The success factors for successful skunk works

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Abstract

Over the decades, the market competition is becoming stronger and stronger; Innovation is generally considered as one of the main drivers of growth in business field, skunk works as a form of innovation has been widely used for companies to make their business outstanding from the others and achieve sustainable development, and at the same time try to compete with the increasing number of competitors. However, due to statistics, the failure rate of skunk works projects is so high, which means it contents high risks and uncertainties. As a result, it is quite important to identify some success factors for successful skunk works.

In order to find the answer, Losec case had been used as a single case study in this thesis, consequently, team leader and leadership, team member and team working, management support, timing and manage change, opportunities and luck had been identified as important factors that will lead skunk works project to success.

Also, a framework of successful skunk works flower had been discussed in managerial implementation. Mangers can try to find a balance between the successful factors in order to achieve successful skunk works.

*Key words: skunk works, successful factors, leadership, teamwork, motivation.*
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1. Introduction

1.1 Backgrounds

Nowadays, organizations and companies are developing rapidly in global and dynamic markets. In the strong competition, companies are under the control of economy, society, business, technology and other aspects of environment. It is very important for companies to make their business outstanding from the others and achieve sustainable development in the future, and at the same time try to compete with the increasing number of competitors. With this background, innovation is one of the main drivers of a firm’s competitive advantage as well as the main source of economic growth for companies in today’s competitive world (Fosfuri & Rønde, 2009). One of the most well known organizational innovation activities that cover a wide range of innovation entities is skunk works (Brown, 2004).

Skunk works generally refers to some innovative activities, which are secretly done without any bureaucracy and out of the organizations/companies main structure under the management of a talented team leader. Skunk works has become one of the most well known organizational innovations and R&D programs to emerge in recent years (Brown, 2004). Now, as more companies are suffering the strong competition, in order to “hide” their ideas and products from competitors, many are moving away from giant research centers and towards building something like a lean startup inside their companies. Others have the luxury of a different model, where secretive labs work on projects that may never see the light of day. (Max Nisen, 2013). Lots of famous companies and brands are using skunk works and build up secret lab such as Google X, Boeing Phantom Works, Amazon's Lab126 and A9, Apple design lab and Nike's Innovation Kitchen. Although its process or arguments are usually hidden from the public, it’s still possible to explore skunk works and its outcomes for successful innovations. Besides, skunk works projects also usually provide the opportunities to large-scaled technology companies in order to compete on a level at where they play against smaller competitors (Gwynne, 1997). The successful results of skunk works usually make a radical change and contribution to its field this is why it remains as one beneficial way to reach successful innovations. Thus, it is very important and
valuable for companies to handle a successful skunk work projects in order to find a better position in the market.

1.2 Problem discussion

As today’s businesses are under the trend of moving to a more dynamic environment, being innovative has become increasingly important and a key factor to succeed. Being innovative is not only to gain competitive advantage but also to survive (Brown, 2004). In this situation, lots of companies choose skunk works projects as a way out. However, “there is no guarantee of success for skunk works”, because of high risks and uncertainties are always around. In another word, the failure rate of skunk works project is high.

The final aim and function of skunk works projects is to speed up the innovation process and create new products for the company/industry. During the process, the company will take more risks and uncertainties than normal innovation projects due to the characteristics of skunk works projects. Skunk works projects usually contain high level of risks and uncertainties in each stage of innovation process as the projects are aiming to create totally new products or services that do not exist in the market or the filed or even in the world. And this is also one of the reasons why the failure rates of skunk works projects are so high. Another reason that can explain why the failure rates of skunk works are higher is the projects are usually under limited financial sources or time.

According to an estimate by one consultant, more Fortune 200 companies have skunk works staffed by individuals seconded from other departments and kept on for simple projects than have advanced technology groups” (Gwynne, 1997), however, we cannot always hear about good news from skunk works project as most of them are failed without telling the world. In another word, most of the skunk works cases described in literature is successful, because the failure ones will never known publicly. Perhaps one of the reasons that it is hard to find “bad” example of skunk works is because non-successful skunk works remain in the dark memory of the lonely project manager instead of public it. In addition, due to the fact that skunk works projects are most done under the table, if there is no positive result, managers
will not share it with the public as well. Some companies such as Schuller International finally gave up skunk works projects after several failure cases while the successful labs mentioned before (Google, Apple Nike etc.) earns billions of dollars every year just because of successful skunk works. Not all the companies own enough lucky and have the ability to afford successful skunk works projects. However, even though the failure rate of skunk work is so high, companies are willing and eager to take it as a tool to help them to take a part in the market competition.

As a result, considering the benefit and risks that might bring by skunk works projects, the questions could be: “what are the key successful factors for skunk works” and “what can managers do in order to get better results of skunk works projects”. What’s more, there are limited researches shown related to skunk works, which pinpoint the area as in need of more research.

1.3 Research Purpose
As skunk works is applied by lots of companies in the modern business environment, it is important to find factors that provide higher chance for success. Skunk works has attracted a lot of attention from the management level and has been implemented by many large technology firms (Fosfuri & Rønde, 2009). It shows that successful skunk works projects bring lots of benefits to companies, such as Apple’s Mac and IBM’s notebook. However, from statistics we can see that the failure rate of skunk works projects is higher than normal innovation projects. In order to lower the risk and uncertainties of skunk works projects, it is necessary to identify some elements and conditions which could lead skunk works to success. As a result, the purpose of this thesis is to find the most prominent success factors of skunk works projects and provide managers a solution on how to increase the chance to succeed.

1.4 Research Question
- What are the success factors of skunk works projects?
2. Literature review

2.1 what is skunk works

Single and Spurgeon (1996) declared that innovation process are characterized by having two main phases that are creation and commercialization. As a main type of innovation, these two phases are usually involved in skunk works projects. Moreover, the end product of successful skunk works projects should be commercialized. According to Gwynne (1997), the ultimate purpose of a skunk works is to produce real-world competitive advantages to the company, which means that the end products of skunk works projects should be commercialized and could create competitive advantages to the organization. Spurgeon (1996) also clarify that skunk works is a method of managing the innovation process. In Holt (1992)’s opinion, innovation could be identified as transformation of creative and useful ideas. In another way, creativity is the prerequisite to the innovation process. Thus, skunk works is always highly innovative project, which means skunk works is an important part within innovation process. These also provide people a better understanding of how innovation process work on skunk works projects. Again, as mentioned before, skunk works is a famous tool for organizations to use to fight in the innovative market. Even thought it is dangerous, it is still attractive to many organizations. However, it is still a question on “what is skunk works”.

Even though the original story of skunk works can be found in defense industry, which firstly applied by Lockheed Martin in US during the Second World War, it is a general term to define some innovative activities nowadays. A skunk works project presently means special teams of passionate intrapreneurs, who are isolated from the rest of their business, given resources and relatively free reign to innovate and develop (Brown, 2004). In addition, most of them had been done secretly or under table. It is found that there is limited information and material published for skunk works because companies hid most of the practical applications of skunk works as secrets, which brings difficulties for research in the field. Due to this limitation, there is no clear or exact definition of skunk works so far.
The following table shows several different definitions of skunk works presented by researchers before.

