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PAIRS IN INNOVATION: EXPLORATORY RESEARCH ABOUT
THE UNDISCOVERED PHENOMENON OF DYAD
RELATIONSHIP LEADING TO INNOVATION

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Abstract (English)

Several innovative companies of the last years have been founded by pairs of individuals that introduced breakthrough outcomes into our lives. Some managed to disrupt the computer industry and initiated a revolution, while some developed a search engine and made it part of our daily lives. History is full of remarkable amount of cases, where pairs led the greatest innovations and changed the world together. Although innovations of such pairs are widely recognized, their relationship have been poorly explored with regard to innovation processes. This dissertation draws the attention at this point and analyzes the functioning of innovative pairs in order to contribute a value-added framework to the literature and several propositions explaining their dynamics through innovation path. By relying on the existing literature and following a qualitative study of 15 real world cases, it is also aimed to identify managerial practices that can be applied in companies to foster innovation. Leveraging on the generated pair relationship, it is revealed that dyad formation has the advantage of being able to create an intimate space, which is not easy to achieve within a team structure. Trust and shared vision are the key elements to create such intimacy and within this space, pairs can go beyond their boundaries, support each other emotionally through the obstacles and reflect their perspectives by the frequent exchange of ideas. Overall, literature is enriched by contributing a different perspective of innovative pairs and within this context a basis for further research is provided.

Abstract (Italian)

Negli ultimi anni diverse aziende innovative sono state fondate da coppie di individui che hanno introdotto scoperte rivoluzionarie nella nostra vita. Alcuni di loro sono riusciti a sconvolgere l'industria dei computer e hanno innescato una rivoluzione, mentre altri hanno sviluppato, ad esempio, un motore di ricerca integrandolo nella nostra vita quotidiana. La storia è piena di questi casi eclatanti in cui le più grandi innovazioni, che hanno cambiato il mondo, sono state create da coppie. Sebbene tali innovazioni sono state ampiamente riconosciute, le loro relazioni non sono state pienamente esplorate per quanto riguarda i processi di innovazione. Lo scopo di questa tesi è quella di attirare l'attenzione su questo aspetto e analizzare il funzionamento di coppie innovative al fine di contribuire alla letteratura con un quadro di valore aggiunto e con diverse proposizioni che spiegano queste dinamiche attraverso un percorso di innovazione. Attingendo alla letteratura esistente e seguendo uno studio qualitativo di 15 casi studio reali, la tesi ha anche lo scopo di identificare pratiche manageriali che possono essere applicate in diversi ambiti aziendali per favorire l'innovazione. Sfruttando la relazione di coppia creatasi, viene rivelato che la formazione della diade ha il vantaggio di riuscire a creare uno spazio intimo, non facilmente ottenibile all'interno di una struttura di squadra. La fiducia e una visione condivisa sono elementi chiave per creare tale intimità. All'interno di questo spazio le coppie possono andare oltre i propri confini, supportarsi emotivamente a vicenda nel superamento di ostacoli e riflettere sulle proprie prospettive attraverso un frequente scambio di idee. Nel complesso, la letteratura si arricchisce così grazie a nuove prospettive di coppie innovative e viene creata una base di partenza per ulteriori ricerche.

Executive Summary

Breakthrough innovation requires collaboration and different perspectives (O'Toole et al. 2002). Instead of skills and competences of a single leader, developing an innovative outcome relies also on the values of multiple individuals. Within this context, team is a structure that consists of individuals with complementary skills or competencies (Miles and Watkins 2007). Until today, several scholars and companies gave huge amount of importance to the teamwork and its relation to innovation (Alvarez and Svejenova 2005; Miles and Watkins 2007; Pearce 2004). However, in between one single individual and a team, there is the structure of pair (dyad): the smallest unit of a team.

In retrospect, there are remarkable amount of cases, where pairs led the greatest innovations and changed the world together. Steve Jobs and Steve Wozniak, Larry Page and Sergey Brin, Mark Zuckerberg and Eduardo Saverin are few of the "sparring partners" that are widely recognized in the entrepreneurial environment due to their breakthrough results.

Unfortunately, leadership and innovation theories about pair dynamics are weak. In this respect, literature can be enhanced with academically accepted theories or frameworks that could bridge over managerial practices for companies in order to foster innovation. In this regard, literature is scanned to find out insights about the pair dynamics and its linkage with the innovation process.

Literature Review

By collecting information from different academic journals and related books, pairs that obtained innovative results, the path they took together, their required qualities and the leadership approach they referred to are discovered in every aspect.

Literature review is designed based on the timeline of pairs' togetherness from the moment first they met till reaching the innovative outcome.

First of all, as an opposing view, the topic of lone genius is introduced in order to explain the traditional perception of "Great Man", where the importance of personal competences is highly appreciated for innovation (Alvarez and Svejenova 2005; O'Toole et al. 2002).

Secondly, within the section of Why Pair, it is informed that several creative and world changing ideas also come in the shape of dyad. With this regard, the advantages of pair structure are explained, touching on the power of different perspectives and criticism, the diversity of talents and experiences, and the possibility to share the responsibilities (Alvarez et al. 2007; Arnone and Stumpf 2010; Miles and Watkins 2007; O'Toole et al. 2002). Additionally, Hunter and colleagues (2012) explained the benefits of dyadic relationship over team structure in three key points, which are efficient knowledge and idea sharing, not allowing rebellion and splitting the reward easily.

Later on, under the title of Pair Formation, one of the most critical milestones of the innovative pairs, their gathering, is deeply investigated by answering the hows and whys. Pair formation can arise from a social relationship, such as siblings, spouses, couples or close friends, or from a task-based interaction where individuals can encounter in work-through roles (Alvarez and Svejenova 2005; Gabarro 1987; Marshack 1998). Additionally, as Shenk (2014) mentioned, meeting of pairs can be divided into three main forms, which are introduction by a mutual party, encountering at a place of common interest and chance meeting that turned out to be driven by a subterranean similarity. Farrell (2001) defines the locations where people with common interest meet as "magnet places". Talking about why pairs select each other, the importance of homophily is introduced by several scholars (McPherson et al. 2001; Zipf 1949). On top of that, as supported by Gronn (1999), trust and its significance on the pair formation is mentioned by several examples.

From the moment pairs come together till the end of their outcome, there is a long and compelling path, which is analyzed under the section Functioning of Pairs. How pairs perform together at the path of their innovative outcomes is investigated

under this part. As regards to Alvarez and colleagues (2007, p.12), in order to create a successful cooperation at the top, relationship of the co-leaders should demonstrate "complementarity, compatibility and commitment" qualities. These characteristics can be identified as the building blocks of an effective partnership in order to be prospering.

According to Gronn (2002), complementarity enables co-leaders to bring their strengths into prominence. Gronn and Hamilton (2004, pp.16-7) identified complementarity as "two individuals are perceived as bringing attributes to their joint work that are both separate and distinct, but which also blend harmoniously". In the literature different authors classified complementarity in different forms. In addition, Alvarez and colleagues (2007) define complementarity in terms of expertise, experiences, skills, styles and networks; while on another side Miles and Watkins (2007) identify complementarity through more structured perspective by dividing it into four segments, which are task, expertise, cognitive and role complementarities.

Shenk (2014) verbalized compatibility of individuals as "chemistry" or "electricity" between two people. In the matter of two individuals that aim to work together, the quality of compatibility is an essential requirement that should be developed in order to avoid any further problems. Power sharing executives could function most of their complementarity through trusting and comfortable relationship, which in other words is called emotional compatibility (Alvarez et al. 2007).

Following complementarity and compatibility, pairs need to proceed towards a common purpose in order to achieve mutually desired outcomes. In this sense, commitment refers to creating a common purpose through "mutual values, unified decision-making criteria, and a common vision" for the sake of the company (Alvarez et al., 2007 p.12). Miles and Watkins (2007) identify shared vision as one of the crucial pillars of effective complementarity. They mention the importance of shared vision by stating that its absence could be a cause of the pair relationship to collapse.

While pairs are working together, apart from complementarity, compatibility and commitment, the dynamics in between two individuals are playing a crucial role as well.

Few of the main concerning subjects related to the working dynamics of pairs are confluence, interdependence, trust, criticism, communication and conflict.

To start with, confluence is defined in the dictionary as the situation in which two things join or come together. According to Shenk (2014), confluence can be observed in three different ways, which are asymmetrical confluence, distinct confluence and overt confluence. Another important factor for working dynamics of a pair is the interdependence, which is defined as "the degree to which team members must rely on the skills of others, interact, and depend on one another in order to complete and accomplish their tasks and, accordingly, reach their goals" (Fausing et al. 2015; Guzzo and Shea 1992; Wageman and Baker 1997). Related to this topic, Gronn and Hamilton (2004) in their research on co-principalship, categorize the working relations in three paramount set of norms, which are complementarity, overlap and duplication. Moreover, as a necessity of working dynamics, trust is introduced by several scholars as making mutual decisions within a complex business world requires a strong level of trust among pairs (Alvarez and Svejenova 2005; Gronn 1999; McAllister 1995). Following that, criticism is mentioned by Verganti (2016) as the process of going deeper by clashing together different ideas in order to bring out richer and stronger interpretation. Furthermore, communication and its importance is introduced as a crucial part of the working dynamics. Creative solutions are emerged not while individuals are working alone in an isolated way, but while they are together in constant communication (Farrell 2001). Finally, as another key factor of the working dynamics, conflict is introduced, which is defined as "perceived differences or incompatibilities, where discrepant views or interpersonal incompatibilities contribute to the tension of conflict" (Jehn, 1995 p. 257). Regarding this issue, Deutsch (1969) defines two types of conflict as task and emotional; while Jehn (1997b) has mentioned process conflict as the third type.

Apart from the above-mentioned characteristics of power sharing arrangements and working dynamics, pairs passing through innovation processes must have proper and effective relationships both in between each other and towards outsiders. Regarding the internal relationship of pairs, shared leadership is the approach that

pairs mostly refer to. According to Mainemelis and colleagues (2015), despite the existence of different labels for the shared leadership notion, the main idea given by the scholars was always the same; which is plurality of the leaders, plurality of the leadership roles and a dynamic leadership process with high level of interactions. Shared leadership approach is the distribution of tasks, which could be an efficient way of managing and administrating strategic moves, and correspondingly contributing to innovation. Researches on the model of shared leadership show that there are several benefits such as improved team effectiveness and enhanced team performance (Ensley et. al 2006; Hmieleski et al. 2011; Pearce et al. 2004). As it is mentioned by Hoch (2013), even though there are limited amount of studies about the linkage of innovation and shared leadership; there is a key role of this approach for promoting the team's ability to adapt changes and correspondingly creating innovative outcomes.

