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**DEVELOPING INNOVATION AND CREATIVITY FOR BUSINESS
ADVANTAGE**

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Abstract

New and very attractive product for the teeth whitening market, called plasma cleaning has been recently developed by a well-known Swedish industrial gas company “Stockholm Gases”. After 12 months of research completed by the company’s R&D Department and used a budget of £1million the meeting was conducted by the R&D Manager. The main purpose of the meeting was to review the progress of the plasma cleaning project and to make a recommendation to the board whether “Stockholm Gases” should be investing another £10million into this project or not. This report aims to critically analyse the whole innovation process of the plasma cleaning project, to select an appropriate business model, the potential market of this project and specify which products can be produced as a result. The author of this report is an independent consultant employed by “Stockholm Gases”.

Introduction

The main objective of this report is to critically assess and analyse the innovation product for the teeth whitening market, called plasma teeth cleaning as a future potential investment opportunity. This product has been researched and developed by the Swedish company “Stockholm Gases”. It is a well – known industrial gas company, long – term supplier of liquid oxygen to the healthcare industry in Sweden and worldwide. The company also supplies carbon dioxide to the drinks and beverage manufacturers all over the world. Currently “Stockholm Gases” or SG for future reference has around 32,000 employees in more than 70 countries. According to the company’s annual report, the sales last year went up to £12.1billion and the annual budget of the Research and Development department (R&D) being set up at £100million. This figure shows how seriously SG is approaching the company’s research and development activity and for over the previous 80 years there were many successful results produced by this department. Later in this report, the author will be discussing the role and importance of R&D departments within big corporations in a more detailed way. Plasma teeth cleaning project or PTCP for short was amongst 100 other projects currently being running within R&D of “Stockholm Gases”. After 12 months of the PTCP initiation, the meeting was being set up by R&D Manager to discuss the progress of the project and also to ask the members of the panel to come with the recommendation to the board whether PTCP worth an investment or not. The result of the report will be the author’s independent opinion regarding PTCP’s possible future investment which will be highly valued by the members of the panel.

The meaning of innovation concept, critical analysis of innovation as a business need, benefits of innovation to the business and concerning the SG case study

To start an explanation of the meaning of innovation concept let us see first what is the definition of the innovation itself. There are too many definitions of innovation these days, and sometimes this term has been used and mistreated to the point of becoming pointless and ineffective. However, Shaver (2016) argues that one of the best descriptions of innovation was made by Tidd & Bessant (2009) in the book “Managing Innovation: Integrating Technological, Market and Organisational Change”: “...innovation is a process of turning opportunity into new ideas and of putting these into widely used practice”. Tidd & Bessant (2009) not only came up with one of the best definitions of innovation, but they also researched and provided the knowledge to understand innovation together with skills to manage innovation at an organization’s operational and strategic levels. They have looked at innovation from a completely different angle, in the light of its interaction with technological, market and organizational changes.

Another interesting view on the meaning of innovation was given by Greenwald (2014), she describes how innovation should be seen by the businesses and entrepreneurs. This description consists of 4 different points:

- ✓ **Words:** original, unpredicted, never imagined of before, inspired, new.
- ✓ **Reactions:** “Isn’t that smart?”, “What a great idea!”.
- ✓ **Descriptions:** discovering new ways the things have being accomplished in the past, transferring concepts from one industry to another and from one geographical location to the different one.
- ✓ **Strategic principles:** Creating significant points of difference for new products against current alternatives.
 - **Satisfying** unmet customer demands by proposing new ways of accomplishing the targets been set up before.
 - **Opening** new markets for the brands to compete in.
 - **Inviting** and savouring customers to increase their loyalty.

As of the range of innovations, they can be varying from ground-breaking such as nanotechnology or 3D printing to simple ones like adding the fourth ball to a tennis ball can or changing the form and position of the ketchup bottle.