Table 1. Different opinions about Skunk Works
Adaptation from Estevez and Yunicheva (2012)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Definition of Skunk works</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single and Spurgeon (1996)</td>
<td>“Method of managing the innovation process, characterized by extremely efficient use of time by a small group of creative engineers”</td>
</tr>
</tbody>
</table>
| Gwynne (1997)                    | “Provide large technology companies with the opportunity to compete on a level playing field against smaller competitors. But they require careful preparation if they are to pay off”.  
                                   | “Small groups of scientists, engineers and other personnel who tackle specific problems and try to commercialize the solutions”                                                                                           |
                                   | “Today,….., the concept of the Skunk works is spreading rapidly to technology-based corporations concerned about the slowing pace of innovation”                                                                       |
| Technological dictionary, Whatis.com, 2009 | “… a group of people who, in order to achieve unusual results, work on a project in a way that is outside the usual rules. A Skunk work is often a small team that assumes or is given responsibility for developing something in a short time with minimal management constraints. Typically, a Skunk work has a small number of members to reduce communications overhead. A Skunk work is sometimes used to spearhead a product design that therefore will be developed according to the usual process. A Skunk work project may be a secret” |
| Brown (2004)                     | “A true Skunk works is an isolated and highly skilled team designed to accelerate the research, but especially the development of innovative product/ services. The team typically works outside the bounds of the parent’s rules and regulations and under time pressure” |
| Bwired (2009)                    | “A term widely used to describe a team that have a high degree of autonomy, little bureaucracy and work on specific projects”                                                                                           |
Even though it can be seen that the definitions of skunk works presented by the authors are different from each author, there are still some common points and key words between these definitions such as small group of people, innovation, specific aim and high skilled people.

Thus, to be concluding, the working definition of skunk works for this thesis is:
A small group of skillful people who work for specific innovation project but separates from original organization and in most of the situation, hidden from original organization. This group of people are leading and sharing the same mission and goal with high level of corporation.

### 2.2 Types of Skunk Works

There are also different types of skunk works, according to the skunk works matrix, presented by Brown (2004), types of skunk works can be differentiates based on different level of secrecy and management support. In this way, Brown (2004) defines skunk works into four different types; pseudo, emergent and transitional skunk works.
“True Skunk works” is a special limited group of people with a high level of skills, and these groups of people are separated from company’s main organization with the focus of developing innovative products or services. However, the “true Skunk works” nowadays are mostly limited and belong to military and government projects with limited access to information. As a result, most “true Skunk works” are fully supported from top management as they can benefit and get success through skunk works (Brown, 2004).

“Pseudo skunk works” mostly exists in corporate projects, which are known “throughout an organization as causing some of its dysfunctions and problems” (Brown, 2004).

“Emergent Skunk works” usually starts from small and secret projects, without permission and support by top management. According to Brown (2004), if a project can reach some success and be proved, it can be approved by the managers and stop being under the table. After that, the project will switch to other types of skunk works.

“Transitional Skunk works” is considered as public and high level of management support. The direct influence on “transitional Skunk works” usually comes from top management team, who able to decide the future of the project. For example, the
project could be continued and moved to “pseudo-Skunk works”; or in case of rejection of the project, it can be moved to “emergent Skunk works” and become “more secretly and more unofficially than previously” (Brown, 2004).

Table 3. Expanded Model of Brown’s Types of Skunk Works

<table>
<thead>
<tr>
<th></th>
<th>Non-Supported</th>
<th>Emergent</th>
<th>Mandated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-Supported skunk works</td>
<td>Emergent skunk works</td>
<td>True skunks works</td>
</tr>
<tr>
<td>Non-Supported</td>
<td>N/A</td>
<td>Plastic skunk work</td>
<td>Plastic skunk work</td>
</tr>
<tr>
<td>Emergent</td>
<td>Plastic skunk work</td>
<td>Plastic skunk work</td>
<td>Plastic skunk work</td>
</tr>
<tr>
<td>Mandated</td>
<td>Plastic skunk work</td>
<td>Plastic skunk work</td>
<td>Plastic skunk work</td>
</tr>
</tbody>
</table>

Brown (2004)’s model is questionable while combining the definition of skunk works. The new item might rise as “Non-supported Skunk works” which means a small group of people start small and secret projects without permission and support by top management while they keep working on a project for a product or service innovation. In this type of skunk works, people usually do not get any moral or resource based support from management side, however, they keep their willingness to contribute to existing innovation projects. Unfortunately, there is no innovation type that is neither available for public nor supported by management; thus that column on the first left side was marked as “N/A”.

What’s more, during the development and process of skunk works, the type of skunk works can switch between each other. The real world cases are far more complicated than the model; there are too many factors that will make influences on type of skunk works. One of the reasons is skunk works projects usually contains high risks and uncertainties, which means that secrecy and management support might easily change when outside or inside environment change. As time passes by, other factors and elements influenced skunk work may change as well (which will be discussed later).
Also, the studies and cases show that skunk works projects are so special that each of them is different based on different industries, companies or projects. As a result, it is considered that there is no clear boundary between the five types of skunk works, when detail conditions change, the type of skunk works will change as well.

2.3 Differences between skunk works projects and normal innovation projects

The main characteristics of skunk works projects could be distinguish from normal innovation projects by form of the team, performance, management support, timing, level of risk taking and so on. There are similar characteristics between skunk works projects and normal innovation projects for sure. However, there are still lots of difference exit in between. The creation of skunk works projects is usually simple, a company or an industry needs something new and involved innovation in order to change current situation. Skunk works projects accelerate innovation process with a highly motivated team, which also hidden from an organization’s main facility. One of the aims to do so is to get rid of main management level and keep all the information as secret as possible. Thus, this is the reason why skunk works projects are different from normal innovation projects, in many situation, skunk works projects usually fail to get support by management level of the organization, because the projects contain high risk or just because the idea is too innovative. Thus, skunk works projects sometimes have to locate outside the main organizations and the projects are secret for the outsiders. As mentioned before, according to Single and Spurgeon (1996), there are two stages of innovation process: creation and commercialization. This is also one of the differences as skunk works projects have this different innovation process approach than normal innovation projects. Table 4 shows the differences between skunk works projects and normal innovation projects.
### Table 4. Differences Between Skunk Works Projects and Normal Innovation Projects

<table>
<thead>
<tr>
<th></th>
<th>Skunk works project</th>
<th>Normal innovation project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group scale</strong></td>
<td>Small group and talent people</td>
<td>Not limited by number of involved people</td>
</tr>
<tr>
<td><strong>Secrecy</strong></td>
<td>High level of secrecy that only team member knows about</td>
<td>All people in the organization might knows about</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>Goal orientation</td>
<td>Mission orientation or other orientation</td>
</tr>
<tr>
<td><strong>Team leader</strong></td>
<td>High level requirements of talent, personality and risk taking</td>
<td>Could be normal person</td>
</tr>
<tr>
<td><strong>Management support</strong></td>
<td>Depends, some skunk works projects do not have</td>
<td>Indispensable</td>
</tr>
<tr>
<td><strong>Risks and uncertainties</strong></td>
<td>Very high</td>
<td>Depends</td>
</tr>
</tbody>
</table>

#### 2.4 Characteristics of successful skunk works

According to previous studies done by Rich (1994), Single and Spurgeon (1996), Gwynne (1997), and Brown (2004), there are several main characteristics, which might lead to successful skunk works. Combining the differences between skunk works projects and normal innovation projects, the following elements could be conclude as characteristics of successful skunk works.

**Team leader**

One of the key factors of Skunk works is leadership (Gwynne, 1997; Rich, 1994). A team must have a strong opinion leader (Gwynne, 1997), who will be able to see the whole situation without focusing too much on details, and be the ultimate decision-maker with the ability to delegate both authority and responsibility (Rich, 1994). Moreover, the leader must be charismatic, and have an ability easily inform and give people vision, goals and objectives. Both the leader and a team must think in long-run perspective and be able to look ahead (Single & Spurgeon, 1996). Furthermore, the
leader must also be able to create a special environment of trust and “informal processes with close personal interaction” (Brown, 2004).

**Team member**
The leader must choose correct team member as the fact that the further result is fully depends on the team performance and its leader. According to Single & Spurgeon (1996) and Brown (2004), it is necessary to find “the right people and give them complete freedom from bureaucracy”. Team members must also be highly qualified and experienced. According to Single and Spurgeon (1996) and Gwynne (1997), it is also very important to have right people with right skills, knowledge and personal qualities (Single & Spurgeon, 1996). Gwynne (1997) also mentioned that a research from American Express found 85% of the unsuccessful skunk works projects had the same problem with involving wrong people in the project. What’s more, communication between different members and leader also plays important role in successful skunk works (Single & Spurgeon, 1996).

