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## A Review of Biotechnology Based Listed Companies and the Importance of Intellectual Properties

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### Abstract

Nowadays, biotechnology industry consider as important technology field due strong life, food and health application. However this important technology require large amount of investment to maintain the progress. Investors or entrepreneurs especially listed company consider intellectual property system as safeguard as well as become a crucial leverage value of the company. In this review, the discussion focused on the introduction of top ten biotechnology based company, the introduction of intellectual property system and the important of the intellectual properties to biotechnology industries.

**Keywords:** Biotechnology, Company, Intellectual Properties, Novelty, Market Value.

### Introduction

Biotechnology is mean as 'the technology and science to living organisms application, parts and models thereof, to change non-living or living resources for the knowledge production, services and goods' (OECD, 2006). At the same time as, the industry of biotechnology is a field made up of entrepreneurial life science industries which use modern biological techniques to develop services or products to serve the needs of animal health or human healthcare, food processing, agriculture, environmental affairs or renewable resources. The significance of biotechnology field as one of the economic growth engines is eminent, for an instance, conclude that one per three of the world's Gross Domestic Product is generated by biotechnology industries and other industries. The biotechnology division also continues to grow by about ten to fifteen percent globally, reaching United States Dollar 271 billion in 2011 with the healthcare division as the biggest contributor to the whole biotechnology division revenues (Frost & Sullivan, 2009).

In general, the intellectual property system is a complex law structure which has been developed in the several centuries. This intellectual property system consists a range of implements which are very useful to shield variety aspects of inventions and creates a type of monopoly. The main instruments are designs, utility models, patents, copyrights, unfair competition, trademark and antitrust (Reinhold Publishing Corporation, 1964).

Since the intellectual property potential as important safeguard and value added tool to biotechnology industries, this system and this field potential able to complementary to each other. However, the lack of review discusses about the relationship biotechnology industry and intellectual property. Thus in this study an attempt was made to discuss about as intellectual property as crucial safeguard and value added tool in biotechnology industry.

### **Biotechnology Listed Company in the World and its View to Intellectual Property**

In this review is discussed about the top 10 biotechnology based company in the world regard the name of company, history of firm, largest market cap (United States Dollar billions), market cap in Third Quarter 2018 (United States Dollar billions), market cap in 2017 (United States Dollar billions), market cap in 2016 (United States Dollar billions), market cap in 2015 (United States Dollar billions), market cap in 2014 (United States Dollar billions) and market cap in 2013 (United States Dollar billions) and view intellectual property to the company.

Until year 2018, Johnson & Johnson is the top one biotechnology based list company in the world and United States multinational medical devices, pharmaceutical and consumer packaged goods manufacturing company founded in 1886 with its largest market cap (United States Dollar billions) reached 397.4, market cap in Third Quarter 2018 (United States Dollar billions) is 370.6. The market cap keep increasing since 2013 (258.3), 2014 (277.8), 2015 (284.2), 2016 (314.1), 2017 (375.4) (<https://www.nyse.com/quote/XNYS:JNJ>). Intellectual properties provide incentives that make sure the innovative firms like Johnson & Johnson able to continue to invest in cutting edge research, especially given the huge cost and time consuming it takes to develop new treatments and medicines (Johnson & Johnson, 2018).

Pfizer is the second top biotechnology based listed company and United States pharmaceutical company headquartered in New York City, with its research headquarters in Groton, Connecticut founded in 1849 with its largest market cap (United States Dollar billions) reached 310.5, market cap in Third Quarter 2018 (United States Dollar billions) is 262.2. The market cap since 2013 was (196.0), 2014 (205.4), 2015 (199.3), 2016 (196.3), 2017 (215.9) (<https://www.nyse.com/quote/XNYS:PFE>). Pfizer believes that intellectual property is crucial factor to stimulating economic growth and driving innovation in countries throughout the world (Pfizer, 2017).