Now, after describing innovation the author will start to define the meaning of the innovation concept. The major tasks of maintaining innovation in big corporations have developed for decades between four components: tactic, formation/methodology, culture, and people. While those four elements remained constant, the concepts and methods of innovation continue to shift, and the way businesses deal with the key issues remains to impact. Lindegaard (2013) names a few key innovation concepts and methodologies, which should be regarded by all businesses and organizations. They are presented on the diagram shown below with more detailed explanation to come afterwards:

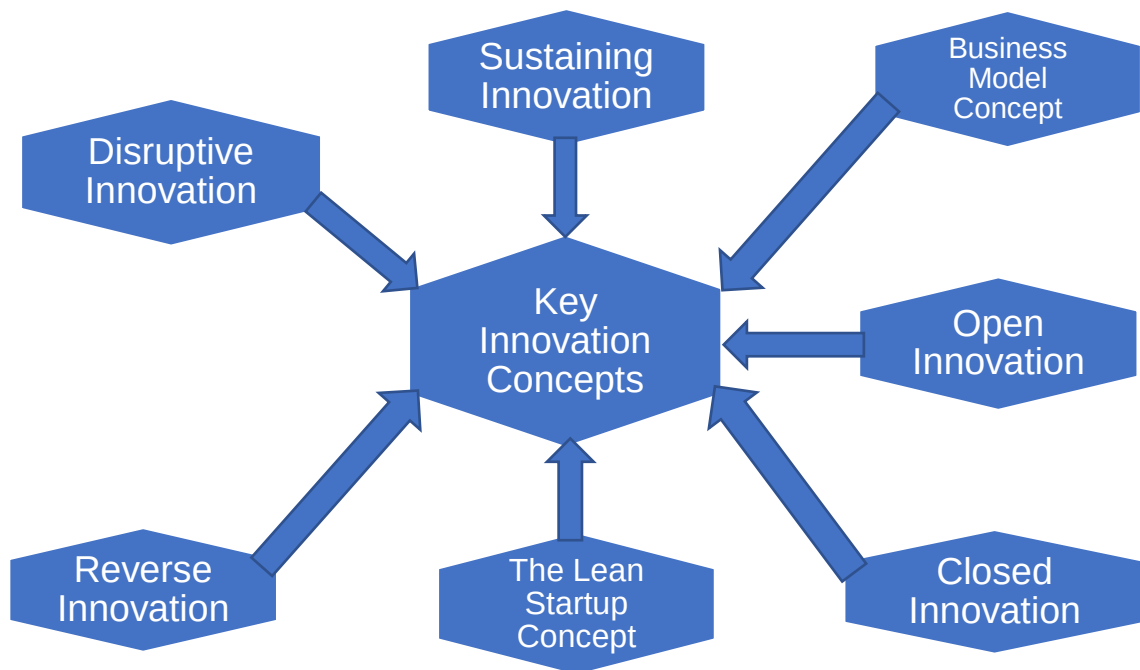


Diagram 1: Key innovation concepts, based on source: (Lindegaard, 2013 & Author's research)

1. *Business model concept*: this model implies largely to the innovation or re-engineering of the business itself. Business model innovation outcomes in a completely diverse kind of organisation, which collaborates not just in the cost proposal of its contributions but also confirm its income plan, assets, and activities to maximise that price proposition, secure new market sectors and undermine rivals.

2. *Open innovation*: the most useful definition for open innovation is to engage internal and external sources, firstly established by Peter F. Drucker in 1985. Then it is imperative to take full advantage of those opportunities to act towards a successful and productive innovation process. A more detailed description of those sources is given in the table presented below:

<i>External Sources</i>	<i>Internal Sources</i>
1. <i>The Demographic Situation</i> : Businesses are influenced by demographic shifts, it's the fact. These innovations influence the markets as they decide the need for products, who buys these things, and how much of the commodity they purchase. The demographic trends in age, employment, and work opportunities affect the company's business route and can open new possibilities for the company if it can properly identify the chance.	1. <i>The Unforeseen</i> : business environment is packed of surprises. Not only the unforeseen defeats but also the shocking success that comes to the company can be a great source of inspiration for creativity. All, unexpected success, and unexpected setbacks, should not remain unnoticed and as opportunities for progress should not be ignored. Unforeseen circumstances can be very effective in the business world because they encourage leaders and innovators to take a specific view of the