Hoch (2013) states that the level of engagement in shared leadership may be impacted by personality factors, which act upon "loyalty, transparency, fairness, or rather than promoting one's self interest in achieving personal goals". Although personality on its own is a complex and broad subject to be covered, few aspects are introduced related to this topic within the literature review (Hoch 2013; Nakao et al. 2000; Silvia 2006; Triandis and Suh 2002). Shenk (2014) talks about the relationship between order and disorder, where anti-pole personalities of dyad can be linked to creativity, which is the main ingredient of innovation.

Under the section of Termination, whether innovative pairs are sustaining their relationship or terminate it at some point and the reasons are introduced. Alvarez and Svejenova (2005) state that voluntary resignation or company's board are the two factors that terminate the pair relationship. On the other side, some professional duos can extend their collaboration even more and unite their carriers. Alvarez and Svejenova (2005) defined united carriers as the true collaboration of pairs depending on the strength of their relationship and the joint career decisions they make.

Lastly, within the section of Innovation, definitions and types of innovation, the network structure and its relation to innovation are explained by emphasizing the topics of knowledge transfer and the cognitive distance. The network structure and its

relationship with knowledge transfer is explained by Burt (1992) as 'structural holes' theory. Structural holes refer to disconnection among different groups of people and states that information diversity and new idea generation is generally higher in between these different groups of people (Burt 2004). Since people experience different social and physical environments throughout life, each person perceives, interprets and evaluates events differently (Nooteboom 2000; Nooteboom et al. 2007). This relative difference in each person leads to cognitive distance, which is a trade-off between novelty and understandability (Cohen and Levinthal 1990; Nooteboom 2000).

Research Gap & Conceptual Framework

This dissertation follows the model of Maxwell (2008) related to the research design, which consists of five steps focusing on different essential components of the entire study. These five steps are goals, research questions, conceptual framework, methods, and validity. The goal of this dissertation has been mentioned under the introduction section. Through the literature review how innovative pairs come together, work together, the leadership practice they referred to or other critical success factors are explained with the existing theories. However, theories and researches about the pair dynamics and its correlation with the innovation are weak and could be a way to open new doors to broader topics with a precise research. That is why, the relationship and functioning of innovative pairs is identified as the research gap of this dissertation and the following research question was built to guide the authors in the further steps.

"How do pairs evolve and function to reach innovative outcomes?"

Maxwell (2008, p.222) defines conceptual framework as "the system of concepts, assumptions, expectations, beliefs, and theories that supports and informs your research". Following the insights from the literature review and cases of famous innovative pairs, the conceptual framework below was built. In the figure, there are main building blocks leading pairs in the innovation process, which are context,

personality, shared leadership, pair formation and functioning. Each building block is endorsed by the findings in the literature. Context, pair formation, personality and shared leadership are considered as the inputs of functioning process. Yet, what is missing and correspondingly the main focus of this dissertation is the functioning of the pairs in the journey to reach innovative outcomes, which is referred as the 'black box'.
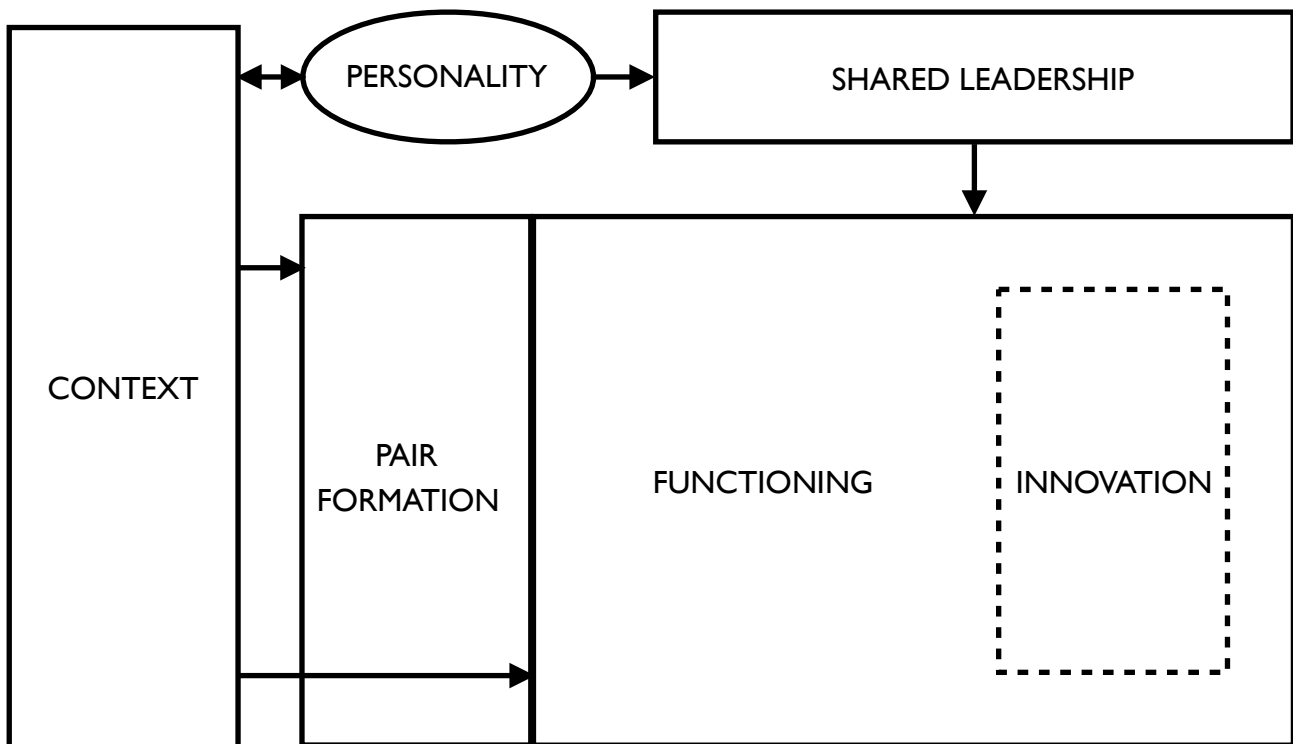
Methodology

For the methodology, qualitative research is selected as the appropriate method to proceed, since "Pairs in Innovation" is a phenomenon that is based on human values. Heath (1997, p.1) defines qualitative research by stating, "Qualitative researchers attempt to describe and interpret some human phenomenon, often in the words of selected individuals". Among several methods of qualitative research, case study is selected as convenient, which is defined as "an empirical inquiry that investigates a contemporary phenomenon within its real life context; when the boundary between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin 1984, p.23). In this dissertation, exploratory

type of case study is used rather than descriptive or explanatory ones, since the aim is to study an undiscovered phenomenon (Yin 2003).

Innovative pairs are identified as the unit of analysis. This study is a multiple-case design since it contains more than one single innovative pair as an experiment, and concurrently relies on holistic approach (single unit analysis) since there are only outcomes as a unit of analysis (Yin 2003). Conducting multiple-case study requires time and resources, but once conducted provides more compelling and strong evidences compared to single case designs (Herriott & Firestone, 1983). Each case is selected carefully to represent adequate heterogeneity and commonality to reach solid results (Eisenhardt 1989; Maxwell 2008; Pettigrew 1988; Yin 2003). The main criteria of the case selection is picking pairs that have reached an innovative outcome where the definition of innovation was set to reach consistent results. In total, there are 6 entrepreneurial level cases, 7 corporate level cases and 2 cases consisting of collaboration between industry and university. Only Italian and Turkish pairs were contacted, due to the limitations of network and language. While Turkish pairs were reached through the online means by individual efforts, Italian pairs were contacted through the ongoing project between Politecnico di Milano and Assolombarda. All cases consist of innovative pairs, yet their features vary along several characteristics such as the duration of their relationship, their socio-demographic characteristics, their previous experiences and their position in the company.

Pair	Gender	Type	Industry	Market	Innovation
1	m/m	Entrepreneurial	Computer Software	B2B	Software as a service tool
2	m/m	Entrepreneurial	Internet	B2C	Online notary service based on blockchain protocol
3	m/m	Entrepreneurial	Wireless	B2C	Predictive Wi-Fi network management software
4	f/m	Entrepreneurial	Information Services	B2B	Platform making prediction of aggressiveness of breast cancer
5	f/f	Entrepreneurial	Textiles	B2B	Sustainable textile application

6	f/m	Entrepreneurial	Air Condition	B2C	Sanitizing air conditioning systems
7	m/m	Collaboration between industry and university	Food	B2C	Packaging technique for grated cheese
8	f/m	Corporate	Building Materials	B2B	Fiberglass bar that is an alternative to steel in concrete structures
9	m/m	Corporate	Mechanical Engineering	B2B	Shape memory string
10	m/m	Corporate	Chemicals	B2B	Binder that keeps lithium oxide together
11	m/m	Corporate	Automative	B2B	Intelligent tyre
12	m/m	Corporate	Mechanical Engineering	B2B	Accelerometer

13	m/m	Corporate	Information Technology	B2B	Electrical development in personal computer
14	m/m	Collaboration between industry and university	Chemicals	B2B	Scientific awarded catalyst that enables polymerization
15	m/m	Corporate	Pharmaceutical	B2B	Contrast media substance for medical imaging

Considering the data collection, the main sources of data are the interviews supported by observations and archival data consisting of pre-existing documents, videos or similar artifacts. Semi-structured interviews are executed to ensure some flexibility (Dunn 2005). The interview involved open questions on several topics such as the background and history of both the individuals and the duo, details about their functioning such as the task division, evolution, innovative outcome and the conflicts or challenges faced and the way of their handling. Beyond the answers of the participants, their behaviours and approach to different questions were also examined within the interview duration. As a first step of data analysis, the interviews are transcribed, and the Italian ones are translated to English using an online software. For the analysis of the case studies in this dissertation coding is performed, where code is defined as "a

word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data" (Saldana 2013, p.3). Both in Vivo and constructed codes are used (Strauss 1987). As data sets are coded, some codes show up repeatedly throughout the text forming a pattern that are gathered together under categories. Following the structure indicated by Saldana (2013), the categories are resolved to a more conceptual and theoretical level, forming the propositions. In order to minimize errors and biases and achieve a high-quality case study, construct validity, external validity and reliability are respected (Yin 2003).

Discussion

As a first step, in order to enhance the gathered data from the literature review and real-world cases, each arrow of the conceptual framework is supported through the codes from interviews. Later on, the findings are used to deep dive into functioning process and three different, but related propositions are built in order to answer the research question and contribute to the literature.

Proposition 1: Pairs go beyond their boundaries throughout the functioning process.

Fluidity: As the pair structure is formed, two distinct individuals might have defined zones and boundaries, which can be referred as a rigid structure. However, during the interviews, pairs explained how their strict and rigid divisions fade away and their limits disappear with time. There is a fluidity in the sense of breaking the boundaries, integrating through the process.