**Secretary**
The Skunk works team must be separated from the parent organization. It is mostly a win-win situation, due to the fact that both the parent company and small organization can have its own goals and work separately without intersection with each other (Rich, 1994). In this way, people who are working in skunk work project can be more concentrate on the project.

**Management support**
Strong support and encouragement from high-level management makes the innovation process easier, which also reduces risks in the projects in many cases. Thus, similar to normal innovation projects, management support is another factors cannot be neglected, which will influences the result of successful skunk works projects. Gwynne (1997) presented as “ in today’s world top management often takes an active role in setting up skunk works teams”. Brown (2004) declares that management might be attracted due to the successful results of skunk works projects in other industries and that might trigger them to create skunk works teams. With the support of top management, more resources such as human resource as well as financial support can get for skunk work projects.
Timing

Single & Spurgeon (1996) presented that an efficient and effective innovation process is the most valuable product of skunk works. Rich (1994) also raised the opinion of “time is money” for skunk works projects. Create great value in limited time is an important competitive advantage for skunk works projects.

2.5 Important factors affect skunk works

Through the definition of skunk works and characteristic of skunk work, it could be seen that there are several important factors which will make great influence on the result of skunk works projects. The factors include motivation for both team leader and members, team leader’s role, team-working sprite as well. Team leader and team member are must components of a skunk work project, without the participation of them a skunk work project is unable to ongoing properly. The reasons for highlight these factors are because they are especially key factors that will make significant impact to skunk work more than the others. All the literature mentioned both factors as necessary component that will lead positive result of skunk works projects. In another way, team leader provides directions and overview control for the project, team member’s quality and their performance decide the result of the project. What’s more, motivation is the strongest support for the team to continue the project while suffering difficulties. As most of the skunk works project occurs under the poor conditions, only strong motivation could lead the participators to continue working with the project.

2.5.1 Motivation

There are several factors that might create an effect on an innovations success in the long run. Motivation is a critical ingredient for high-performing departments and technical project teams (Katz, 1998). Motivation is dependent on 3 psychological processes: arousal which means the need or desire for some object or state that is at least partially unfulfilled or below expectation, direction means direction goals guiding one’s behavior and intensity which means the strength of one’s desire and need to achieve goals and needs with different difficulty levels. (Bandura, 1986; Ford, 1992). As we all know, being a part of skunk works project will face lots of
difficulties during the process, strong motivation exists as a key factor that support people to continue working on it. Thus, according to Katz (1998), highly motivated people and teams push themselves to overcome all the barriers. While according to Latham (2007), all of these psychological processes depend on personal needs, values and beliefs.

Motivation of each team member is also important in terms of their satisfaction from the work they do and its outcomes as well. James (2005) evaluates the importance of motivation with two factors, extrinsic and intrinsic factors. According to Richard and Edward (2000), motivated person means someone who is energized or activated toward as end. Motivation can be considered as a unitary phenomenon, in both different level and types. The most basic main distinction is between intrinsic motivation, which refers to do the activities lead by inherently interesting, and extrinsic motivation, refers to doing something lead by separable outcomes.

Intrinsic motivation
Intrinsic motivation is defined as the doing of an activity for its inherent satisfactions rather than for some separable consequence (Richard & Edward, 2000). This motivation is a form of human nature, which could be considered as a critical element in cognitive, social and physical developments as this natural motivation tendency comes from one’s inherent interests that will grow in knowledge and skills. Although there are different argues about what intrinsic motivation about (operant theory by Skinner, (1953); learning theory by Hull, (1943), in on sense, it’s exists in the relation between individuals and activities, in another sense intrinsic motivation exists in the nexus between a person and a task. As a result, the researchers reach in common that basic needs are satisfied by intrinsically motivated behaviors.

What’s more, intrinsic motivation will also be influenced by environment. Self - Determination Theory is specifically framed in terms of social and environmental impact on intrinsic motivation. Deci and Ryan (1985) presented Cognitive Evaluation Theory (CET) to specific the social impact on intrinsic motivation. They argued that interpersonal events and structures will engender feelings of competence during action, while the feelings of competence can enhance intrinsic motivation as they allow satisfaction of the basic psychological need for competence. However, feelings
of competence will not always enhance intrinsic motivation unless the feelings are accompanied by a sense of autonomy or, in attribution terms, or internal perceived locus of causality. In another word, people must experience satisfaction of your needs both for competence and autonomy in order to reach a high level of intrinsic motivation.

To summarize, social and environmental elements can facilitate intrinsic motivation by supporting the needs for autonomy and competence, however, there are different individuals and individuals activities as well, intrinsic motivation will occur only for activities that hold intrinsic interest for the individuals have the appeal of novelty, changeling or aesthetic value.

**Extrinsic motivation**
Extrinsic motivation refers to doing an activity simply for the enjoyment of the activity itself, rather than its instrumental value. Different from intrinsic motivation, extrinsic motivation is construct that pertains whenever an activity is done in order to attain some separable outcomes. Different attitudes and adjustment will result different types of extrinsic motivation. There are four different types of extrinsic motivation according to Richard and Edward (2000). They are external regulation, introjected regulation, identification regulation and integration

--- External regulation
External regulation is the least autonomous forms of extrinsic motivation, This behaviors is existing for satisfy an external demand or obtain an externally imposed reward contingency.

--- Introjected regulation
Introjection represents the kind of regulation caused by self-esteem. It is a kind of internal regulation but still under certain control, as people will perform this feeling under the pressure of avoiding guilt or anxiety or to attain pride.

--- Identification regulation
Identification is a more autonomous or self-determined for of extrinsic motivation. People accept its regulation as his or her own because he or she realized personal
importance of a behavior.

-- Integrated regulation
This is the most autonomous form of extrinsic motivation. It occurs because of self-examinations and will bring new regulations into other values and needs for himself. Integration will only occur after fully assimilated identified to the self.

According to James (2005), extrinsic factors, including rewards, are organization programs and inducements designed to encourage a worker to perform at a high level or effectively. The most common ways of extrinsic factors are compensation and public recognition. In contrast with extrinsic factors, intrinsic factors are those associated with the work itself, frequently for the sake of personal satisfaction. According to Amabile (2002), employees will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself, rather than by external pressures or inducements around the work.

Chen, Ford and Farris (1999) explore several hypotheses with respect to the effects of extrinsic and intrinsic factors to an organization, and find that in the eye of the R&D respondents, intrinsic rewards were the most beneficial, and the individual variable rewards the least beneficial to the organization. Thus, as it was also indicated by James (2005) and Amabile (2002), companies should look for the ways of using intrinsic factors as the main motivators for employees.

2.5.2 Team leader and leadership
John Naisbitt said, “Whenever the world changes so dramatically, what characterizes appropriate leadership also changes”. Leadership as an evolving concept includes also some characteristics. Nowadays the trend of leadership is starting to be more distributive and everyone is expected to contribute to leadership. It is also perception that everyone can be a leader. Trait theories argue that leaders share a number of common personality traits and characteristics, and that leadership emerges from these traits (Saul, 2003). The definitions of a trait differ, Gordon Allport (1937) defines a trait as “a generalized and focalized neuropsychic system (peculiar to the individual) with the capacity to render many stimuli functionally equivalent and to initiate and
guide consistent forms of adaptive and expressive behavior” (Allport, 1937). Even though these specific traits are not viewable, their existence can be inferred from observing the consistencies in a person’s behavior. Other trait theorists view traits “as convenient constructs that are used to describe patterns of behaviors” (Ryckman, 2007). Ralph Stogdill suggests that traits considered singly hold little diagnostic or predictive significance. However, Stogdill (1974) criticizes that trait theories take an atomistic approach, viewing each personality variable as something that acts independently to determine leadership.

