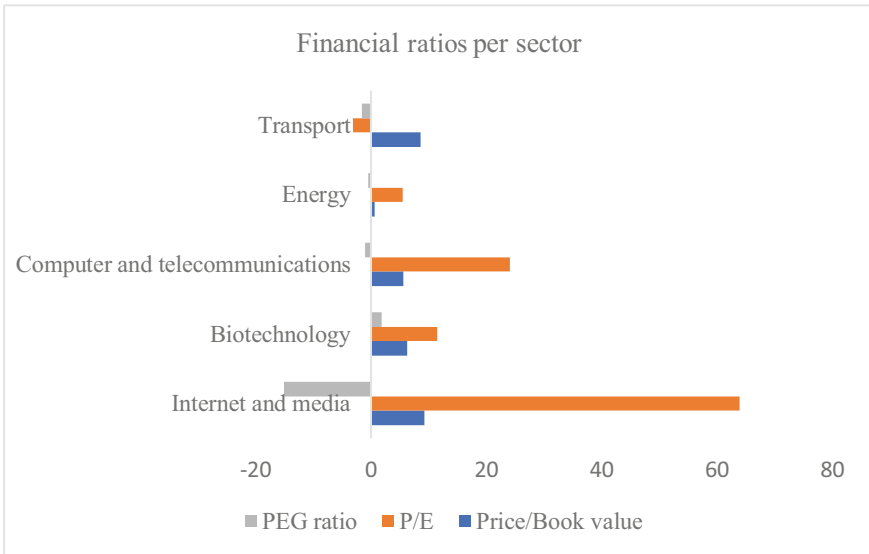
**Table 3** (continued)

Company	Enterprise value	Market cap	P → V <sub>B</sub>	P/E ratio	PEG ratio	ROA (%)	ROE(%)	β	EPS
Mobileye	9.11	9.35	15.77	109.9	1.25	10.88	17.68	N/A	0.34
Collectis	5.98	8.99	3.35	-19.74	N/A	-8.51	-16.12	1.28	(1.28)
Intrexon	2.98	3.24	5.23	-17.24	0.49	-6.86	-33.66	1.53	(1.59)
First Solar	2.40	3.79	0.65	5.46	-0.50	6.88	12.86	1.79	6.82
FireEye	2.25	2.39	2.56	-4.00	-26.13	-13.42	-53.58	0.51	(3.59)
Spark Therapeutics	1.51	1.84	4.77	-20.07	1.22	-14.74	-26.06	N/A	(2.95)
Huawei	N/A	1.82	0.59	11.01	N/A	6.00	6.12	0.32	0.03
Tencent	N/A	260.85	12.40	6.66	1.22	11.05	32.12	1.09	32.26
Fanuc	N/A	3.40	0.02	0.24	N/A	10.26	11.80	0.78	7.05
Naver	N/A	26.21	7.92	39.38	N/A	24.35	28.87	1.02	20.21
Snapchat	20.44	21.35	9.15	N/A	-1.5	-40.94	-29.62	1.09	-0.72

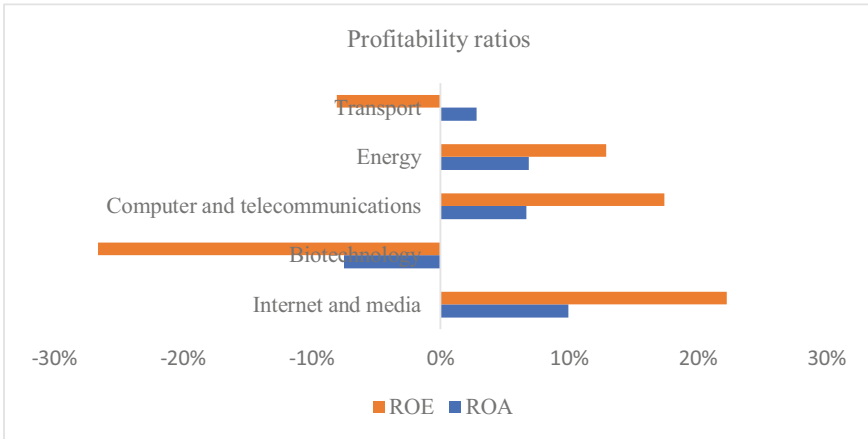
Source Own source



**Graph 1** Shows the market value and the capitalization market per sector. *Source* Own source



**Graph 2** Shows the most relevant information from financial ratios. *Source* Own source



**Graph 3** Shows the ROA and ROE per sector. *Source* Own source

of that companies if because they have diversified their products and are investing high amounts of money in their research and development departments (R&D); biotech sector as computer and telecommunications have excellent expectations in the future. Graph 3 shows the profitability of the smartest companies.