	situation (positive or negative) and explore the opportunities that occur.
2. <i>The Changes in the World View:</i> Over the years, there has been a huge change in the way people experience the world. Viewing the environment changes over time, and because of the advancement of technology and the prevalence of social networks, these changes happen quicker than ever. Consumers may change their views about a product, brand, or industry instantly. To keep up with new consumer trends and choices, this will maintain innovation activity within the company.	2. <i>The Contradiction:</i> Most companies plunge into the ploy of designing a brand without doing the right research to determine what the targeted customers are looking for. The discrepancy between what it is and what it is supposed to be or what it is and what everyone else thinks may cause the business to fail, but it may also be a great source of creative inspiration. Customer reviews and comments are often the best way of identifying apparent contradictions.
3. <i>The New Knowledge:</i> New knowledge is often used as a synonym for creativity. Technological and scientific advances are the foundation of innovation that cannot be overlooked by companies. Organizations that refuse to adjust to changes driven by discoveries are destined to fail. Innovative technologies can be introduced in all areas of the business — from learning more about customers to analytics, managing the chain of suppliers, and hiring the finest workers.	3. <i>The Change of the Work Process:</i> Drucker (2015) suggests that rather than the situation, this type of innovation is more focused on the task. Here the room for innovation is based on scrutinising the processes of the company and identifying the weak spots and ways to improve them. After a thorough analysis of the organisation's strengths, the teams will create more innovative solutions to identify the weakest links.
	4. <i>The Structural Change Within the Industry or the Market:</i> Industry and market systems can maintain stability for years, but with rapid technological growth, many industries can be disrupted almost overnight.

Table 1: External and internal sources of open innovation, based on source: (Drucker, 2015 & Author's research)

3. *Closed innovation:* Closed innovation is the opposite of open innovation, and the organisation retains its originality and creativity. In the opinion of the authors, Apple uses a combination of open and closed innovation. An example of closed innovation is when they (Apple) develop a new iPhone and until the phone is officially launched, nothing is published about it, all the R&D activity is kept in absolute secrecy. But when it comes to solving some specific issues and collaborating with other people and businesses, it is when Apple starts using open innovation fragments. Another example of closed innovation is the engagement of the military. Most of the research operation in the defence sector begins as closed innovation, but some of its developments later become widely used throughout the industrialised world, such as high-frequency microchips, originally developed in collaboration with NASA(The National Aeronautics

and Space Administration) and DARPA(The Defence Advanced Research Projects Agency).

4. *The lean startup concept*: Ries (2011), a key think-tank on lean startup methodology, argues that it is the new approach to the way exactly how new products are constructed and introduced. His primary focus was on start-ups, but he is undoubtedly right to maintain this for big companies too. Some of the key ideas behind the methodology: fail quickly–fail cheaply. In the book called “The New Lean Startup: How Constant Innovation Creates Radically Successful Businesses “, published in 2011 Eric Ries is giving the answer to this question: "Can we build a sustainable business around this set of products and services?". Create a minimum feasible product to start the educational procedure as fast as possible.

5. *Reverse innovation*: The “reverse innovation concept” was firstly introduced by Vijay Govindarajan. He is a Professor of International Business at the Tuck School of Business and founding director of Tuck’s Centre for Global Leadership. Lindegaard (2013) states that this is a fascinating concept that helps us understand what it means in the place of emerging markets to open a world of business opportunities, rather than scaling down rich world produce. This type of innovation starts in developing countries and then finds its way into the industrialised world. Many companies are starting to create and then distribute new goods worldwide after their first introduction in evolving economies such as China, Mexico, or India.

Here the most interesting cases of reverse innovation:

- *Tata Motors – Tata Nano*: while corporations like Ford have set up their global car platform in India to cover niche luxury markets in India, Tata launched Tata Nano in 2009 to satisfy India's price-sensitive customer. After success in India Tata plans to unveil Tata Nano in Europe and the US later too.
- *GE – GE MAC 800*: GE's work on the GE MAC 400 to create a portable low-cost ECG system for people in rural communities who are unable to manage to pay for high-priced health care was released as an advanced version later in 2009, in the U.S. as MAC 800.
- *Procter and Gamble (P&G) – Vicks Honey Cough – Honey-based cold medication*: Honey-based cold remedy created in Mexico by P&G (Vicks Honey Cough) found success in the European and U.S. markets.
- *Vodafone – Zoozoos*: Vodafone, which works in over 30 countries, plans to internationalise its cute characters–Zoozoos. Zoozoos, the animated creatures of black and white, and they are quite a trend in India. Over there Zoozoos were unveiled in advertising ads, they looked like aliens and spoke an alien language. But for consumers across all age groups, the product message is very simple. Vodafone has also licenced retail merchandise characters (and accessories) throughout India.