Nowadays people are learning more about what they can do as individuals to develop leadership qualities within organizations. One of the most important leading traits is setting of goals. A good leader has to realize that setting unrealistic goals can lead to failure and disappointment. He/she should break long-term aims into smaller, more manageable goals as achievement of smaller goals leads to overall objective accomplishment. Goals should be also specific because general objectives are more difficult to achieve. Other important traits of leaders are risk acceptance and decision-making process. Risk acceptance is affected a lot by the people who we are leading and decision-making by lonely leader can sometimes become confusing so a leader should have a soul mate that will help him (Peter, 2002). And all these factors make a good leader extremely important for successful skunk works. According to Rich (2004), one of the key factors for successful skunk works is to have a good opinion leader. It is very important for a leader to provide skunk work project a direction to follow and create team members a cultural environment inside the team (Gwynne, 1997).

Kirkpatrick and Locke (1991) consider leadership trait consisting of six elements: drive, desire to lead, honesty and integrity, self-confidence, cognitive ability, knowledge of the business. As what had already mentioned at the beginning, vision has also be considered as a very important part of leadership. Warren Bennis (1989) said, “Vision makes a true leader”. Leaders know what they want and where they want to go. They have a vision of their goals (Locke and Kirkpatrick, 1995, Hajek, 1995). To achieve their vision and strategy, leaders can use different styles and approaches of leadership. There are of course many different theories of leadership.
styles. Some of them state just three leadership styles (Kurt, 1979) others state until six leadership styles (Daniel, 2002).

Lennéer & Thylefors (2005)’s model describes four different leadership styles, which are dissimilar and shows the most common behaviors of leaders.

**Authoritarian leadership**: an authoritarian leader is not the same as a leader with authority. Authority is something all leaders should have but not always get. It is when others accept the leader’s power and influence that the leader is assigned with authority and respect. The concept authoritarian stands for something completely different and symbolizes arbitrary and dictatorial characteristics. An authoritarian leader doesn’t trust the competence of the employees and thinks one to know best in all situations. Therefore he/she controls the organization by him-/herself without listening to the personnel. Authoritarian leadership was more common before when the views upon leadership was different and the employees had to follow the rules of the leader not to lose their jobs.

**“Okeydokey” leadership**: a leader that practices the okeydokey principal sneaks away from the chief responsibility by not putting up limits or leave distinct replies. The okeydokey boss is unable to make fast decisions and also misses motivation and safety in the role of leadership. The employees perceive this type of boss as kind-hearted and nice. The business climate with an okeydokey boss is very “un-hierarchical” which can be suitable in some types of operations were the personnel is more of a self-propelled nature and likes to mind one selves business.

**Democratic leadership**: a democratic leader shares power and influence. He/she listens to and trusts the employees. A democratic decision-making is not based on the quest of popularity or personal goal achieving, but on the company’s need. This type of leadership has much strength since it creates a safe and stabile working climate that is open for changes and wrong-steps. This enables for both the company and the employees to develop as the environmental condition changes.

**The Charismatic leadership**: a charismatic chief is someone who raises much feelings and commitments around through his/her personal aura. Charismatic people
easily get into leader positions since they have personal charm, inbreathe aplomb and respect.

2.5.3 Teamwork and team performance

The importance of role of team in success of innovation project is not a new topic that had already been discussed by lots of researchers (e.g. Belbin, Barczak, Guzzo and Shea etc.) According to Holt (1992) team working is the top success factor of innovation projects. “cross-functional group of individuals who are charged with creating and developing new products and services. Members typically come from a variety of functional disciplines. Innovation teams are temporary in that they are together for the life of the project from idea conception to launch” is the definition provided by Barzak (2010) and it’s a definition which explains how and why a team is formed, that is a group of people who sharing the same idea and goal by using their knowledge in a specific filed. According to Barzack and Wilemon (2003), innovation team should be cooperative, devoted to a common objective and should get on with each other, from having the right people with the right skills. A strong team leader is needed in order to have high level of teamwork and empowerment (Holahan & Markham, 1996).

Barzack and Wilemon (2003) had presented in their research, lots of studies that discuss different impacts of different organizational and team characteristics on team performance had been done during the last few years. One of the results showed that quality of team member is one of the most important factors. Team quality includes how team member work together, and the degree of influence of team performance for innovation teams (Hoegl & Prosperio, 2007). What’s more, the relationship between members also influence team performance, for example, if team members are close and get on well with each other, there will be a positive influence on team performance. According to Holahan and Markham (1996), each team member should have knowledge, skills and personalities such as strong interpersonal abilities and good communication skills. Also he or she should have expertise in their fields.

Integration, coordination, collaboration and teamwork, all these words can have the same meaning or something common between all of them (Estevez & Ynicheva,
Barczak (2010) discussed in his book about relationships between these concepts. Integration is a combination of interaction and collaboration. Also, interaction focuses more on communication and exchange of information, whereas collaboration focuses on the effective process of sharing resources and goals between departments. Collaboration includes a high level of integration, coordination, cooperation, transparency, and synergies. And according to Hoegl, Ernst and Proserpio (2007), teamwork includes all these concepts mentioned about the definitions above such as communication, coordination, cohesion, effort, mutual support, and balanced contributions. Pinto and Pinto (1990) found that a high level of cooperation and collaboration could lead to high levels of success. Kratzer, Leenders, and van (2004) also held the similar idea that cooperation and integration influence on team performance in a positive way. This shows the importance of communication and corporation within, which could make impact on team performance.

Besides team member’s quality, team working’s quality is also an important factor for successful innovation project, for example, skunk works projects. Hoegl and Gemuenden (2001). According to their research, teamwork quality is significantly related to project success, which also includes team performance, as well as team members’ personal success. Team performance is defined as the team’s ability to fulfill required quality, cost and time. There are two perspectives of team performance, which are effectiveness and efficiency (Hoegl & Gemuenden, 2001). According to Hoegl and Gemuenden (2001), effectiveness means the degree to which the team meets expectations regarding the quality of outcomes while team efficiency refers to adherence to schedules and budgets (Ibid.). In order to achieve better team performance, it is also necessary to take into consideration that the team also needs to work in a way that increases members’ motivation and ability to engage in future teamwork (Hoegl & Gemuenden, 2001).
3. Methodologies

3.1 Research approach

Research approaches therefore can be seen as the relationship between theory and the actual research (Bryman & Bell, 2007). In general, there are two kinds of research approaches are used in social research, inductive and deductive. Inductive approach refers to a process moving from specific observations to broader generalizations and theories (Saunders & Thornhill, 2009). It also means when the researcher starts by making observations of the reality without having reviewed the theories in that given area while deductive approach is described as going from theoretical approach to empirical. The reason is conducted from more general to more specific and the conclusion follows logically from available facts. However, some researchers also point that there is a third kind of research approach, which is abductive approach (Patel and Davidsson, 2003). Abductive approach is a combination between deductive and inductive that refers to “the process of switching between the theoretical and empirical framework”. It is truth that during the process of research, provisional theoretical frameworks and comments could be applied if it’s valuable and possible. This approach brings more flexible for the research.

This thesis is guided by existing theories on the chosen topic that will be applied to the case. As specific case study is used by finding observations, analyzing and generalizes the findings comparing to theoretical overview, deductive research approach is going to be employed through this study.

3.2 Research method

There are basically two methods in social research, quantitative and qualitative according to Bryman and Bell (2007). Quantitative method is characterized by many respondents and uses figures and quantities to describe the reality. It also refract on a view of social reality. Moreover, this method also emphasize on the qualification in data collection and analysis.