Involvement: Although pairs might have fluidity on their working dynamics, at the basis of their dyad formation, they have some competences and previous experiences that place them into defined zones. Within the interviews, several pairs talk about significant contributions of their partners

in very crucial moments, which usually are the turning points for their innovation.

Transformation: It is observed that members of the pair can change their roles or boundaries throughout the innovative journey and end up with different competences at the final state. Mostly, interviewees talk about these moments as a natural shift, which occurs as a reflection of the journey's requirements where individuals extend or transform their competences in such a way that it helps the innovation to grow solidly and cooperatively.

As a part of this proposition, boundaries of each pair and their evolution over time is positioned by getting inspiration from the model of Gronn and Hamilton (2004). As seen from the figure, although pairs (indicated with numbers) started their functioning process either from duplication or complementarity, over time their limits tend to disappear and at the end a shared space emerges.

Duplication	Overlap	Complementarity

| 3, 5, 10, 12 | → | ← | 1, 2, 4, 6, 7, 8, 11, 15 |

| 9, 13, 14 |
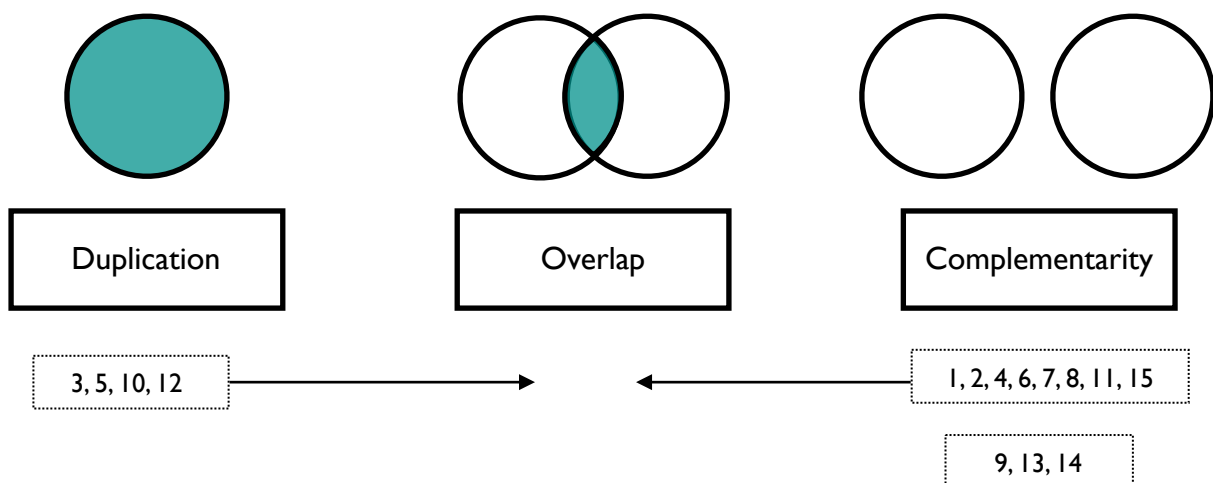
Proposition 2: Pairs react to challenging moments by emotional support.

Motivating Each Other: The path to innovation is considered as a tough experience by the majority of the interviewed pairs, even one defined it as an *'emotional rollercoaster'*. When one is down, the other reached out and took the other from the hardship. While interrogating how the pairs succeeded, a pattern of motivation was discovered.

Handling Challenge: When pairs are asked to talk about the challenges they faced, variable amount of cases emerged. Although pairs mentioned diverse challenges, it is realized that at the end, they were able to solve these conflicts by sticking up together to unclog the functioning process instead of blaming the other for the problem.

Proposition 3: Pairs exchange ideas for critical reflection.

Sharing Ideas: Analyzing the pairs' daily interactions, there is one common behaviour, which is the idea exchange throughout their functioning process. Pairs mentioned that sharing each other's perspectives and knowledge was the key for the advancement of their innovation.

Constant Communication: Sharing ideas is enabled by communication. This communication is not only bounded within the working hours, but includes nights, weekends and any moment that required an interaction. Constant communication helps pairs in the decision making, being on the same page and sharing the latest news.

Learning: Working as a pair brings different expectations and responsibilities. In order to work smoothly, pairs need to learn about each other well and

understand the working style of their partner. Knowing and acting based on strength and weaknesses of each other makes the functioning fluent. Adequate level of understanding comes with time and effort.

Filling the Gaps: Sharing ideas, constant communication and learning through the functioning process help pairs to fill the gaps of each other. Both sides give each other what was missing and the ability to look to a problem from another angle.

In dyad structure there is the intimacy, which cannot be easily observed at individual or team structures. The intimacy between pairs is a space for creativity, which is the key element for innovation. It is where the pair truly opens up and shares their uncommon ideas. This intimate space in between is created through two main elements; trust and shared direction. Once the intimate space is formed, pairs have the courage to overcome the limits and dare to interfere (proposition 1) and share their ideas to create new perspectives (proposition 3). In the light of the trust and shared vision, pairs feel obliged to support each other (proposition 2), especially in the challenging moments. The formation and the functioning within the intimate space is explained visually in the following figure. In order to support the propositions, famous case studies such as Steve Jobs and Steve Wozniak are used as a part of the triangulation process.

TRUST

+

SHARED VISION

P1) GOING BEYOND THE BOUNDARIES

P2) OBLIGATION TO SUPPORT

P3) CRITICAL REFLECTION

INTIMATE SPACE
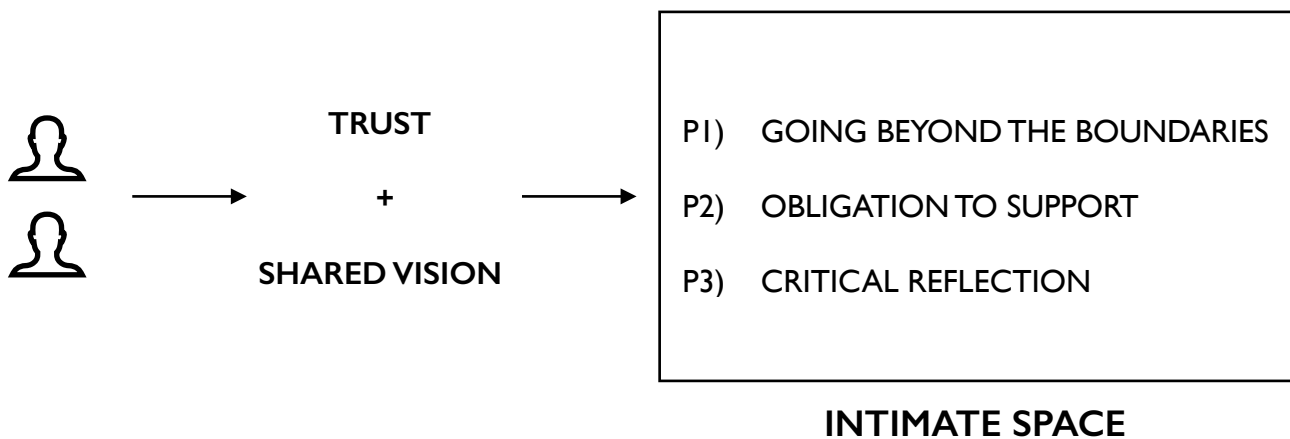
Conclusion

On a theoretical perspective, this study contributes to the leadership and innovation theories of functioning of dyads. Based on the information gathered from the literature, a conceptual framework and three propositions regarding the pair functioning are introduced. By achieving this, theory regarding the pair dynamics is modified and developed respectably.

Complementarity is a trait that is seen as a necessity to working usefully together by several scholars (Alvarez et al. 2007; Alvarez and Svejenova 2005; Gronn 2002; Gronn and Hamilton 2004; Miles and Watkins 2007; O'Toole et al. 2002). Yet, this study is defending that within the pair structure, there is a special trait of intimacy. By having this, pairs are breaking the boundaries in between and instead of being two complementary members, they become a single unit, where they achieve the fluidity within their functioning process. In this sense complementarity can be a trait, which is mostly linked to the team structure. Moreover, while talking about the functioning process of pairs, challenges and conflict are inevitable (Deutsch 1969; Jehn 1997). There are several methods introduced to explain the challenge handling methods (Alvarez et al. 2007; Fjellvær 2010). This dissertation indicates a new perspective to handling challenges, where the emotional support is an approach to solve the problems and pairs are obliged to support each other in difficult moments for the sake of achieving their common goal. Finally, an important advantage of being a pair is the ability to bring different ideas to the table. This dissertation expands the limits of idea exchange and state that a successful idea exchange enables high level of critical reflection, which is achieved by the previously introduced intimate space.

Interpreting the theoretical findings to support managerial practices plays a crucial role for the practical application of this study. Intimacy is the key element that lacks within a team, which can be achieved in a dyadic relationship. Firms can provide an environment made out of trustworthy relations and common vision. The ideas that are shaped at dyadic level will be stronger and richer due to critical reflection of the dyad members and will be carried to the team level in a stronger sense, which will help to foster innovation in the firm. This early criticism can be useful to increase efficiency

and quality of ideas within the innovative path of a company while bringing new and diverse perspectives.

Since this is an exploratory case study research, it would be fair to mention that there were some limitations. Accessible network and time period of the study allowed the analysis of only pairs from Italy and Turkey. Additionally, within the study both in terms of most selected cases and all real-world cases, only the successful pairs were chosen and analyzed where the inclusion of unsuccessful pairs could have enhanced the knowledge generated. The interviewed pairs were in different maturities within their innovative journey, which was both advantageous and disadvantageous in some aspects. Within this study, only the functioning part was interrogated since the main linkage of the innovation was found in that building block and it was a research gap that was not pointed out before. Yet, for further research steps, the conceptual framework could be interrogated comprehensively in order to deep dive into the other building blocks, revealing more propositions that might have connection with the innovative outcome. Moreover, a further study can interrogate personality on its own and question how it affects the dynamics of the innovative pairs.

Once and for all, this dissertation draws the attention to the underestimated phenomenon of innovative pairs. By gathering data and making analysis of 15 selected cases, a value-added framework and 3 propositions are created. Leveraging on the applied qualitative study, it is revealed that dyad formation is able create an intimacy by the key elements of trust and shared vision. Within this space, pairs can go beyond their boundaries, support each other emotionally through the obstacles and reflect their perspectives by the frequent exchange of ideas.