6. *Disruptive innovation*: Christensen (2015) was the first to bring a larger business audience to the definition of disruptive innovation. His revolutionary technology ideas and theories are still relevant and useful these days. The author, however, is wondering how this is affected by the increasing speed of change and globalisation. Now the author will have a more detailed view of disruptive innovation. First, a quick

overview of the idea. According to Christensen (2015), "Disruption" defines a process that allows a smaller company with less resources to contest current dominant corporations successfully. In general, when most of the well-established businesses focus on enhancing their goods and services for their most challenging (and typically most rewarding) customers they satisfy certain markets' needs and disregard the other ones. Competitors from other business establishments that show to be disruptive begin by targeting those ignored segments of the market effectively, gaining traction by providing more desirable functionality — often at a lower price. Competitors in this case tend not to respond aggressively, seeking higher profitability in more challenging segments. The diagram shown below gives an idea of how the disruptive innovation relates to sustaining one:

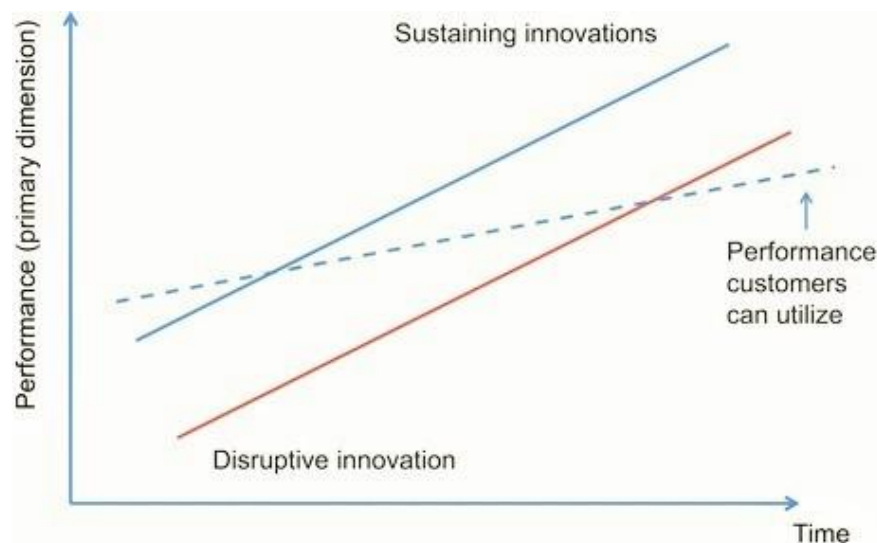


Diagram 2: *Disruptive innovation theory and its relation to sustaining innovations,*
based on source: (Springer link, 2019)

7. **Sustaining innovation:** Sustaining innovation aims to improve existing products as opposed to disruptive innovation. It is not forming new markets or concepts but expanding existing ones. That is the main difference between disruptive and sustaining innovation and the diagram shown above clearly explains it. All of these would aim to pursue both change and progress to achieve cutting-edge technology within an organisation while building a long-lasting market advantage. Disruptive innovation and sustaining innovation need not be alternatives to each other, but somewhat balancing steps.

The breakthrough in teeth whitening plasma can be viewed as a *disruptive innovation* in the case of Stockholm Gases, as there are already a few known products that can offer similar results when used. It would be difficult for SG to enter the teeth whitening market or any related markets, as existing multinational corporations such as Colgate-Palmolive, GlaxoSmithKline, Johnson & Johnson, Procter & Gamble, and Unilever are already there. They offer teeth whitening products such as regular toothpaste with some additives "designed" to whiten the teeth, anti-caries toothpaste, toothpaste for children, multi-benefit toothpaste, toothpaste for tartar control and others. Therefore, it would be very difficult to convince potential Stockholm Gas customers that teeth

whitening plasma would be as safe to use as toothpaste and more powerful without harmful side-effects. The likely reaction of existing brand owners would be as follows:

- To produce plasma for their consumer upgrades, they would increase their R&D activities.
- They will be trying to offer SG co-branding.
- They will insist that the safety issue of using plasma as a whitening agent needs to be investigated more thoroughly.