On the other hand, a quantitative research means that the research is conducted by measuring indicators, which can explain or indicate the respective concept. In the
meanwhile, qualitative research can be seen as a research strategy with emphasis in words and in the analysis of the data which emphasizes more on the words the respondents use and leaves more freedom to the answers of the respondents. Qualitative method makes use of text in writing and is more interpretive in its nature and characterized mainly by interviews, observations and documents. In addition, it is usually limited to fewer numbers of respondents and looks more into the depth of the problem or issue. Moreover, This method often leads to the testing of theory against social reality under study, hence giving the study a deductive approach of research.

According to Patton (2002), there are three main methods for collecting accurate qualitative data among different methods, which are interviews, observation and documents. Interviews are often leaded by questions that with the aim of getting in-depth responses about experiences, perceptions, opinions and knowledge from the interviewees. In addition, observation refers to the description of activities, actions, and behaviors among other observable human actions, whereas, documents aims to get written materials that can be found within the organization, surveys or official publications.

Consequently, in this study, qualitative research method is used, as it allows flexibility and openness that enables the process to be interactive. This research is involving collecting, analyzing, and interpreting data. The motivation of this thesis is to find out the factors that will affect the result of skunk works projects by using really life case. One detailed case has been used which provide a vertical analysis and in-deep deductive study. As the case is based on a famous successful case with the case leader’s autobiography as main source, qualitative research method will provide a deeper insight into the empirical data and thus enhance the possibility of getting a better understanding of the research question in return. Even though there is only one case being discussed in this research, it will provide the readers a deeper and vertical view of the case. And then lead the reader to the research question and reach the answers.
3.3 Data collection

There are mainly two different ways to collect data: primary and secondary data collection. Primary data is gathered from original sources by the researcher whilst secondary data is gathered from existing sources (Pervez et al., 1995). Interviews and observations are two of the most frequently used primary data collection methods for empirical data. But they usually cost a lot of time and money. Whilst, secondary data is more economical, as the cost of collecting original data is saved (Rajendar, 2008). Although some of the secondary data might not have good quality, if the sources of the data is authentic, the result of the research can still be good (Yin, 2009).

The literature being used in this study is all secondary data, which is cited in course books, published articles and Internet resources. The courses books are derived from Halmstad University library. The published articles are derived from Halmstad University’s database and Google article. All references are listed at the end of the paper.

3.4 Selection of the case

In order to proceed to the case study, Losec’s discovery story has been chosen to be the case in this thesis. Losec’s discovery story is one of the most famous skunk works story in not only Sweden but also skunk works world. The main source of the case comes from the book “Drug discovery - a pharmacists story” which was written by Ivan Östholm, the leader of Losec skunk works project. Östholm’s book clearly recorded the whole story of Losec that becomes a very good resource for case study.

Losec’s story was taken place in a famous Swedish company, and the discovery of Losec caused a sensation at that time. This provides chances to get clue about the case. Additionally, as the case happened long time before and quite famous at the moment, not a few researchers and scholars had been discussed the case so to enhance the richness of data collection. With the main source of Ivan Östholm’s book, several more articles and books had been introduced to explore the case. In order to get a deeper and vertical understanding of the case as well as the findings, a single case
study had been chosen. As Yin (2009) argues, an advantage of using single case studies is the evidence collected can be considered more compelling and robust.

### 3.5 Reliability and validity

In order to test the reliability and the validity in this qualitative research, LeCompte and Goetz (1982, cited on Bryman & Bell, 2007) identify the reliability and the validity as external and internal respectively. External reliability means the degree to which a study can be replicated, and internal reliability means all the research members should agree about what they say and hear. Internal validity refers to the degree to which researchers’ observations and the theoretical ideas match, while external validity means the degree to which findings can be generalized across social settings.

As mentioned before, a single case study has been used in this thesis in order to provide the readers a more vertical understanding of the case. On the other hand, only secondary data had been used in this study. The main reason for not using primary data is the project took place in 70s’ and last long for more than 20 years, the author had already passed away. Not only, the participants for the project during that time either too old or passed away as well. This means that there was little chance to get primary data about the case for this thesis.

However, even thought there is no primary data, in order to maximize the chance of reliability and validity, the main source of the case was from Ivan’s book “Drug discovery - a pharmacists story”. This book recorded Ivan Östholm’s experience as being the leader of the Losec case that provided rich information about the discovery of Losec. The book was published as his autobiography. Besides Ivan Östholm’s book, several more resources had been applied as assist resource to ensure the reliability of the case to avoid single-faceted result to the study.

Last but not the least, the analysis of empirical data by comparing it to the theory presented in the theory literature and framework, which will minimize the risk of incorrect findings and conclusions.
3.6 Limitations

One of the limitation of this paper is the use of single case study, all the results are coming from analysis of one case, in addition, one special thing about skunk works projects is each of the cases is so special and different from the others in different industries, companies or even types of skunk works; in this case, pharmaceutical industry is the only industry. So, the result of Losec case may not be the same with other cases, and this will cause different perspective of the result. As another word, the result of this study might not represent all the skunk works cases.

Secondly, there are limited resources and information in literature about skunk works in studies. Most of them are related with the original form, Lockheed Martin’s skunk works factory which is true skunk works, but this study is not focusing on military industry. Some of skunk works related theories and opinions are mainly coming form four articles, which are Rich (1994), Single and Spurgeon (1996) Gwynne (1997), and Brown (2004), it would be better if there is more academic support from pervious studies. Limited resource is also another reason for single case study in this thesis. As mentioned in pervious part, it is hard to find unsuccessful skunk works case because most of the skunk works are doing under the table, once it fails, managers will not share it with the public. Consequently, these factors cause difficulties in using multi-case study to compare successful and unsuccessful skunk works in this thesis. As a result, only successful skunk works case had been studied and deduct factors from this literature and case.
4. Empirical Data

Case study: Losec

Losec (omeprazole) is a peptic ulcer medicine, discovered by a Swedish pharmacists Ivan Östholm and his research team. It had been presented as “the greatest Swedish discovery in modern times” in the early 90s’ and created a huge level of profit for the company, AstraZeneca (was also known as "Astra"). Losec made $620 million sales all around the world in 2000, and became the champion peptic ulcer medicine at that time (Kruse and Timmerman, 2009). However the discovery of Losec is a quite famous skunk works story, because its discovery took 22 years. Ivan Östholm (1995) wrote about the story in his book “it was a struggle to keep the project alive particularly after our first failure in 1970”, due to the fact that nobody, outside of the team, believed in the product. During the process, Östholm and his team was told five times they should terminate the project by the company officials (Östholm, 1995). In order to keep the project alive, Östholm asked for grants from the government’s Board for Technical Development, and other institutions due to rejections from the company.

The starting point that resulted with the development of Losec was raised from a simple idea according to Ivan Östholm (Östholm, 1995): a new medicine is needed in pharmaceutical industry for the company, AstraZeneca. Ivan Östholm was the research director at Research Institute of Hässle (a small pharmaceutical factory grouped by Astra in 1947). In 1956, Leif Hallberg, the association professor in internal medicine, suggested that a good liquid antacid is needed in pharmaceutical industry (Östholm, 1995). The marketing department rejected this idea because there was a similar product in pharmaceutical industry and the sales numbers of that pill was not that great in terms of profitability. Finally, Ivan convinced the board and developed Novalucol suspension after two years of his first declaration, in 1957. Novalucol suspension became one of the best-selling products in the 60s’. The success of Novalucol was a proof of that Ivan Östholm has the ability to take the possible opportunities, and the intelligence in research and development as well (Östholm, 1995). These abilities of Östholm helped him a lot during the development stages of Losec.
The success of Novalucol suspension made the financial support possible for Ivan’s research. In March 1966, Ivan and his team held a symposium “The Ulcer Illnesses” in order to get better knowledge in medical needs and ways. This conference provided several opportunities in terms of increasing their competences. According to Ivan Östholm, during the whole process of the invention of Losec, they had a strong desire to create new drugs rather than developing something already existing in pharmaceutical industry (Östholm, 1995). After the symposium, Ivan was quite sure about that there was a need for a new medicine to treat peptic ulcers. Before the goal-orientated “Gastrin Project” started in 1966 Ivan and his team tried to get rich information on Ulcers. What they need was a new biological principle; their chemists also needed a chemical lead to start with in order to set up their synthesis program. By November, they successfully had a compound named H68/51, which could effective in inhibition hydrochloric acid secretion by testing through rats. Unfortunately, it turned out that H68/51 was harmful to dog’s liver but everything went well with rats before. Similar stories happened several times during years, new compounds were found without satisfied results. It took almost their four years when they understand that it was not appropriate to use rats to test stomach medicine because dogs were more similar to human in terms of stomach structure.