Roche is the third top biotechnology based listed company and Swiss worldwide Healthcare Corporation that operate worldwide under two divisions: Diagnostics and Pharmaceuticals. Its holding company, Roche Holding AG, has bearer shares listed on the SIX Swiss Exchange. The corporation headquarters are located in Basel founded in 1896 with its largest market cap (United

States Dollar billions) reached 263.6, market cap in Third Quarter 2018 (United States Dollar billions) is 201.4. The market cap since was 2013 (240.3), 2014 (258.5), 2015 (234.7), 2016 (192.1), 2017 (216.7) ([https://www.six-group.com/exchanges/shares/security\\_info\\_en.html?id=CH0012032048CHF4](https://www.six-group.com/exchanges/shares/security_info_en.html?id=CH0012032048CHF4)). Roche are turning advances in medical and data science into life changing treatments and innovative diagnostics for patients. Roche constantly innovating to deliver and develop products for the benefit of millions of people around the world. We strongly believe that robust intellectual property systems stimulate innovation and economic growth for the benefit of society as a whole.

(<https://www.roche.com/dam/jcr:bb9bbfd1-0f70-4949-862e-ca077c672281/en/roche-position-ip.pdf>) Novartis is the fourth top biotechnology based listed company and Swiss worldwide pharmaceutical business based in Basel, Switzerland founded in 1996 with its largest market cap (United States Dollar billions) reached 275.2, market cap in Third Quarter 2018 (United States Dollar billions) is 200.8. The market cap since 2013 was (195.0), 2014 (229.8), 2015 (206.1), 2016 (170.5), 2017 (196.7) (<https://www.nyse.com/quote/XNYS:NVS>). Intellectual property rights are fundamental for investment in the research and development that leads to new medicines The intellectual property system is important to Novartis' central mission of extending and improving people's lives (Novartis, 2017).

AbbVie is the fifth top biotechnology based listed company and specialize in diversified products including diagnostic equipment, medical devices and nutrition products founded in 2013 with its largest market cap (United States Dollar billions) reached 196.2, market cap in Third Quarter 2018 (United States Dollar billions) is 191.0. The market cap since 2013 was (83.8), 2014 (104.1), 2015 (96.8), 2016 (100.2), 2017 (154.4) (<https://www.nyse.com/quote/XNYS:ABBV>). AbbVie has protected more than one hundred patents to avoid anyone from attempting to copy the biologic, with sixteen billion United States Dollar in annual sales (<https://www.bloomberg.com/news/articles/2017-09-07/this-shield-of-patents-protects-the-world-s-best-selling-drug>).

Merck & Co. is the sixth top biotechnology based listed business and United States pharmaceutical company and one of the largest pharmaceutical companies in the world founded in 1891 in the world with its largest market cap (United States Dollar billions) reached 196.2, market cap in Third Quarter 2018 (United States Dollar billions) is 163.4. The market cap since 2013 was (146.5), 2014 (166.9), 2015 (147.6), 2016 (164.3), 2017 (153.3) (<https://www.nyse.com/quote/XNYS:MRK>). Merck believes that policies supporting intellectual property protection such as patents and proprietary regulatory data protection incentivize sustainable investments in life-enhancing and life-saving drugs (Merck, 2015)

Amgen is the seventh top biotechnology based listed company and United States worldwide biopharmaceutical firm headquartered in Thousand Oaks, California founded in 1980 with its largest market cap (United States Dollar billions) reached 143.0, market cap in Third Quarter 2018 (United States Dollar billions) is 137.2. The market cap since 2013 was (78.7), 2014 (93.1), 2015 (122.5), 2016 (108.9), 2017 (126.2) (<https://www.nasdaq.com/symbol/amgn>). The successful enforcement of

intellectual property (IP) rights enables Amgen to keep on to invest in truly innovative new medicines (<http://investors.amgen.com/phoenix.zhtml?c=61656&p=irol-newsArticle&ID=1332195>).