I. Introduction

1.1. Problem Definition and Opportunity

Over the years, there has been a common assumption that leadership is a solo act; meaning that the term leadership was only associated with one person (Alvarez et al. 2007). The history is full of brave leaders ruling nations on their own or alone wolves making the most strategic innovations at the top and changing the world. Even though many cultures believed in the power of singularity and attributed the organizational progress to a single person, rarely one individual has such great power in today's complex companies (O'Toole et al. 2002; Pearce 2004). Although the image of one dominant head remains as the essential factor of innovation both in theory and practice, breakthrough innovation requires collaboration and different perspectives (O'Toole et al. 2002). Instead of skills and competences of a single leader, developing an innovative outcome relies also on the values of multiple individuals. Within this context, team is a structure that consist of individuals with complementary skills or competencies (Miles and Watkins 2007). Until today, several scholars and companies gave huge amount of importance to the teamwork and its relation to innovation (Alvarez and Svejenova 2005; Miles and Watkins 2007; Pearce 2004). However, in between one single individual and

team, there is the structure of pair (dyad). It should not be overlooked that in reality there are also remarkable amount of cases, where pairs led the greatest innovations and changed the world together. Steve Jobs and Steve Wozniak, Larry Page and Sergey Brin, Mark Zuckerberg and Eduardo Saverin are few of the "sparring partners" that are widely recognized in the entrepreneurial environment due to their breakthrough results.

Related to the above-mentioned fact, despite the success of these well-known pairs, their relationship with regard to the innovation process were not deeply explored at a sufficient level in the literature. As a matter of fact, theories and researches about the pair dynamics and its correlation with the innovation are weak. In this respect, literature can be enhanced with academically accepted theories or frameworks that could bridge over managerial practices for companies in order to foster innovation. Taking these into consideration, this topic can be an action with the opportunity of insights for managerial or organizational practices. Regarding the innovative pairs that disrupted the status quo by their outcomes, how they came together, how they worked together, the leadership practice they referred to or other critical success factors are few of the mysteries that one can be curious of. Those taken for granted assumptions could be a way to open new doors to broader topics in the literature with a precise research supported by accurate data analysis.

To sum up, spotting the above-mentioned literature gap, examining it thoroughly and building on the existing de facto theories has been seen as an opportunity for this dissertation. By achieving this, value added insights in the sense of managerial practices could be introduced to the current business environment and lead companies to innovation, which is now a must to survive in every single market.

1.2. Phenomenon of Pairs in Innovation

Long time ago, Schumpeter (1950) argued that innovation is a need for organizations in order to renew the value of their asset endowment. According to Zahra and Covin (1994, p.183), "Innovation is widely considered as the life blood of corporate survival and growth". In response to rapidly changing consumer needs and market

structures, organizations have to innovate in terms of products, services, operations and processes. Concerning the role of innovation in renewal and growth, Bessant and colleagues (2005, p.1366) stated that "Innovation represents the core renewal process in any organization. Unless it changes what it offers the world and the way in which it creates and delivers those offerings it risks its survival and growth prospects". In the sense of creating something novel and valuable, contrary to the myth of lone genius or team structure, pairs also play an important role.

Hereinbefore, in opposition to vulnerable academic research, history is full of innovative pairs that left a significant mark on this planet. At first glance, number of duos that achieved amazing works together could seem limited, but by investigating deeply, there is a huge spectrum of sparring partner cases from past to the present. Science to art, entertainment to fashion or high tech to business; one can easily encounter pairs that led to splendid works together in different industries. Even though only one figure might be on the front scene from an outer perspective, there are considerable amount of companies that have two signatures on their work of art. To cut a long story short, "Pairs in Innovation" is a phenomenon waiting to be explored and reformulate the literature.

Talking about the business world, Warren Buffett and Charlie Munger, co-founders of the second largest proprietary company of the world; Berkshire Hathaway is an impressive example. This old hand couple together created an empire from the scratch and still keeping it on top of the rankings for decades (Gillies 2017). Yet, another long-lasting partnership is between William Hewlett and David Packard, that successfully evolved from being co-founders to co-CEOs of the company Hewlett-Packard (HP), which was named on behalf of this pair (Hunter et al. 2012). As also one can realize in today or the recent past, many corporate companies have experienced this dual structure at the management level for innovation processes. For example, in the 80s, the co-leaders of Ford Motor Company were Donald Peterson and Red Pooling and they achieved pleasant results together (Harrison 2005). Furthermore, talking about Boeing, the largest global aircraft manufacturer, merger-oriented form of shared

leadership was observed after the acquisition of McDonnell Douglas, where CEO Phil Condit learned to work with Harry Stonecipher flawlessly (O'Toole et al. 2002).

A further industry where successful partnerships have occurred is for sure the computer industry. These partnerships allowed pairs to specialize in specific parts of their business and end up with innovative results. In the case of Apple, marketing whiz Steve Jobs combined forces with tech guy Steve Wozniak to create a radical innovation (Shenk 2014). Another example is the meeting of introvert Bill Gates with extrovert Steve Gardner Allen, who together reshaped an industry from the beginning and co-founded Microsoft (O'Toole et al. 2002). Furthermore, with the spread of internet era, Facebook, one of the most innovative outcomes of the last decades, co-founded by Mark Zuckerberg and Eduardo Saverin from Harvard University (Carlson 2012). Talking about the recent past, many digital based companies were also founded by pairs as well. Dropbox (Drew Houston and Arash Ferdowsi), Netflix (Reed Hastings and Marc Randolph) and Uber (Travis Kalanick and Garrett Camp), Nest Thermostat (Tony Fadell and Matt Rogers) are just few recent world shaking partnership examples that have disrupted the industries that they entered (Bernard 2018; Castillo 2017; Mylavarapu 2016; Raymond 2017). One final classical example could be, as anyone knows, the co-founders of Google, Larry Page and Sergey Brin, whose success is interwoven and led to one of the world's most significant innovation that changed our lives enormously (Alvarez and Svejenova 2005).

Looking from a broader perspective, partnership dynamics are also apparent in fashion, art, literature, science or entertainment, where creativity and management possesses a huge gap and needs to be bridged. Despite the fact that the outcomes of these pairs are far from the innovation definition of this dissertation, (which will be mentioned in the next chapter), understanding the dynamics in between could be rewarding for the main objective. A prospering example here could be the famous brand Valentino; co-founded by Valentino Garavani and Giancarlo Giammetti, where Valentino was responsible for design and creativity, while Giancarlo was taking care of the product commercialization and together, they built a worldwide known high luxury brand (Eisner and Cohen 2012). Moreover, in the case of Gucci-Yves Saint Laurent;

separation of Tom Ford, (chief designer) from Domenico di Sole (CEO) decreased the company's stock value in 2003, showing us the importance of pair dynamics and its effect on the business (Alvarez and Svejenova 2005). Examining art, an inseparable pair from music industry appears; John Lennon and Paul McCartney, who inspired each other deeply from the heart and resulted in spectacular works affecting the entire world (Shenk 2014). Considering the literature field, impressionists Claude Monet and Frederic Bazille dared experiments in impressionism for the first time in the form of pairs (Verganti 2016). Additionally, J.R.R. Tolkien and C.S. Lewis from the literature shared the interest of Northerners together as a pair (Verganti 2016). Last but not least to give an example from entertainment industry, Matt Stone and Trey Parker, co-creators of South Park can be put on the list that goes to infinity (Shenk 2014).

Besides startups and corporate companies, pairs can also be observed in the history of science. Marie Curie and Pierre Curie with their researches on radioactivity, James Watson and Francis Crick by creating the double-helix model of DNA, and Orville Wright and Wilbur Wright, pioneers of aviation are just few examples of such pairs that ended up with game changing discoveries (Alvarez and Svejenova 2005; Shenk 2014).

To conclude, above-mentioned world-famous pairs form only tip of the iceberg. These and many more pairs will be mentioned throughout this dissertation and the dynamics in between will be discovered and analyzed deeply. However, it should not be forgotten that not every pair came together ended up with innovative results. Alongside many successful co-founders, the history also contains several failed partnerships. Since they were not able to produce any innovative outcomes and leave a mark, literature does not give enough place to these pairs. Instead, it is more dwelled on the pairs that initiated innovation together, yet at the end parted the ways due to several reasons. At this point, eventfully separation of Mark Zuckerberg and Eduardo Saverin, co-founders of the Facebook, takes an important place, which was later on subjected to entrepreneurial books and films (Carlson 2012). In addition, the break up between Citigroup's Jamie Dimon and Sandy Weill was greeted with astonishment by the financial world (Lie 2010). In this matter, partnership or the leaderships practices in

between, how they came together and also how they worked together is playing a crucial role. There should be a reason why Michael Eisner and Frank Wells were great partners in Disney, while Michael Eisner and Michael Ovitz could not last longer than almost a year (Eisner and Cohen 2012).

1.3. Objectives

Since the relationship of innovative pairs was identified as a literature gap, the main objective of this dissertation is to discover more about these aforementioned duos and their dynamics resulted in innovation. Regarding the innovation definition, this dissertation captures development of radically novel products, services and processes; more generally in the matter of business and strategic vision development. By gathering data and making analysis; it is aimed to contribute a value-added framework to the literature and build propositions explaining the dynamics of innovative pairs. Finding a solid pattern with regard to innovative pairs; digging deep on how they came together and evolved with time, how they interacted with each other and formed innovative ideas are the main questions intended to be asked. While doing this, effect of leadership practice in between pairs will also be associated with the defined context. In order to enlighten the above-mentioned phenomenon, in the data collection process, this dissertation will be relied on multiple sources of evidences. Based on real case studies and interviewing with innovative pairs within the accessible network, it is attempted to describe and interpret "Pairs in Innovation" phenomenon. Regarding the real case studies, globally known cases are addressed that are full of reliable qualitative data. In the matter of interviews, relatively innovative pairs from Italy and Turkey are contacted. In addition to what has been told, as a second iteration step, it is aimed to contribute to the current managerial practices of enterprises, where professionals could rely on the projected framework if successful, to foster innovation and achieve breakthrough results.

2. Literature Review

Within this section, it is aimed to explore the existing theories and researches of pair dynamics associated with innovative outcomes. By collecting information from different academic journals and related books, pairs that obtained innovative results, the path they took together, their required qualities and the leadership approach they referred to are discovered in every aspect. Since there are not many de facto frameworks or theories existing to analyze the innovative pairs, this dissertation follows the timeline of their togetherness from the moment first they met till reaching the innovative outcome. To support the information that exist in the literature and strengthen the statements, real world cases are also added to each related topic from academic journals, related books and online resources. Although not all the innovation examples by pairs given throughout the literature review section can be defined as breakthrough innovations, they produced marvelous outcomes at great organizations; and taking them as examples is helpful to understand the significance of the related topic and its linkage to the innovation.