When Ivan’s negative result was presented to Astra Group’s annual research conference in the fall of 1970, they were informed to stop the project, as the top of the company had a doubt on the project. Finally Ivan convinced them and got the chance in order to continue the project, however, they had to cut their budget. This was the first time Ivan and his team suffered from such a difficult situation. However, there was always a way out, an American pharmaceutical company, Abbott was interested in collaborating with Astra. But Astra had already a contract with Ciba-Geigy, a Swiss Company. Ivan negotiated with Abbott and finally they arranged an agreement which includes Abbott’s $50 000 research support for Ivan. Thanks to the help of Abbott, the project continued, even though the name of the project has been changed to Acid Secretion Project.

In the summer of 1972, their efforts and works on the project made a progress. A very creative group founded with the members of Ivan’s team (Sven-Erik Sjöstrand, Ulf Junggren and Lars Olbe) that produced many useful inventions for the project's
development. As some of them were from University, the work was divided into university-based research for the basic knowledge, while the company performed development expertise and provided capital required for productization (Claessen, 2013). Ivan and his team studied lots of documents and literatures in order to accomplish their mission, that is creating a peptic ulcer medicine. Then they decided to develop the project based on a similar compound CMN 131 found by American’s Searle Company. Finally, the project restarted in October of 1972. Twelve project members found more than 200 new compounds between 1972 and 1974 (Kruse and Timmerman, 2009). Luckily, they made H124/26, a benzimidazol derivative, which also became a basic structure that led to the goal, the drug omeprazole, marketed as Losec.

Before H124/26 went to clinical tests on patients, another drama came on the stage. The reason was they got information that a Hungarian pharmaceutical company had already applied for the patent, which has the same compounds with theirs but to treat tuberculosis. Ivan decided to negotiate with the Hungarian Company in Budapest and buy the patent; just because he didn't want to waste his time and effort he spared for the project's development. Nevertheless, a “drama” came out, as he didn't expect in Budapest, Hungarian side ended the negotiations abruptly as their application had been withdrawn at that time.

Due to the lack of budget, the research group pinned their hope on Abbott in order to keep safety test. They were very disappointed when they had been told that H124/26 showed toxic effects on rats; this is why H 124/26 could not be tested on human. At that time, the researchers group didn’t know whether they were on the right trail or not; because there was nothing that might proof the effects of substance on human. However, they didn’t want to give up and decided to keep the work. Afterwards, According to Ivan Östholm (1995). everything was worthwhile, thus the researchers made another synthesized H83/96 in February 1974, which was the 340th substance they have ever synthesized and tested for the project. It was an unexpectedly completed new compound, and with H83/96 they had one more year to present a positive result. In 1974, negative effects of H83/96 were seen in human’s immune system. Ivan had to try very hard in order to persuade top manager to have another year for the project (Carlsson, 1997).
At this moment, another news became a bad blow for the future of the project. A British pharmacist James Black found a new antacid medicine cimetidine. Just because of this news and plus the negative results provide by Ivan’s group, top manager of Astra were full of doubt in whether they can find a better medicine or not. On the other hand, many people suggested they should stop the project and turn it to other directions. However, the researchers didn’t have the plan to give up, no matter what, Ivan believed that they would make better medicine.

Eventually, hope came in December 1976, H 149/94 had been developed. The new compound was much more effective acid secretion inhibitor than anything they had before but without any undesirable effects. After ten years’ struggle, Ivan and his group could finally apply their findings to human test and preliminary reach their goal.

Once again, things not went smoothly. Abbott could not wait for positive results any more hence they ended the corporation with Hässle, in this case financial problem raise again. While luckily by this time, Swedish government saved the project. In the early 70s’ Sweden’s Board Technical Development started a commission for drug research and supported 250,000 dollars to continue the project. This amount of money did much help toward the realization of Ivan’s project.

At last Ivan’s group proved that they had developed an effective compound after the animal experiments and safety tests on H149/94. Everybody was quite happy to go to the next step of clinical tests as soon as possible. But this is not the happy ending, in June, 1978, a safety report told that H149/94 had discovered changes in dogs’ blood vessels, which means it is impossible to put on test on human. Everybody was shocked by this result, once again the project had been stopped because of the toxic effects. At the same time, Ivan had left his job as research director but still being a part of the company management of research and development. However, somebody saved the project again. According to Claessen (2013), Bjorn Folkow, their consultant from Göthenburg University found the problem was on the tested dogs instead of the compound. Then, the project had a new lease on life.
After Hässle research group made sure there were no negative effects on animal tests, in 1979, Swedish Social Welfare Board agreed the clinical test of H149/94 (Östholm, 1995). That was the first human test for the project, which was successful in patients. In order to get better compound, the research group developed ten more compounds with more effective acid secretion inhibitors with less negative impact. Finally they choose H 168/68 and named it omeprazole. However, Omeprazole is a unstable compound, which was sensitive to water, light and heat. It means that this compound could not make into tables (Carlsson, 1997). Again Ivan and his team had to continue working on it. After that, the first and highly encouragement came to report clinical efficacy in Stockholm (Kruse and Timmerman, 2009). However, problems raised again in 1984, all the test had to be stopped because there were cancer like tumors found in rats that had been given Omeprazole. Everybody was about to give up. Fortunately, they did not give up but finally found they were wrongly “diagnosed”. Thus, the clinical test could continue (Carlsson, 1997). Finally, omeprazole was approved used by Sweden in February 1988 under the brand name Losec. In 1997, Losec reached a yearly sale of more than 6 billion USD and became world’s biggest sales drug.

It took 22 years in total just for development of Losec; however, it is not the end of the story. The developing process of Losec from idea to market then to success is shown in Table 5. When a new substance has been created, there is a long road left before it becomes a new medicine. No matter how, it was a long journey for the chemicals and researchers in Hässle to work as this famous skunk works story. Just form the story we can see that skunk works project is full of risk and uncertainties, nobody knows what will happen tomorrow or even next minute. And the high risk and uncertainty is one of the reason why Ivan and his team could not get support by their manager, the costs, risk for failure was higher with a long duration (Luca and Stefano, 1994). Obviously, management support was lost after several years while the project was fail. Moreover, the successful of Skunk works involves lots of factors, money, knowledge, technology, time, human resources, industry background, policy, and also a bit of luck. According to Carlesson (1997), an important success factor was the culture of openness and trust within the working group. Ivan’s altitude and consists in the project as well as his leading ability provide motivation for the group to move on. Also, the researchers and scholars’ professionally provide ingredient to the success of
the project. In addition, all the elements are changing as time passes by which made the case more complicated. Yet amount these factors, the determination of the leader of skunk works may create the greatest influence to the result or development of the project. The decision making of the leader played the most important role there.