Abbott Laboratories is the eighth top biotechnology based listed business and American health care Corporation with headquarters in Lake Bluff, Illinois, United States. The firm was founded by Chicago physician Wallace Calvin Abbott in 1888 with its largest market cap (United States Dollar billions) reached 129.9, market cap in Third Quarter 2018 (United States Dollar billions) is 128.6. The market cap since 2013 was (59.3), 2014 (67.9), 2015 (67.0), 2016 (56.4), 2017 (99.3) (<https://www.nyse.com/quote/XNYS:ABT>). Kaletra falls into the dominion of intellectual property of Abbott Inc. Intellectual property includes inventions, idea, processes (trade secrets), patents, copy rights, trademarks, and other legally protected intangible assets. These are internationally sheltered in order to preserve incentives for corporations to keep on to do research and development and move into overseas markets (Jennifer et al., 2007).

Novo Nordisk is the ninth top biotechnology based listed company and Danish multinational pharmaceutical firm headquartered in Bagsværd, Denmark, with production facilities in 8 countries, and affiliates or offices in seventy five countries founded in 1923 with its largest market cap (United States Dollar billions) reached 159.6, market cap in Third Quarter 2018 (United States Dollar billions) is 114.5. The market cap since 2013 was (19.6), 2014 (125.4), 2015 (153.9), 2016 (92.6), 2017 (131.2) (<https://www.nyse.com/quote/XNYS:NVO>). *Novo Nordisk sees intellectual property (IP) rights as a essential precondition for innovation and growth, improved human health and leading to new and better treatment options throughout the world* (<https://www.novonordisk.com/about-novo-nordisk/novo-nordisk-in-brief/positions/Intellectual-property-rights.html>).

Eli Lilly & Co. is the tenth top biotechnology based listed company and worldwide pharmaceutical corporation headquartered in Indianapolis, Indiana, with offices in eighteen countries. Its goods are sold in around one hundred and twenty five countries founded in 1876 with its largest market cap (United States Dollar billions) reached 125.3, market cap in Third Quarter 2018 (United States Dollar billions) is 116.5. The market cap since 2013 was (57.0), 2014 (76.6), 2015 (93.4), 2016 (80.9), 2017 (93.0) (<https://www.nyse.com/quote/XNYS:LLY>). Lilly supports effective and strong protection of IP rights, as well as patent protection for pharmaceutical products (<https://www.lilly.com/who-we-are/key-issues/intellectual-property>).

**Table 1 The top ten biotechnology based companies in the world**

Ranking	Company	Largest Market Cap (United States Dollar billions)	Market Cap in Q3 2018 (United States Dollar billions)	Market Cap in 2017 (United States Dollar billions)	Market Cap in 2016 (United States Dollar billions)	Market Cap in 2015 (United States Dollar billions)	Market Cap in 2014 (United States Dollar billions)	Market Cap in 2013 (United States Dollar billions)	References
1	Johnson & Johnson	397.4	370.6	375.4	314.1	284.2	277.8	258.3	<a href="https://www.nyse.com/quote/XNYS:JNJ">https://www.nyse.com/quote/XNYS:JNJ</a>
2	Pfizer	310.5	262.2	215.9	196.3	199.3	205.4	196.0	<a href="https://www.nyse.com/quote/XNYS:PFE">https://www.nyse.com/quote/XNYS:PFE</a>
3	Roche	263.6	201.4	216.7	192.1	234.7	258.5	240.3	<a href="https://www.six-group.com/exchanges/shares/security_info_en.html?id=CH0012032048CHF4">https://www.six-group.com/exchanges/shares/security_info_en.html?id=CH0012032048CHF4</a>
4	Novartis	275.2	200.8	196.7	170.5	206.1	229.8	195.0	<a href="https://www.nyse.com/quote/XNYS:NVS">https://www.nyse.com/quote/XNYS:NVS</a>
5	AbbVie	196.2	191.0	154.4	100.2	96.8	104.1	83.8	<a href="https://www.nyse.com/quote/XNYS:ABBV">https://www.nyse.com/quote/XNYS:ABBV</a>
6	Merck & Co.	196.2	163.4	153.3	164.3	147.6	166.9	146.5	<a href="https://www.nyse.com/quote/XNYS:MRK">https://www.nyse.com/quote/XNYS:MRK</a>
7	Amgen	143.0	137.2	126.2	108.9	122.5	93.1	78.7	<a href="https://www.nasdaq.com/symbol/amgn">https://www.nasdaq.com/symbol/amgn</a>
8	Abbott Laboratories	129.9	128.6	99.3	56.4	67.0	67.9	59.3	<a href="https://www.nyse.com/quote/XNYS:ABB">https://www.nyse.com/quote/XNYS:ABB</a>
9	Novo Nordisk	159.6	114.5	131.2	92.6	153.9	125.4	19.6	<a href="https://www.nyse.com/quote/XNYS:NVO">https://www.nyse.com/quote/XNYS:NVO</a>