First of all, as an opposing view, the topic of lone genius is introduced in order to explain the traditional perception of "Great Man", where the importance of personal

competences is highly appreciated for innovation. Secondly, within the section of Why Pair, to break the taboos of this traditional view, pairs contrary to popular myth of lone genius are presented. In this section, the hidden structure of dyadic relationship and its benefits over a single individual and a team are mentioned. Later on, under the title of Pair Formation, one of the most critical milestones of the innovative pairs, their gathering, is deeply investigated by answering the how and why. If it is assumed that pairs revealed innovative results are passing through different stages, formation is just the beginning. From the moment they come together till the end of their outcome, there is a long and compelling path, which in this dissertation is analyzed under the section Functioning of Pairs. Within this section, power sharing arrangement of pairs and the required de facto qualities such as complementarity, compatibility and commitment to obtain innovation are introduced. Then, the details of their working dynamics that includes the topics of confluence, interdependence, trust, criticism, communication, conflict and their benefits for achieving innovation are mentioned. Thereafter, the leadership approach they mainly refer to and the personality factor at a sufficient level within the boundaries of this dissertation are discussed. Further, under the title of Termination, it is aimed to discuss broadly whether these innovative pairs are sustaining their relationship or terminate it at some point and the reasons. Last but not least, within the section of Innovation, definitions and types of innovation, the network structure and its relation to innovation are explained by emphasizing the topics of knowledge transfer and the cognitive distance.

2.1. Lone Genius

History is full of great leaders that changed the world completely and pushed the human race forward. They dreamed and imagined on their own. They saw things differently and challenged against the status quo. For many years, societies have told the story of geniuses that achieved splendid works and influenced large number of individuals. Mohandas Gandhi for the Indian independence or Martin Luther King, Jr.

for the racial equality are just few of the singular figures that best fit with the traditional one great man rule practice (O'Toole et al. 2002; Yukl 2010).

Centuries ago, related to this fact, ancient Greek philosopher Plato stressed that leadership is possessed by only one person in any society, who is the main source of wisdom and truth (Takala 1998). It is a common assumption that leadership has always been a solo act over the years (Alvarez et al. 2007). No matter what kind of group, organization or corporation, on top of that there has been a single figure ruling the remaining and putting his signature on the results. Regarding the influence of great leaders in history, Thomas Carlyle in 1840 states that "The history of what man has accomplished in the world is at the bottom the History of the Great Men who have worked here" (Boring, 1950 p.339).

Passing from old-time revolutions to the current business world, big corporations are also reflected under the figure of one "Great Man" (Alvarez and Svejenova 2005; O'Toole et al. 2002). With the development of modern society, enterprises started to put emphasis on the significance of creativity for the innovative outcomes and directly linked the innovative performance of corporations to the individual leader figure who has the creative ideas (Hunter and Cushenbery 2011). Thinking about the innovative listed companies that appear every day on the media and magazines, one can imagine the charismatic leader crossing his arms, posing for the cameras in front of the company logo. In the literature, charismatic leadership dates back to 1987, when Conger and Kanungo stated that attribution of charisma to a leader is more likely when the leader has a vision that challenges the status quo, does everything to achieve it and attains successful results (Conger and Kanungo 1987, Yukl 2010). For example, Apple Inc., one of the most innovative company that will take its place on many lecture books in the future, is always remembered with one single name, Steve Jobs. As a common assumption, the creative output of Apple was shaped by his creative input and idea generation. In relation to that, many scholars associated creativity with individual premises such as "personality, intelligence and divergent-thinking ability" (McLean 2005; Sternberg 1999, p.250); meaning that creative ideas are born from individual qualities.

As explained above, traditional perception has always been the hierarchical singular leader, where the main focus is primarily on the leader as an individual (Yammarino et al. 2012). Whether voluntarily or as a result of their personality, many of the breakthrough innovators at the top are alone because of the common personal trait of separateness (Schilling 2018). This isolation gives the innovators ability to reject rules and norms, and probably leading them to be original thinkers. Schilling (2018) speaks of several innovative leaders such as Albert Einstein, Thomas Edison and Elon Musk as the lonely geniuses that spent most of their time with books rather than people. In parallel with this perception, several business schools have carried out to teach leadership as a singular act for years. MBA students were schooled to believe that CEO is the only person who is in charge (O'Toole et al. 2002). The trend was the concentration of power on one person (O'Toole et al. 2002). Still today, the dominant models of leadership and creativity are originated within the name of an individual: a heroic leader as in the theory of Great Man.

2.2. Why Pair?

Contrary to popular myth of lone genius, several creative and world changing ideas come in the shape of dyad. Recent years testified the foundation of innovative companies by pairs of individuals that changed the world completely. William Hewlett and David Packard, Steve Jobs and Steve Wozniak, Bill Gates and Paul Allen, Larry Page and Sergey Brin, Mark Zuckerberg and Eduardo Saverin are few of the mostly known co-founders that led the greatest innovations together. HP; an American multinational information technology giant providing hardware and software services, Apple Inc.; a technology company holding hundred thousand billions of cash, turned the markets upside down and became subject to many strategy books, Microsoft; a globally known technological revolution in computer industry with its best known operating system Windows, Google; a disruptive search engine that is now a piece of our lives and Facebook; a social media and social networking service company with

more than 2 billion active users are not just coincidences. There must be underlying reasons for these companies to be innovative and successful.

If there are so many powerful and successful pairs, one can wonder why leadership is generally perceived as a solo act. According to Hunter and colleagues (2012), one reason could be the hidden structure of the dyadic relationships. Among two, people could be aware of only one single figure. Hunter and colleagues (2012) explained this cause with the position of Steve Jobs and Tim Cook with regard to general public. Even though Tim Cook was a great influence on the company, the outsiders only interacted with Steve Jobs, who was seen as the charismatic leader. Due to this different point of views, Hunter and colleagues (2012) states the possibility of leadership dyads to be mistaken as solo leaders by scholars. Hence, the undiscovered dyadic relationships could be one of the underlying reasons of the lone genius myth.

First of all, as stated by O'Toole and colleagues (2002), the dual structure is allowing pairs to spend more time in the field and focus on their specific tasks in an efficient way. In these circumstances, by focusing on a specific target, the dual structure could be a predictive factor of pairs' success. By dividing the business into core pieces, they are able to be more effective. They can be at different places at different times and address different stakeholders simultaneously (Alvarez and Svejenova 2005).

Additionally, pair structure (or so-called co-leadership) has the greatest benefit of diversity of thought and talents. Since the ideas are the result of two different minds, they are more powerful and solid compared to single thoughts. In such dual formations, each individual can refer to his or her own strength (Miles and Watkins 2007). Talking about one of the most innovative company in the world, Apple Inc. was founded by a dreamer that conceptualized a powerful new technology and a doer that recognized the potential of that idea then shaped and marketed it (Shenk 2014). As Steve Wozniak explained in one of his interviews, their success with Jobs was due to Wozniak's engineering skills and Jobs' vision (Shenk 2014). Furthermore, related to this topic, Reid and Karambayya (2009) emphasized the need of leadership dyads to balance contradictory forces and support legitimate trade-offs due to differentiated perspectives. Similarly, O'Toole and colleagues (2002) mentioned that in pair

formations, individuals can challenge each other with their ideas in order to make better decisions and achieve stronger business results like Steve Jobs pushed Steve Wozniak all the time in order to reach the optimum.

In addition to what has been said, according to the studies of Arnone and Stumpf (2010), successful pairs lower their stress level with the division of responsibilities, which in return affect their performance and relationship positively. To make it clear, having a partner could generate the feeling of confidence, since there is someone else giving support on the other side of the task. More critically, when difficulties arise, having a partner reduces the feeling of loneliness at the top as well (Alvarez et al. 2007).

From the company perspective, management by co-leaders influence the company culture as well. The open dynamics between pairs, the way they set aside ego and working together also reflects on the mindset of employees, correspondingly creating a more positive environment in the company. One important benefit of the co-leadership at the top is that when one of the duo need to leave the company and the other one is staying, the transition phase in the corporation is overcame with less trouble compared to the situations when the solo leader is changing his position with another singular outsider (O'Toole et al. 2002).

Having all these in mind, if two players at the top have advantages over a single leader, could it also be said that more than two players at the top are even more successful than co-leaders? Briefly speaking, if two is bigger than one, could it be said that three is also bigger than two? Compared to bond formation with a group or a team, human nature is more prone to interact with a single person and this brings certain advantages. Hunter and colleagues (2012) explained the benefits of dyadic relationship in three different points.

First of all, pair formation allows efficient knowledge and idea sharing. Thus, increasing number of team members tend to reveal coordination problems. Imagine having a video chat with a single person then turn up this call into a video conference with additional members, the situation could get complicated. Secondly, pair formation or so-called dyad doesn't allow rebellion. Extension of the team size can induce

conflicts due to variety of team members. However, in a bilateral formation both sides need each other to proceed. Thirdly, it is always easy to split a reward two ways than more ways. Distribution of the winnings can create problems with additional beneficiary (Hunter et al. 2012). Furthermore, as Shenk (2014) discussed in his book *Powers of Two*, dyad formation is the most fluid and flexible form of relationships. Two people together can come to terms and make their own society, any additional member to this society can make the situation stable, which will result in less creativity. Simply put, a table with three legs make it stable and two legs are for walking and jumping. Additionally, free riding and social loafing is less compared to a larger group; nobody could hide in pair. To sum up as it was already discussed by sociologist Farrell (2001), it could be said that groups created a sense of community, purpose and audience but truly important work ended up happening in pairs.

2.3. Pair Formation

After mentioning about the reasons why dual structure is successful, one can also be curious about the triggering moment of their formation; how did such world changing pairs come together and why did they choose each other? In order to find out more about this, despite the lack of information, literature has been scanned precisely related to genesis of two individuals.

In his book of *Collaborative Circles: Friendship Dynamics and Creative Work*, Farrell (2001) states that collaborative circles are formed by individuals, who are relatively equal in status and resources; being relatively equal in economic, social and cultural capital enables balanced exchanges and keep pace in the interactions. According to Farrell (2001), for a circle to be successful, it is crucial to have wide range of exchanges. Taking this fact in mind, if there is unequal distribution of resources among members, equality in the exchanges would be more difficult.

2.3.1. How Do Pairs Come Together?

Regarding the genesis of professional duos, Alvarez and Svejenova (2005) divided the form of relationship in two principle ways, which are arising from a social relationship (so-called affective dyad) and in the course of tasked based interaction (so-called working dyad). To make it clear, affective dyads can be siblings, spouses, couples or close friends (Marshack 1998), while in task-based interaction, individuals can encounter in work-through roles (Gabarro 1987). Task based ties differ from social relationships since there are different situational and contextual parameters affecting the pair formation.