Table 5: developing process of Losec

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>Start of the “Gastrin project”</td>
</tr>
<tr>
<td>1970</td>
<td>No effect of H 81/75 in man</td>
</tr>
<tr>
<td>1971</td>
<td>Presentation of CMN 131</td>
</tr>
<tr>
<td>1974</td>
<td>H 83/89 Timoprazole <em>(thyrotoxicity)</em></td>
</tr>
<tr>
<td>1977</td>
<td>H 149/94 Picoprazole <em>(vasculitis)</em></td>
</tr>
<tr>
<td>1979</td>
<td>Picoprazole given to man</td>
</tr>
<tr>
<td>1979</td>
<td><strong>Omeprazole synthesized</strong></td>
</tr>
<tr>
<td>1982</td>
<td>Symposium OMGE, Stockholm</td>
</tr>
<tr>
<td>1984</td>
<td>Clinical trials suspended <em>(carcinoids in rats)</em></td>
</tr>
<tr>
<td>1988</td>
<td>Approval in Sweden</td>
</tr>
<tr>
<td>1990</td>
<td>1 million treatments</td>
</tr>
<tr>
<td>1990</td>
<td><strong>The Genotox story</strong></td>
</tr>
<tr>
<td>1993</td>
<td>50 million treatments</td>
</tr>
<tr>
<td>1994</td>
<td>100 million treatments</td>
</tr>
<tr>
<td>1995</td>
<td><strong>The BGA story</strong></td>
</tr>
<tr>
<td>1997</td>
<td>Worldleader</td>
</tr>
<tr>
<td>2000</td>
<td><strong>Approval of Esomeprazole</strong></td>
</tr>
</tbody>
</table>

**Source:** Kruse and Timmerman (2009).
5. Analysis

5.1 Motivation

It can be said that motivation in Losec case is the most important support for Losec case. Without motivation, the researchers couldn’t keep on working for an endless project for 22 years. The motivation came from both intrinsic and extrinsic.

The intrinsic motivation mainly came from Ivan and his team member’s inside and psychological, they believed that they could find new and useful drug successfully. They had a strong desire to create new drugs rather than developing something already existing in the industry. With this believe in their heart, no matter how many difficulties they faced, they never thought about giving up, but tried to find solutions. For example, each time when top managers had stopped the project, Ivan tried to save it and persuaded his manager as none of the members wanted to waste their effort before.

On the other hand, extrinsic motivation mainly came from support from other people or organizations, or we can say sometimes “luck”. Started from very beginning, during the whole process, even top manager never agreed with their idea, Ivan and his team received help and agreement from other scholars and businesses. The corporate with Abbott, and financial support form Sweden’s Board Technical Development, these could also be a kind of motivation for the team to consist their goal, as “at least there was someone shows positive idea about us”. In addition, the negative opinion from management side, which is a kind of demotivation, could also provide motivation for skunk works project. This demotivation can turn extrinsic motivation factors into intrinsic motivation factors. In Losec case, even nobody believed they can make good drugs but Ivan and his team never doubted about they can.

5.2 Team leader and leadership

A leader needs drive and desire to lead, honesty and integrity, self-confidence, cognitive ability, knowledge of the business in order to be a good leader. In Losec case, Ivan Östholm was the true and great leader who provided biggest opportunity for the successful of Losec project.
Far at the beginning of the project, Ivan set the goal and vision for the team as well as the project, which was to find a new drug that did not exist in the market. Later, this goal narrowed down to a medicine to treat peptic ulcers. And this is the goal they consisted for the following 20 years. Because of his confident and believes, no matter how many challenges they faced, this skunk work group never gave up this goal until it really came true. On the other hand, as a leader, Ivan had the personality and quality in his eloquence, negotiation and social skills. With his excellent eloquence skill, he save the project five times when the project has been ask to stop by top managers. With Ivan’s personal abilities, he attracted not only talent person to join in his project, but also find “sponsor” (the American pharmaceutical company Abbott) for support. It seems that Ivan Östholm had the ability to always make right decision and save the project by his eloquence and networking. His friends and colleagues in pharmaceutical industry and from universities gave strong support for the project as well.

It can be consider that Ivan is a democratic leader who shared power and influence with his team. His goal of making new drug is not only for satisfy him but also for the development for Astra company. In order to get good compound, he and his team tried very hard working together to find useful material and supports. He was also a part of the researchers working in the lab instead of only “spirit leader” who made orders only.

**5.3 Teamwork and team performance**

In different stage of development of Losec, corporation between different team members and team leader provided great contribution to success of Losec. First of all, all the members involved were talent person; they were researchers, students from famous universities and famous professors from universities as well. These intelligent team member were creativity and hard working and sharing the same goal with Ivan. For example, Bjorn Folkow was their consultant from Göthenburg University and he was the one who found the problem why H149/94 was failed on animal test and saved the project from mistakes. In addition, on the early stage of Losec invention, Ivan and his team held “The ulcer illnesses symposium” in order to get better knowledge in
medical needs and ways. Ivan also involved himself as a part of researcher group, and worked with his team together. There were always small meeting between the group and they shared their opinion and results together. They failed thousands of times with more than 340 new substances had found. And finally, they got H149/94 and passed human test. Even after positive result in human test, in order to get better compound, the research group developed ten more compounds to choose. The whole team made all these efforts together from beginning to the end.

5.4 Management support
At the beginning of Losec project, managers form Astra did provide support especially financial support for the project, but as the first test showed negative result, they stopped project and didn’t want to support it any more. Although Ivan persuaded the managers to continue the project, manager side cut their budget and changes their research direction as well. At this moment, Losec case turns from transitional skunk works to pseudo skunk works. However, at last, the project turned to non-supported skunk works. Even there is little management support, after 22 years struggling, Ivan and his team successfully discovered new drug which was Losec to the market and made great contributions to Astra.

5.5 Other factors
During the process of analyzing the case Losec, there come some other factors that cause big influence of the success of Losec project. The two factors are “times and change” and “opportunities and luck” which have not been mentioned in literature review, but new findings from the case.

5.5.1 Time and changes
It took overall 22 years for Losec before it really discovered by Ivan and his team. As time passed by, conditions were changing all the time. As a result, it is a great problem in how to manage these changes. As team leader, Ivan Östholm did solve the changes properly.

There were five times that the project had been stopped by manager side. However, Ivan tried his best to persuade top manager to give more time for the project. The
following change was the corporation with Abbott, at 1970, Ivan negotiated with Abbott and made the company as a sponsor to provide financial support for the project. However, in 1976, Abbott stopped the corporation but Swedish government saved the case instead. What’s more, the negative result of test of Ivan’s new compounds happened several times and made changes and barriers to the development of discovery process as well. There were more changes involved in this 22 years long case. However, no matter the changes were good or bad, the research group over came all of them and found Losec successfully at last. This shows that lots of conditions and things might be changed in a long-term project; however, the skunk works team must find a way to solve the changes and face them.

5.5.2 Opportunities and luck

See from the Losec case, without “luck” and opportunities the project might not be successful or take even more time to go. The most important thing here is to catch the opportunities and get well use of that bit of luck.

The first opportunity for Ivan was the joined of Abbott. This American company used to show interest with corporate with Astra, however, Astra had already had a contract with another company, so Ivan persuaded Abbott to join his project and get final support from the company. It is really lucky for Ivan and his group that each time when something horrible happened, something lucky was waiting for them. For example, a Hungarian pharmaceutical company had applied a patent that has the same compounds with Ivan’s compounds but to treat tuberculosis. Ivan also ready made the decision to go to Budapest to buy that patent, however, a drama was on stage, that company’s application had been withdrawn just then. Another one is once the American company stopped the corporation with Ivan and Ivan had financial problem again, Swedish government had a commission for supporting drug discovery and supported 250,000 dollars, which saved the project in time. It’s hard to explain what are exactly factors but luck or opportunities. Things just happened without any expectation. However, the only things that skunk works involved people can do is to catch the opportunities and enjoy their luck.
6. Conclusion

6.1 Conclusions

There are lots of factors that might influence the result of a skunk work project, and as each skunk work is a unique happening or process, it is difficulty to say if a factor is a “must” factor. However, there are still some factors that appear in the rare literature as well as in the case. These could be considered as “standards” of successful skunk works. Besides the factors literature explained in the previous study, (team work and leadership etc.) there are some other factors can be found in Losec case (opportunities and luck etc.). What’s more, this conclusion can provide an answer to the research question: What are the success factors of skunk works projects?