A more detailed description of the innovation model more suitable in the SG case study will be given later in the course of this essay.

The next critical question is to answer now is: why businesses need innovation? To answer this question, the author completed relevant research and one of the best replies was the one supplied by Wright (2018): “If you are not innovating, then you’re not growing. Growth is crucial for any start-up but also businesses in general. Businesses need innovation to ensure competitive advantages”. Wright (2018) also gave a detailed description of the five main reasons why innovation is needed by businesses. They are all shown on the diagram displayed below and more details of each reason will be provided afterward:



Diagram 3: 5 reasons why businesses need innovation, based on source: (Wright, 2018)

Now let us see those five reasons explained in a more detailed way:

1. **Growth:** Businesses that continuously innovate do have an ability to expand their production and that will require the additional workforce to be added to the company. Even big multinational corporations these days are maintaining their capacity to innovate to stay within the top ranks of world businesses.
2. **Stand out of the crowd:** It does not matter what type of services your business is offering, there are always will be another business doing the same. This is the

reality of the modern environment. Here comes innovation to help you to be more visible on the competitor's market and stand out of the crowd. Also getting ahead of the competitors will make any business more attractive to potential investors.

3. **Meet customer's needs:** When businesses are constantly investing in long – term innovations, then they will be capable to offer their customers something new and never seen before. Every so often this “something new” will be responding to changed or altered customer needs and tastes, thanks to thorough marketing, research and developing activities within the company. As a result, more new customers will be attracted, and the existing ones will be happier and more loyal to the company.
4. **Attract the best talent:** Inviting and encouraging innovative people to work for the company can only be possible if this company will be accepting innovative values. Having long -term, well – established a history of innovation is another requirement for any business willing to attract an innovative workforce.
5. **Improve employee relations:** People will feel more appreciated and motivated when people work in an environment where creativity is an ongoing process. Their perspective on innovative strategies in all business sectors, including product development and marketing, would help to run the company more smoothly and efficiently.

After detailed analysis of businesses need for innovation the author will identify the benefits which innovation brings to the businesses. It was summarised in the diagram shown below with more detailed explanation to follow.



Diagram 4: 5 benefits of innovation to the business, based on sources: (BDC, 2019 & Startupr Hong Kong Limited, 2018)

Here is a more detailed description of each benefit, researched by the author:

1. **Improving sales and customer relationships:** According to BDC (2019) if your business is not upgrading its products and services, it can put you at risk

of failing customers to more innovative rivals. When you invest some time and money in innovation it will be noticed by the customers and appreciated. That also will affect your level of sales. To use this benefit if full, the first step will be arranging regular customer surveys to identify potential products upgrades. The second step would be setting up an innovation team within the company to research and develop those upgrades.

2. **Reducing waste and costs:** BDC (2019) states that businesses with constantly ongoing innovation activities are always looking for solutions on how to minimise or eliminate waste completely. They are implementing operational efficiency changes, such as decreasing machinery and workforce inactive time, modernizing order processing or improving their logistic chains of supply.
3. **Problems solved quicker and easily:** Some problems arising during the existence of any business will be requiring creative answers to solve them. Some problems cannot be solved by standard solutions and that is why they always there. To remove those problems out of the way for good innovative thinking is required.
4. **Increased productivity:** When the business starts to lose productivity, the new smart way of continuing the business will have to be found. To do so, creative thinking must be applied, together with the innovation, because they are linked together very strongly. Tuvey (2019) states that although creativity and innovation are relying on each other and can be easily confused, there are some significant differences between them. Creativity is a form of expression or the way of sorting problems out. Creativity also supplies ideas which later could be potentially leading to the starting of the innovation process. As the process, the innovation needs stability and establishment, it is more time-consuming and requires long-term investments. Regarding the increase in productivity, both, creativity, and innovation can be successfully exploited. Starting with encouraging of creativity amongst the company's workforce, then later selecting the best ideas and using them in researching and developing process, and that is when the innovation will start taking the place. Result-increased productivity, positive feedback from employees and satisfied customers.
5. **Success on the market:** To stand out from the crowd, the business must have a unique character. Once that business character has been developed, it should be put on the market. In this case, an innovated marketing plan will be outlining business personality and helping to stay ahead of other competitors.