In the matter of social relationship, family is considered as a natural environment for bringing up professional duos. Starting at the early stages, exchange in between two family members could be a strong base of successful outcomes. In the example of Miramax, in 1979, two brothers Bob and Harvey Weinstein co-founded the independent film motion picture distribution and production company (Alvarez and Svejenova 2005).

Concerning the task-based interaction, the state of being close is considered to be one of the most important building blocks for top managers in building stable relationships (Alvarez and Svejenova 2005). Distance in this sense, is one of reason how two individuals can come together. Two employees working together in the same company can find the opportunity to unite and start their own business. One example related to work proximity is the professional duos John Whitehead and John Weinberg at Goldman Sachs that started to be partners at the company's office (O'Toole et al. 2002). Also, as in the case of Jerry Greenberg and Stuart Moore; they met in the Cambridge Technology Partners as consultant employees and together became the co-founders of Sapient Corporations (Alvarez and Svejenova 2005). Furthermore, co-founders of the Nest, Matt Rodgers and Tony Fadell, previously worked together at Apple (Bergstein 2014).

According to Shenk (2014), meeting of pairs can be divided into three main forms, which are introduction by a mutual party, encountering at a place of common interest and chance meeting that turned out to be driven by a subterranean similarity.

People match friends that they think they have things in common. In 1971, Bill Fernandez introduced one high-school friend Steve to another Steve, who is living on the same block with Fernandez. In one of his interviews Fernandez told the world changing moment as *"Steve Jobs bicycled over to hang out with me and do electronics projects in the garage, and out in front was [Steve] Wozniak washing his car. So, I thought to myself, Okay, this Steve is an electronics buddy. He's an electronics buddy. They'd probably like to meet each other."* (Shenk, 2014 p.36). In the case of Charlie Munger and Warren Buffet, Davis family arranged a meeting for the two men that reminded each other in the eyes of many people (Eisner and Cohen 2012). Going back to older times, Józef Kowalski introduced his young Polish friend Marie Skłodowska, who is in need for a lab space, to a physicist called Pierre Curie (Shenk 2014).

Additionally, as Farrell (2001) calls, "magnet places" are the locations that people with common interests meet. "Magnet places serve the function of putting like minds together" (Alvarez and Svejenova 2005). Schools and laboratories are few of the best examples for such places. It is a common fact that universities like Stanford, Harvard and Cambridge has been a nest for the co-founders of world changing companies for years. Co-creators of South Park; Matt Stone and Trey Parker met in a film class at University of Colorado, Larry Page and Sergey Brin met on a tour at Stanford University, co-founders of Yahoo Jerry Yang and David Filo also met at Stanford University or James Watson and Francis Crick met at Cambridge University's Laboratory. As Nicholson (2000, p.179) mentioned, *"One could say that the whole of Silicon Valley stems from gangs of young men who carried on playing together beyond their college years"*. Indeed, magnet place does not have to be a place only, it can also be an event lasted for hours; as in the example of Facebook's CEO Mark Zuckerberg and COO Sheryl Sandberg at a Christmas party of a Silicon Valley entrepreneur (Shenk 2014).

Finally, some meetings can be accidental without any common party to influence the cross of each individual's path. As in the example of fashion designer Valentino Garavani and architecture student Giancarlo Giammetti; they came across at a cafe in Rome, resulted in the creation of world's one of the most successful fashion brand (Shenk 2014). Although the meeting of Valentino and Giancarlo seems like accidental without any common party mediation, inevitably there are many underlying reasons that caused both to be at the same cafe; turning the meeting point into a magnet place.

2.3.2. Why Do Pairs Select Each Other?

In addition to what has been said regarding the ways of pair genesis, homophily can absolutely be considered as a remarkable factor for why of their genesis. Homophily "is the principle that a contact between similar people occurs at a higher rate than among dissimilar people." (McPherson et al. 2001). Briefly speaking, it is the reason why an individual can get along with another individual well. As McPherson and colleagues (2001) described, homophily is an indicator to define the network distance in terms of social characteristics. Correspondingly, the social network structures influence information and learning transfer among individuals (Boucher 2012). According to Lazarsfeld and Merton (1954), homophily can be distinguished in two different types, which are status homophily and value homophily. Status homophily includes the sociodemographic characteristics such as race, ethnicity, sex, age and acquired characteristics like religion, education, occupation, behaviour patterns. While on the other side, value homophily is based on values, attitudes and beliefs; characteristics that shape future behaviour. As Lazarsfeld and Merton (1954) mentioned, people start with status homophily and then move to the latter one since it is the derivative of the social positions.

One of the most crucial factors of homophily is for sure space; people are more likely to have contact with people who are not away. As Zipf (1949) stated, connecting to people who are distant always take more energy than those who are nearby. Moreover, family is a biosocial substrate that connects people to who are similar and

different simultaneously. The structure of the family ties (to set an example; a marriage bond) are different than those of more voluntary and less intense structures such as co-membership, co-employment or friendship (McPherson et al. 2001). Furthermore, organizational focus such as school, work and voluntary organization provide the great majority of ties (McPherson et al. 2001). As supported by Feld's (1981, 1982, 1984) argument, focused activities are the way of fostering formation of personal relationships by putting them together.

On top of everything, one last factor of pair formation is inevitably trust. Without the feeling of trust, genesis process would not be solid and long lasting. As stated by Gronn (1999), "trust" is essential in the matter of institution building or expansion, which each party is deeply committed. According to Shenk (2014), confidence and trust are synonyms. The distinction is that: confidence is "about what you expect to do with a person", while trust is "how you regard that person". As economist Robert Shiller defines trust as "an emotional state that dismisses doubt about others." (Shenk, 2014). Not long after Steve Jobs and Steve Wozniak met, they build a gadget called "blue box", which is able to hack phone lines and make free long-distance calls. This gadget helped them to build confidence and work together, as Steve Jobs mentioned; they trusted each other to build up something and put it to production (Shenk, 2014). In other words, trust was the building block of this pair formation, and accordingly they built Apple, one of the most innovative company of all times.

2.4. Functioning of Pairs

After mentioning the crucial points of dual structure and the essences of pair formation, it is also important to set place for how pairs perform together at the path of their innovative outcomes. Within this context, power sharing arrangement of pairs, their working dynamics in between, required qualities of being together and most importantly their relationship are the main issues of concern leading these dyad structures to innovative outcomes. Thinking pairs in innovation as a long-life cycle process, what has been analyzed until now was just the tip of the iceberg. From the

moment they meet until reaching the innovative outcome, pairs are passing through long and compelling path, which in this dissertation will be analyzed under the title of Functioning of Pairs.

2.4.1. Power Sharing Arrangement

In contrast to traditional notion of top-down influence, power sharing methodologies can be encountered everywhere. Döös (2015) states that in ancient Rome, two officers of the state performed power sharing system; each individual officer had to have a colleague with equal authority. Furthermore, solitary leaders throughout the history have been always supported by talented people and sharing the power at the top. Without the joint efforts of important Indian leaders, Mohandas Gandhi would have failed in his rebellion or without the contribution of impressive leaders, Martin Luther King, Jr. would have been unsuccessful for the racial equality. As a matter of fact, sharing the power among people could assist to achieve the task in an effective and efficient way.

According to a survey that took place in 2002, by MassMutual Financial Group/ Raymond Institute American Family Business, 13% of the sample companies had two or more co-CEOs and more than 35% of the companies uttered that they would consider such power sharing arrangements in the following generations (Alvarez et al. 2007). Today, the organizational structure that authorize duos to control the power and authorize them to head the business is not only exclusive to large companies anymore. From large corporate companies to small newly born enterprises, from rooted family businesses to inexperienced startups, one can easily realize the power sharing arrangement at the top levels of management.

Two different individuals at the top means two different identities. Individual differences of pairs in terms of knowledge, awareness and creativity shape their relationship, as it creates a chance for pairs to discover and take advantage of new opportunities (Harper 2008; Venkataraman 1997). As regards to Alvarez and colleagues (2007, p.12), in order to create a successful cooperation at the top, relationship of the

co-leaders should demonstrate "complementarity, compatibility and commitment" qualities. These characteristics can be identified as the building blocks of an effective partnership in order to be prospering.

2.4.1.1. Complementarity

Complementarity is defined in dictionary as the state of working usefully together. According to Gronn and Hamilton (2004, pp.16-7), complementarity means that "two individuals are perceived as bringing attributes to their joint work that are both separate and distinct, but which also blend harmoniously". When two individuals come together, it is an inevitable necessity for both sides to function collaboratively. Among many phenomenal innovative pairs, complementarity can be identified as a common quality that they have in their power sharing arrangement. As in the case of Steve Jobs and Steve Wozniak, one was the "dreamer" or the "nerd" that conceptualized the influential technology and the other one was the "doer" or the "hippie" that shaped the idea and marketed it (Shenk 2014). Likewise, despite the intensive collaborative relationship with Steve Jobs, Tim Cook was an opposite polar regarding the working style and personality (Hunter et al. 2012). Yet, as former CEO of Apple Inc., John Scully, mentioned in one of his interviews that "Steve Jobs cultivated customer loyalty, based on incredible products, while Tim Cook used the Apple reputation to build a brilliant business model" (Aiello 2018). Related to this fact, in the dualism concept of yin and yang, opposite forces may become complementary and enhance each other; just in the case of entire universe that is made out of opposite poles (Shenk 2014).

In the literature different authors classified complementarity in different forms. Examining Alvarez and colleagues (2007), they define complementarity in terms of expertise, experiences, skills, styles and networks; while on another side Miles and Watkins (2007) identify complementarity through more structured perspective by dividing it into four segments, which are task, expertise, cognitive and role complementarities.

To start with, task complementarity is a result of the current complex structure of the business world. According to task complementarity, work responsibilities are divided between the leaders, such as internal and external or business unit A and business unit B (Miles and Watkins 2007). Following this, some other possible task divisions mentioned by O'Toole and colleagues (2002, p.78) are divisions according to "interests (innovation vs. operations), skills (technology vs. people) or personality bent (strategy vs. implementation)". One common example in this state is that usually CEOs are responsible from the management of external environment, while COOs often concentrates on internal issues of the entire company (Miles and Watkins 2007). A specific example of task complementarity can be the approach of Zuckerberg, the co-founder of Facebook, to Saverin because of Saverin's vision and knowledge about business. Zuckerberg was mostly interested in the implementation part and wanted to collaborate with a person with business skills (Carlson 2012).