Leader and leadership

A great leader is the corn and soul of a project. Team leader’s personality and ability decides the future and result of the project. In the Losec case, one of the most important key factors is Ivan’s focus on the goal. He never gave up his idea, which was to discovery a new drug not existing at the market. With this goal, he spent 22 years on the project facing different difficulties and solving them at last. His network also made great contribution to the success of the project. Ivan’s friends and colleagues gave him lots of support during the process. On the other hand, Ivan’s ability to communicate also played a part in the project. He persuaded his manager several times in order to gain more time for the project and convinced the American company to spend money to support his research at another point. All these facts show the importance of the team leader in skunk works project. As a democratic leader, he made his best to share information within his skunk works team and was willing to listen to suggestions from others. This leadership style helps a lot to make the project successful.

Teamwork and team performance

The excellent team members, as well as the corporation between the team members, created opportunities for the success of the Losec project. All the members and persons who contributed to the projects were full of talent in their field. Their hard working attitude definitely improved the chance for success of the Losec project. Without their collaboration and contribution, Ivan would never have been able to
finish his dream alone. A great team also supports the result of a skunk works project. In order to get great team performance, team members should have great skill and knowledge in their field. Good communication skill and information flow also works in successful skunk works.

Motivation
The factor motivation is one of the most important for successful skunk works. Without motivation, the Losec project wouldn’t have been finished as nobody can consist in an endless goal for more than twenty years. Sometimes successful innovations from skunk works projects might not find the support from management, even though they are successful. That might also create an intrinsic motivation for the innovator himself/herself. The eager to succeed and the drive to make a dream come true are the intrinsic motivation factors for the team while being non-supported. Sometimes by removing extrinsic motivation factors (such as resources, approval, time) intrinsic motivation can be created among skunk work teams, driving them to finalize the project with a really high level of result. This intrinsic motivation is driven by revenge, self-confidence, and/or trust in their product. As it might be seen through the Losec case study, extrinsic factors might create intrinsic factors, and that might increase the final product’s quality in skunk works projects. This is why, according to theories and case studies used in that study, demotivation in a skunk works project might create positive outcomes as extrinsic motivation factors will turn into intrinsic motivation factors.

Management support
Top management support is needed for skunk works, but is not a must. With management support, more resources such as human recourse and finical support can be gained, which decrease skunk works barriers and difficulties and thereby increases the possibility for success. However, due to types of skunk works, there is one type of skunk works, which don’t have any support or little support from top managers, just like in the Losec case. The level of importance of management support also depends on different types of skunk works. Without management support, the development of Losec did have problems and nearly stopped. Ivan and his group had to solve lots of problems by themselves and overcame all the difficulties such as financial problem. No matter how difficult it was, Losec was successfully discovered although it took the
researchers 22 years time. As a result, skunk works can succeed without management support, but we can say if there is support from top manger side, skunk works projects can suffer less difficulty and reach the goals in an easier way.

**Efficiency**  
Efficiency could also name as timing here. Some of the author said efficiency or timing is very important for success of a skunk works project, which has been discussed in literature review part. Also efficiency is a significant part of quality of team performance. However, this is not the only opinion about skunk works. Take Losec as an example, we cannot say Losec is an “efficient” project as the whole process lasted more than 20 years from the idea to market. Lack of time and money created thousands of problems in continuing the research. As the same thing happens in other projects in pharmaceutical industry, this kind of product invention needs lots of time and energy. But we cannot say timing is not important for skunk works projects, even it cannot be found in the Losec case. Especially for high technology products, the product life cycle of this kind of products are much more shorter, for example, IT industry and military industry. These two kinds of industry have more requirements in time and efficiency than pharmaceutical industry. So, it can be consider that timing is important for skunk works but it depends on different industries and certain situations.

**Manage change**  
During the developing process of skunk works, it can be seen that hundreds of changes are waiting to face. Look at the Losec case. Five times it was stopped due to lack of money, negative test result and competitors’ new medicine etc. Within 22 years, the conditions and the environment are changing all the time. Some of the changes were good while some were a total disaster. These changes required Ivan (team leader) and his team to have the ability to overcome the effects of the changes as challenges. Consequently, to achieve successful skunk works, everyone in the project, especially the team leader have to find a way to mange all the changes.

**Opportunities and luck**  
It is very interesting that luck and opportunities are an indispensabel factors for successful skunk works. At least through Losec case, they were lucky at some places
that once some bad things happened, somebody would come and help them to solve the problem, for example, the drama in Budapest, and the time financial support from Sweden’s Board Technical Development. So, we can say that good luck can help skunk works a lot without expectation.

6.2 Managerial Implication

Successful skunk works flower

Go back to the research question of this paper now
- What can managers do in order to create a successful skunk works project?

The answer of the first question can be found in this framwork of “successful skunk works flower”. This framwork shows the relationship of different main factors that will make influences on result of skunk works. These factors include motivation, team leader, team working, management support, timing, manage changes, opportunities and luck. What’s more, different factors have different roles in this framwork.
Motivation: leaf
The role of motivation here is just like leaf to flower, providing all kinds of support for the living of a flower, without leaf, a flower cannot alive. Same as motivation, without support of strong motivation, skunk works can not succeed.

Team leader, teamwork, management support, timing and manage changes: petal
A healthy and pretty flower needs beautiful petal, which are the main components of a flower. People play an extremely important role in the result of skunk works. Performance of team member, personality of team leader, timing and altitude of top manager are the elements had already discussed by researchers. What’s more, they are the elements that people know and can see from most of the skunk works projects, it can be considered as “surface factors”. These factors are like petals of flowers that everybody knows and they are quite important for beautiful flowers.

Opportunities and luck: The sun
Opportunities are important factor for all kinds of success projects or activities, which is the key to success in business world. How to catch opportunities and get great use of them are important lesson for any one. The same as skunk work projects. Good opportunity can create thousands of profit if it can be held. A very interesting finding during the study of skunk works is almost the entire successful story contains a bit of luck. In most of the situation, some unexpected factors can save the whole project. These two elements are just like sunshine to growing flowers, it will not be sunny everyday, however, it always bring energy and new faith for flowers.

What managers can do with the flower framework is to find a balance between the factors especially for the petal part. In fact, there might be more factors make influence to succeed of skunk works, it might differ from time, industries, companies, products types of skunk works and lots of other factors. So the flower can be more petals for different “skunk work flower”, however, theses factors can be consider as basic factors. Before choose skunk works or during skunk works process, managers can take this framework as a way to analysis whether the project can be a successful project. It could also identify factors already have or factors not have yet.
6.3 Future research

When talking about successful skunk works, it is not only about somebody creates or discovery a new product but also includes future development of the product, whether the product can survive in the market and win the competition will be a more important consideration. The difficulties for skunk work product is more than that, in many situation, companies and customers will not easily accept new products due to different considers. As a result, it is imminent important solve the problem. Why the companies and customers are not willing to accept new ideas? How to make them accept? It is interesting and valuable to know what the customers as well as the market think about skunk works products. If a skunk work project spends time and money but cannot get identity by the people outside skunk work group, it is not successfully. Thus, the judgments come from the public, which means the people whom will buy the product.

For future research, consumer’s altitude about skunk works products is a topic to go deeper to develop. And the result will make successfully skunk works product a real success in concrete way.
7. Reference