Critical analysis of Michael Glass's involvement in the case study project as the R&D project leader

First, Michael Glass, the leader of the R&D team, gave a brief overview of the project itself. As we all know, matter can be viewed as solid, liquid, gas or the fourth form,

plasma, one of the universe's most common. Plasma is an ionised gas that can conduct electricity and consume energy from the source. As gas absorbs electrical energy, it raises its temperature, causing the ions to vibrate faster and the surface to "scrub." The plasma has been used for several years to clean surfaces, such as cleaning a wafer layer before bonding metal. This would completely remove all the residue and reinforce the bond adhesion, extending the device's life. Most of the artificial plasmas that have been produced have been very warm, even hot in the past years, but recent scientific work and developments have made it possible to produce much cooler artificial plasmas. One of those breakthroughs was the patent submitted by the University of Southern California (USC) alleging that researchers at the USC were seeking and using artificial plasma to sterilise teeth, and one of the side effects of this use was teeth whitening. That is when the R&D department from Swedish Gases began to explore the idea of using artificial plasma for teeth whitening and cleaning. They tested the product on the teeth of the pig, the human's teeth next available substitute. After being exposed to the plasma, slides presented by Michael Glass revealed some dramatic changes in teeth colour. Discoloured yellow teeth changed to the white shade noticeably. That was indeed the sign of success.

Michael Glass, the project leader of the R&D department, had many roles and duties to fulfil. He reported directly to the R&D Manager. He had to organise the entire Plasma Cleaning Project (PCP) from start to finish. Listed below are some of Michael Glass's other roles and duties as project leader for R&D department:

- ✓ Manage PCP's routine operating aspects.
- ✓ Establish a successful project plan, meeting deadlines, budget, scope, shareholders, and customer expectations.
- ✓ Ensure that the resources needed to complete the PCP are available on time and within the budget of £ 1million.
- ✓ Coordinate and organise the development team to meet project objectives.
- ✓ Supporting the project team and building a working environment that allows everyone to perform at their best.
- ✓ Monitor and track project progress regularly.
- ✓ Manage project design shifts, adjust and, if necessary, provide alternative solutions.
- ✓ Identify project risks and manage them.
- ✓ Assess results.

In the opinion of the author, during the work on the PTCP, Michael successfully completed his tasks and duties. This is because Michael has already had relevant experience as the manager of the R&D project, strong leadership skills and ability to collaborate with senior management as well as project team members, plus he can see a view of the entire project as well as appreciate the technological, regulatory and other project objectives. He also demonstrated expert skills in project management and planning, particularly in realistic assumptions, scheduling, and risk management. The author wants to highlight the personal strengths of Michael, such as good communication and interpersonal skills, solid IT skills, and the ability to work in a multicultural and divert environment.

Critical analysis, and comparison of open and closed models of innovation and selection of the most suitable model for SG case study project

As the author mentioned earlier in this article, open and closed innovation models are one of the seven key innovation concepts. The author will examine and compare these two innovation models in this section of the essay and choose the most appropriate model for the Stockholm Gases case study. According to Zapfl (2018), how innovation is produced defines the key distinction between open innovation and closed innovation. While a closed innovation is created in autonomous business environment, open innovation combines external information into the process of innovation. Presented below table gives an idea how different open and closed innovations are by comparing their key points and principles:

<i>The key points and principles</i>	<i>Open innovation</i>	<i>Closed innovation</i>
1. Place of innovation.	Outside and within the company.	Inside the company.
2. Company's philosophical approach to the innovation.	The best from all over the world.	We will and we are going to do it.
3. Sources of innovation.	Internal and external.	Internal only.
4. Customer's role.	Active co-innovators.	Inert recipients.
5. Employees mobility.	High to medium.	Low.
6. Persons involved in innovation process.	Bright minds will be deployed from within and outside the organisation.	All highly qualified staff such as researchers and developers must work for the company.
7. The role of R&D department.	Innovation can come from external R&D departments it can create significant value, but to assess and capture this value, internal R&D is still required.	It is only possible to accept in-house inventions. It is also necessary to complete design, development, and marketing within the company.
8. Intellectual property.	There is no need to build an invention to make a profit from it. The company can acquire intellectual property from third parties.	The company will keep its know-how safe and confidential. To prevent infringement of inventions by other entrants, patents, copyrights, and intellectual property protection will be required.