									e/XNYS:NV VO
10	Eli Lilly & Co	125.3	116.5	93.0	80.9	93.4	76.6	57.0	<a href="https://www.nyse.com/quote/XNYS:LLY">https://www.nyse.com/quote/XNYS:LLY</a>

### Intellectual Properties of Biotechnology Company and its Important

According the record, the first monopoly started at five hundred BC; in fact Athenaeus stated that in the “Banquet of the Learned”, quoting Phylarchus, the historian, that if any confectioner of cook in Sybaris, a Greek colony well-known for self-indulgence and luxurious living, invented a excellent and peculiar dish, no other performer was allowed to use it for one year (Reinhold Publishing Corporation, 1964).

The world’s first patent process was created in the early Republic of Venice. The 1<sup>st</sup> actual patent was approved in 1443 to Antonius Marini, who obtainable to build twenty four flour mills for each borough of the city of Venice. The inventor did not allege that his devices were new but did request that no anyone allow to build any mills which operated without water for twenty years (Reinhold Publishing Corporation, 1964).

The 1<sup>st</sup> patent law was dated at 1624 when the Statute of Monopolies passed before the English Parliament. Definitely, this act was really a declaration of the common law in this area. The patent term was only partial to fourteen years (Reinhold Publishing Corporation, 1964).

According Diego and Valter (2010), biotechnology consider the most significant technology field because strong food and health implications. Due to nature of said technology, the biotechnology research cost is huge and need large investments to sustain until reach turnover stage (Diego and Valter, 2010). Consequently, a lot of investors target to safeguard as much as possible to their investments, so that, IP become a very powerful and strong tool to help those investors. In biotechnology field, the patentable inventions involve products such as nucleotide and amino acid sequences, process or methods, microorganisms for modifying said products, use for the medicaments manufacture and etc. To getting a patent, the three main patentability requirements are needed: novelty, industrial application and inventive step.

In the studies of Michael and Kevin (2008), the intellectual property’s ultimate goal is to protect the investment that goes into developing a commercial final product. Due to biotechnology based product often require many year for testing, biotechnology based company possible leverage value from their intellectual property before product reach commercialization stage. Through this way, the start up biotechnology based company able to increase the sustainability of company at the same

moment increase the value of the company. In the table 2 showed that the leveraging of company intellectual properties method's advantages and disadvantages.

**Table 2: The leveraging of company intellectual properties method's advantages and disadvantages (Michael and Kevin, 2008)**

Method	Advantages	Disadvantages
Out-licensing	Is appropriate for early-stage technology Narrows company focus Raises capital	Engenders fear of out-licensing too early Cedes control over reputation and valuation of technology
Cross-licensing	Can allow collaboration Removes blocking patents	Can allow competition Needed giving up exclusive rights
Selling IP or royalties on it	Narrows company focus Raises short-term capital	Requires demonstrable financial return Discounts value of Intellectual Property
Leading secured by	Make use of Intellectual Properties, which may be firm's most valuable asset Raise nondilutive capital	Interest rates received do not generally reflect Intellectual Property value Risks losing Intellectual Property upon default

### Conclusion

This paper discusses the important of intellectual property as safeguard to the company as the same time leveraging the value of the company. And it is needed to emphasis especially the field which requires huge investment especially in biotechnology based company. However, this paper only provided short discussion regard the basic concept while it will be one of the important begin practical references to sustainable the biotechnology industry.

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