Besides the task complementarity, expertise complementarity also plays an important role for co-leaders to overcome the complex structure of the business world. Single individuals are not always able to encounter each difficulty on their own, especially the enterprises with a huge range of competencies require variety of knowledges at the management to survive. A CFO with marketing and sales background could be successfully complemented by a COO with finance and accounting background. As mentioned by Alvarez and Svejenova (2005, pp.118-9), there are several task complementary couple examples such as, "Lazaridis (the "science buff") and Balsillie (the "business maven") at RIM (Research In Motion); Honda (the engineering mind) and Fujisawa (the manager) in the early days of Honda Motor Corporation; Steve Friedman (the trader) and Robert Rubin (the investment banker) at Goldman Sachs; Antony Burgmans (with a marketing background) and his now former co-chair Niall FitzGerald (with financial experience) at Unilever". Through different backgrounds and beliefs, above mentioned cases fostered the complementarity at the top to better deal with complexity of their businesses.

One other type of complementarity is cognitive complementarity, which aims to create variety in "how people process information" (Miles and Watkins, 2007 p.3). It is

important to mention that this type of complementarity is not easy to measure quantitatively. An example given by Miles and Watkins (2007) about cognitive complementarity is seeing the big picture versus focusing on details. This division is common to many prospering pairs. With regards to Synopsys, a successful company in the programming and software industry, CEO Aart de Geus is the "idea-a-minute visionary", while COO Chi-Foon Chan stays grounded in the realistic goals and details (Miles and Watkins 2007). Further, in the case of Michael Eisner and Frank Wells from Disney, Eisner can be portrayed as the creative one, who is coming up with great ideas all the time. Yet, as he mentioned in his book, in the way of creative success; having people around who support creativity with an economic foresight is the second most important aspect after generating ideas (Eisner and Cohen 2012). For Eisner, Wells was the one defining the boundaries of his creativity box through financial standpoint.

At last but not least, role complementarity points out that power sharing leaders at the top have different social roles towards others such as acting the good cop versus bad cop (Miles and Watkins 2007). O'Toole and colleagues (2002) explained the role division through several examples. They mentioned Bill Hewlett as the 'heart' of the organization, while David Packard was the 'guts' of HP. According to them, matching "emotional leaders" with "task leaders" was a way to achieve successful pairs (O'Toole et al., 2002 p.74). Similarly, Miles and Watkins (2007) explained the role complementarity by setting up an example during internal reorganization of the company. They stated that, during such change, one leader can play the "guardian" role, the one who is more prone to conserve the good things, and the other can play the "entrepreneur" role, the one who is willing to challenge and change 'the unpleasant' (Miles and Watkins, 2007 p.5).

Besides the structure of complementarity, it is important to understand the influence of complementarity on pairs. According to Gronn (2002), complementarity enables co-leaders to bring their strengths into prominence. Ability of pairs to focus on their strengths, both in terms of skills and emotional capabilities, is a consequence of aforementioned complementarity structure. An additional advantage of complementarity is that, it creates an opportunity for pairs to improve their skills

through learning from each other's strengths. Eventually, the interrelated traits of pairs resulting in successful or unsuccessful outcomes allows pairs to experience common emotions, which helps them to create a stronger bond through trust and peer support (Gronn 2002).

To sum up, complemental characteristics of co-leaders and the role division between them might be crucial to establish a balanced relationship and maintaining it. In the field studies of Gronn and Hamilton (2004, p.17), one employee described his top-level co-leaders by stating that they are "so different" yet "they seem to work really well together". Even though pairs might look "odd", "unlike" or "opposite" at first sight due to their different skills, their complementary abilities and styles could be very powerful when combined (Gronn, 1999 p.56). However, it is important to mention that, not all complemental people form a flourishing pair or last long enough to create prospering outcomes. Besides complementary skills or expertise, the pairs also need to form several other attributes.

2.4.1.2. Compatibility

Compatibility is defined in the dictionary as "the state in which two things are able to exist or occur together without problems or conflict". Shenk (2014) verbalized compatibility of individuals as "chemistry" or "electricity" between two people. In the matter of two individuals that aim to work together, the quality of compatibility is an essential requirement that should be developed in order to avoid any further problems. It is a fundamental characteristic that cannot be examined simply. Since pairs need to exchange information, resources and control in order to perform in an efficient way, trust is a fundamental issue to overcome strategic situations (Arnone and Stumpf 2010). According to Alvarez and his colleagues (2007), power sharing executives could function most of their complementarity through trusting and comfortable relationship, which in other words is called emotional compatibility. Within this context, a successful example of a trust-based relationship could be seen in between Brian Grazer and Ron Howard, co-founders of Imagine Entertainment. In the book of Eisner (2012, p.106),

Howard explains their relationship with Grazer as: *"...we both agreed that we don't have to agree on everything. If I love something let me know what you think, but back me up. And if you love something and I don't, I will be dead honest with you, but only with you…"*. They accept other point of views; they understand each other, and they are always open to new opinions. To simply put, they are compatible in character and temperament. Co-leaders that are able to develop a special institution to understand each other without even saying a word is a solid illustration to describe emotional compatibility (Alvarez et al. 2007). As in the case of Facebook's CEO Mark Zuckerberg and COO Sheryl Sandberg, they have a private language in between, related to this fact Zuckerberg once mentioned: "We can talk for 30 seconds and have more meaning be exchanged than in a lot of meetings that I have for an hour" (Shenk, 2014 p.95).

2.4.1.3. Commitment

Following complementarity and compatibility, pairs need to proceed towards a common purpose in order to achieve mutually desired outcomes. Without being on the same page in the matter of vision and mission, complementarity and compatibility characteristics would not function successfully. That is why, these characteristics need to be backed by commitment. In this sense, commitment refers to creating a common purpose through "mutual values, unified decision-making criteria, and a common vision" for the sake of the company (Alvarez et al., 2007 p.12). Miles and Watkins (2007) identify shared vision as one of the crucial pillars of effective complementarity; they mention the importance of shared vision by stating that its absence could be a cause of the pair relationship to collapse. A particular example given by these scholars is linking the reason why Ed Zander left his position as COO in Sun Microsystems to the divergence of his vision with CEO Scott McNealy. Ed Zander's speech in the article of Miles and Watkins (2007, p.7) worded as follow *"I could see us start to philosophically move apart—not in a negative fashion but in an honest disagreement about the company's priorities... it was clear the relationship would no longer be productive"*. In addition, as well as divergent visions, differing incentives could damage the functioning of pairs and correspondingly could make results insufficient for the business (Miles and

Watkins 2007). For instance, co-founders of Patagonia headed different ways due to opposing ideas and planned actions they had about the future of the company after the initial public offering (O'Toole et al. 2002). According to Hunter and his colleagues (2012), in order to achieve a large-scale innovation, it is necessary to have leaders with differing and specialized skills. In this way, partnerships can allow great and innovative ideas. However, it is very crucial for such dyads to have common respect and they must place the work above their own personal desires; by aligning individual goals, such leaders can achieve substantial outcomes. Finally, in order to emphasize the importance of commitment, one can reference Pearce's (2004) words, mentioning that a leader's most crucial task is the "communication of a uniting vision".

2.4.2. Working Dynamics

It can be imagined that complementarity, compatibility and commitment are the base of a building; without having them it is not possible to construct a stable structure. In addition to such qualities, for dyads there are also essential necessities that they should possess in order to perform their daily based joint activities. These necessities can be imagined as the additional elements to construct a solid and long-lasting building in the aggregate. While pairs are working together, apart from the required skills, the dynamics in between two individuals are playing a crucial role to be prospering in the future. Hereinafter, few of the main concerning subjects related to working dynamics of pairs are mentioned.

2.4.2.1. Confluence

Looking at the successful pairs from an outside perspective, their dynamics can differ in the matter of their coexistence. For instance, name of the Google's co-founders, Larry Page and Sergey Brin, are always mentioned together as a single unit. In contrary, the innovative outcome of Apple is most of the time linked with a single name Steve Jobs, suppressing the existence of Steve Wozniak. In this regard, it is

significant to observe the coexistence of innovative pairs, or so-called their confluence, under the topic of working dynamics.

Within this context, confluence is defined in the dictionary as the situation in which two things join or come together. According to Shenk (2014), confluence can be observed in three different ways illustrated at figure 1, which are asymmetrical confluence, distinct confluence and overt confluence. To start with, asymmetrical confluence is observed when one member of the pair absorbs the other. According to Shenk (2014), asymmetrical confluence appears when only one member takes credit or is acclaimed for the outcome. For instance, Hunter et al. (2012) stated that, when Apple Inc. and its innovative results are mentioned, the general public think only about Steve Jobs, forgetting his partner, Tim Cook, who really has enormous contribution behind the scenes. In this case, instead of prejudging the relationship and their dynamics, one should bear in mind the roles and expertise of these dyad formations. The second type of confluence, distinct confluence, is defined as the situation, in which both members have individual public identity. To make it clear, it can be said that distinct pairs are recognized individually and separately by others (Shenk 2014). Lastly, in overt confluence, dual structure of pairs is recognized together as a single unit and the members are equally credited. Watson and Crick or Hewlett and Packard are the examples that have overt confluence structure, which are remembered as together all the time (O'Toole et al. 2002; Shenk 2014). The globally known HP brand or the double helix structure of DNA are always linked with the two names together. Above all, as Shenk (2014) mentioned that pairs do not always have to fit into one specific type of confluence, yet they can demonstrate different characteristics depending on the different situations. In addition to that the confluence structure of a pair, their dynamics can change over time, as the partnership unfolds.
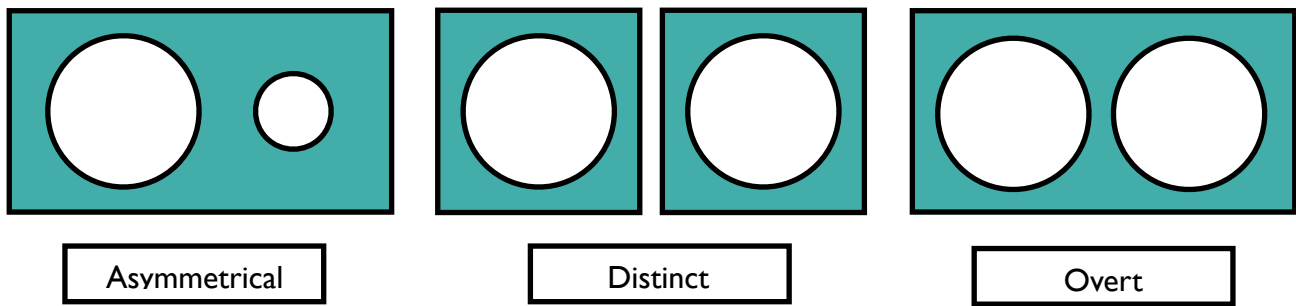
Figure 1. Types of Confluence

2.4.2.2. Interdependence

Another important factor for working dynamics of a pair is the interdependence, which is defined as "the degree to which team members must rely on the skills of others, interact, and depend on one another in order to complete and accomplish their tasks and, accordingly, reach their goals" by Fausing and colleagues (2015, p.275) following the scholars Guzzo and Shea (1992), and Wageman and Baker (1997). Additionally, Gronn and Hamilton (2004) define interdependence as being "constrained or prevented from performing work tasks autonomously". The level of interdependence can be identified as high or low, where high meaning that dense coordination of members; low meaning that completion of tasks independently, with minimum need of communication (Campion et al. 1993; Fausing et al. 2015; Guzzo and Shea 1992). Fausing and colleagues (2015) states that high level of interdependence is positively related to shared leadership yet, it creates the need of coordination and communication among pairs (Gronn 2002). The importance of the interdependence, its influence on shared leadership, and its relationship with communication are stressed by several scholars (Gronn 2002; Pearce and Sims 2000; Wassenaar and Pearce 2012; Yammarino et al. 2012). In an article, Pearce (2004), explains the cruciality of interdependence by stating that the performance of incorporated and interrelated teams surpasses the performance of individuals.