Table 2: *The key points and principles of open and closed innovation, based on source: (Zapfl, 2018 & Author's research)*

According to the author, the most suitable innovation model for PTCP in the case of SG would be closed innovation combined with disruptive innovation. The main reasons being: even though the R&D department used the external idea coming from a patent submitted by the University of Southern California (USC), they (R&D) didn't invite any other R&D teams from outside to work on this project. All the research and

developing work was solely done by Michael Glass, the R&D project leader, and his team. The other reason for combination with disruptive innovation is that invention is entering the already established market of teeth whitening and cleaning products, as the author mentioned earlier in this essay.

Zapfl (2018) notes that three key factors should be considered by any organisation selecting the open or closed process of innovation:

1. Complex innovation: When innovations are closely linked, open innovation will bring some risks: it could include improper elements that affect the process of innovation itself or even harm the whole product range. In case of SG there are no close links to similar innovations, however there are similar products on the same market where SG is trying to enter. Obvious case of disruptive innovation.

2. Unique innovation: Closed innovation is generally favored when innovation produces major technological improvements that offer an unquestionable advantage to the business over its competitors. This is exactly what PTCP is about: inventing not just a new teeth whitening and product, but the whole new technology by using artificial low- temperature plasma. That can also lead to the opening of a new submarket for teeth whitening and cleaning products if the PTCP will go ahead and receive further funding.

3. High competition: Closed innovation is generally better suited to maximising the company's benefits in highly competitive industries. In the case of PTCP, it will give the company a huge boost in the market they trying to enter, because all the researching and developing activity was kept secret and confidential.

Completing recommendation to the board regarding potential investment in SG case study project

In this part of an essay, the author will be making a recommendation to the board whether SG should be investing another £10million in the plasma teeth cleaning project (PTCP) or not. After a thorough analysis of all the circumstances of the case given and all the information provided by the members of the panel including Michael Glass, the author would not recommend further investment in the PTCP.

There are a few big factors of risk to be considered before commencing further investment:

1. While Michael Glass presented a very convincing report on the project's progress, there is still a lack of sufficient information and evidence on the main topic: the question of health and safety. Is the use of plasma safe for human use even at low temperatures? It will require additional testing which could be very expensive and time-consuming. Another significant initiative could be additional public education spending on the safe use of plasma teeth whitening products and its advantages compared to similar non-plasma products on the market.

2. The second important factor not thoroughly discussed in the case study and the report by Michael: how will SG's main competitors including Colgate-Palmolive, GlaxoSmithKline, Johnson & Johnson, etc. respond when Stockholm Gases would reveal the plasma teeth whitening product? As a result, they could accelerate their

R&D efforts, inject them (R&D) with additional funding, and bypass SG by miles. The PTCP could be delayed or cancelled in this situation.

In the opinion of the author, this project would need to be investigated and worked on more extensively, especially on the two risk factors listed above. Therefore, instead of spending £ 10million, perhaps another £ 0.5million expenditure in R&D operation would be a much better solution in this case study within a 6-month timeframe.

Conclusion

In this article, the author sought to examine and explore the nature of innovation, principles of innovation, and advantages of business innovation. All the study and review were focused on the use of the relevant literature and correctly cited, as well as online resources and in-class studies. He also identified and compared open and closed innovation models and suggested one of them to be used in the case study related to the development of the latest teeth whitening product in Stockholm Gases. The author reviewed the findings of the R&D team in Stockholm Gases and made his own recommendation to the board on the possible future investment of £ 10million in the above-listed product. In the opinion of the author, making such an investment would now be too risky. Instead, with a 6-month deadline to reach, he proposed a further £ 0.5 million investment in R&D activity in the PTCP case. The author hopes that this essay will enable the Stockholm Gases board to make the final decision on the £ 10million investment in new teeth whitening product.

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