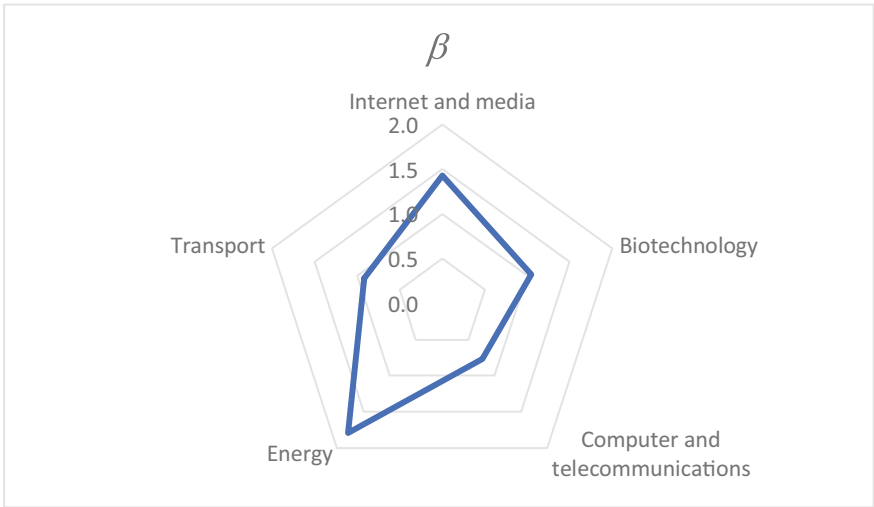
Investing in biotechnology implies accepting the probability of high losses, it is caused by the high rates of failure in R&D departments, on the other hand, the Internet and media are giving very attractive returns to the shareholders. Graph 4 shows the Beta index; it helps as a risk market indicator in the function of the CAPM.

As we see, the energy sector and internet and media have higher risks than biotechnology or computer and telecommunications, it is caused because of the goods and services they sell, they have no elastic, so companies have a better margin to operate with the price. Graph 5 shows the earning per share per sector.

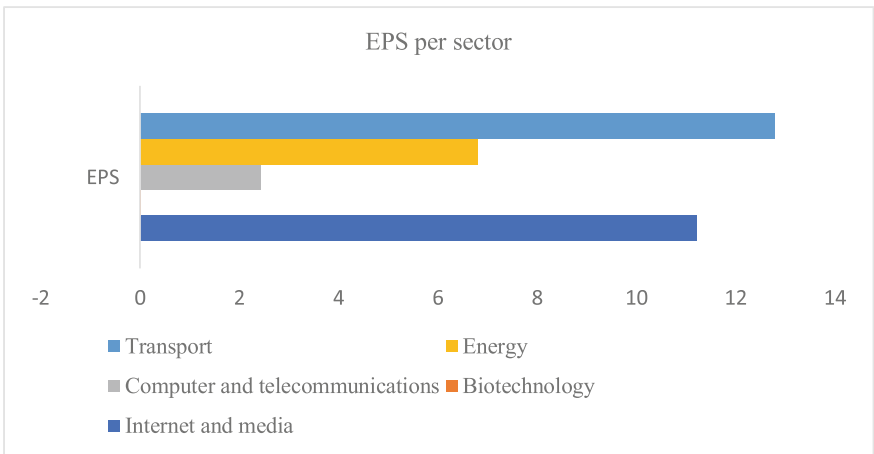
Internet and media as the transport sector are giving excellent yields, as much as the energy sector does at least for the last year (2015–2016), the biotech sector had serious problems for generating profits, but is something common in this sector.

## 5 Conclusion and Future Research

This the first part of the research, and we have found that the yields and returns from smartest companies are very attractive, and it compensates perfectly the operative and the market risks, is deeply recommended to include into a portfolio share like Alphabet or Amazon; in the same way, would be a good idea to include biotech companies, by their essence with a small amount of money, a portfolio could be



**Graph 4** In a radial graph, is showed how the beta index changes in function of the sector. *Source* Own source



**Graph 5** Shows the Earning per share per sector. *Source* Own source

leveraged, having an acceptable range of opportunities to get profits. In the future is shaped to do the same analysis for the past years and then we would be able to do a forecast about the indicators.



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