Gronn and Hamilton (2004) in their research on co-principalship, categorize the working relations in three paramount set of norms, which are complementarity, overlap

and duplication. As it can be seen in figure 2, Gronn and Hamilton (2004) define complementarity as the situation where two individuals are bringing attributes to the joint work that is separate and distinct. Regarding the idea of overlap, while two incumbents are mostly working on their preferred domains, there is also a small proportion of mutual engagement, which they substitute for each other (Gronn and Hamilton 2004). On the opposite side of complementarity, duplication is the condition that each member of the pair substitutes for each other (Gronn and Hamilton 2004).

◯ ◯	Complementarity
◯◯	Overlap
⬤	Duplication
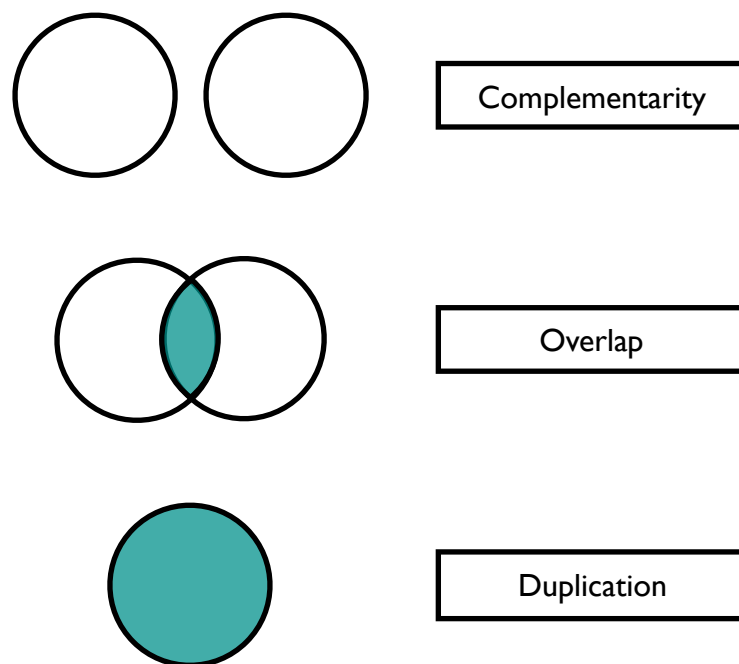
Figure 2. Interdependence within a co-principal shared role space
(Gronn and Hamilton 2004)

Moreover, interdependence has several benefits for the power sharing pair. To start with, it helps pairs to make rational decisions, since filtration of opinions by two people eliminate the subjectivity and selective attention as much as possible (Stewart 1991). Similarly, having some degree of overlapping in tasks reduce likeliness of decision errors, since pairs "tend to cross-check each other's performance" (Gronn, 2002 p.432). Additionally, as mentioned in complementarity, being in charge of interrelated but specified tasks allow pairs to work on fields that pairs are strong in terms of experience, interest and skills (Gronn 2002). Furthermore, the positive effect of interdependence on

pairs' relationship can be attributed by Koster and colleagues (2006), who mention that task interdependence has favorable effect on solidarity.

The relationship between entrepreneurial teams and interdependence is explained by Bacharach (2006) through the Game Theory. According to Bacharach (2006), two elements of strong interdependence are co-power and unsecured implications of individualistic behaviors. The definition of co-power is done by Harper (2008, p. 619) as the "power to cause particular events through joint action" and further explained by stating that individuals perceive the common outcome is achieved through combination of appropriate individual actions. Meanwhile, the latter element states that, the individuals perceive the desired outcome is reached when they choose the action for the sake of the team, instead of following the individualistic benefits (Harper 2008). This frame created by Bacharach (2006) enables the reason of individuals to act for achieving common goal of the team. Harper (2008) explains the implication of interdependence to team building by stating Bacharach's (2006) interdependence theory. Harper (2008, p. 619) states that, "Other things being equal, if entrepreneurs perceive that their decision situation exhibits strong interdependence (which includes co-power and presupposes common interest), they will be primed to identify themselves as team members and to adopt a "we-frame" in entrepreneurial problem-solving".

2.4.2.3. Trust

Building and maintaining a trustworthy relationship is one of the fundamentals of pair dynamics. Making mutual decisions within a complex business world necessitate a strong level of trust among pairs (Alvarez and Svejenova 2005; Gronn 1999; McAllister 1995). Hence, Gabarro (1979) states that the loss of trust causes pairs to have serious problems in their relationship. Similarly, Alvarez and Svejenova (2005), emphasize that the pairs cannot maintain their relationship without high level of trust, and it is essential for pairs to understand each other's motives, abilities and needs. As mentioned by Gronn and Hamilton (2004), for leader duos, trust allows other party to enter their

shared role space. They also add that trust brings strength and joy to leading an organization. Furthermore, Carmeli and Schaubroeck (2007) state that trustworthy relationships enable people to be more creatively involved in their work.

Since forming and maintaining trust is crucial for a healthy relationship, it is mentioned by Arnone and Stumpf (2010) that some firms consult coaches before promoting co-heads. The aim of this preparatory work is to introduce future co-heads to each other, prepare them for the right state of mind and building mutual trust. This precaution can be justified by O'Toole and colleagues (2002, p.72) since they state that merger-created co-CEOs might have difficulties due to being "relative strangers" that "doesn't have a basis of trust to build on". According to them, the partnership works better when an existing CEO invites someone to join, such as in the case of Bill Gates inviting Steve Ballmer in Microsoft (O'Toole et al. 2002). Joni (2004) describes the trust formation through repeated exchanges and shared experiences of colleagues at the workplace. Yet, many of the innovative pairs observed within this dissertation knew each other from different contexts before becoming work partners. In order to understand how these pairs built trust, started to work together and maintained trust over time, it is important to specify types of trust.

McAllister (1995) claim that trust can either have an affective foundation or a cognitive base. When people like each other, affective trust is formed, on the other hand, when people are trusted for their professional competency and expertise, cognitive trust is formed. McAllister (1995) also states that reliable role performance, professional credentials and cultural similarities are factors that strengthen cognitive trust. Meantime, Marshack (1998) state that affective trust is the 'glue of a duo' and such trust is observed in siblings, spouses and friends who embark upon task collaboration. In general, building both types of trust require time and mutually satisfactory interactions (Alvarez and Svejenova 2005; Gabarro 1987; Krackhardt 1992). Alvarez and Svejenova (2005) state that existing personal affection of friendships or family ties enables cognitive trust to be build faster. Existence of both types of trust leads to thick trust (Gambetta 1988; Putnam 2000), which, according to Alvarez and Svejenova (2005), allows members to unite their carriers. To clarify, Alvarez and

Svejenova (2005, p.179) define united carriers as *"durable, coordinated task collaborations in the working lives of two or more professionals in which the career of one individual evolves with that of (an)other individual(s) through a series of vertical, lateral, or cross-organizational moves that have been jointly decided and undertaken"*.

According to Gronn (1999, pp.54-7), shared values, complementary temperaments, requisite psychological space, and previous experience of collaboration are the four essential factors to develop trustworthiness among pairs. Krantz (1989) state that lack of any of these four factors leads to an unsuccessful relationship. Robert Rubin describes why his relationship with Steve Friedman at Goldman Sachs worked well by stating *"We shared the same fundamental views about the firm, trusted each other totally, kept in close touch and were both analytically minded in our approach to problems"* (Alvarez et al. 2007 pp.12-3).

2.4.2.4. Criticism

"Criticism" is coming from the Greek word "krino", which means "able to judge, value and interpret" (Verganti 2016). In his book of Collaborative Circles, Farrell (2001) points out how criticism motivate people to be innovative by giving the example of impressionism, which is an outcome of "long constructive confrontations among its creators". Although the term criticism evokes the sense of negativity, essentially it has no particular positive or negative temperament, rather it is the "practice of going deeper" in interpreting things (Verganti 2016). According to Verganti (2016), criticism is the process of going deeper by clashing together different ideas in order to bring out richer and stronger interpretation. In his entire book, Verganti (2016) stresses the fact that criticism is one of the essential necessities for the innovation of meaning, which is an inside out process, enabling not to be in stuck in personal framework of interpretation and to challenge personal cognitive frame.

With regard to the dyads, Farrell (2001) explains that pairs working together create an environment of "instrumental intimacy", in which criticism is constructive and sympathetic. In contrary to general belief, instead of damaging the relationship,

criticism improves the environment, where pairs can smoothly discuss their opposing ideas. One can observe this relationship in the creation of Nest, which is a radical innovation of smart thermostat, founded by Matt Rodgers and Tony Fadell. Developmental criticism of this pair allowed to dig deeper in their ideas and share their visions (Verganti 2016). Related to this matter, Warren Buffett once said *"CEOs get into trouble by surrounding themselves with sycophants. You are not going to get a lot of contrary thinking."* and added that his partner Charlie Munger is contrary, he enables contrary thinking with Buffett (Eisner and Cohen 2012). It is always beneficial to have a partner, who is able to criticize and think different, instead of pampering like some teachers nurture their students to encourage for better results. All in all, criticism in this matter is a way to construct better visions through clashing of ideas and develop diversified innovative outcomes filtered by stronger interpretations.

Besides, in order to learn from each other's feedback and be able to criticize, trust, which is mentioned above, plays a crucial role (Döös 2015). Without achieving it, criticism could terminate a conversation and hinder the development on innovative results.

2.4.2.5. Communication

According to Farrell (2001), creative solutions are emerged not while individuals are working alone in an isolated way, but while they are together in constant communication. Interaction among individuals, merging of minds and collaborative searches for the solutions are the ways through creative innovations. In this sense, communication is a significant working dynamic among pairs that is enabling exchange of ideas and leading to innovative outcomes. As mentioned by Alvarez and Svejenova (2005), the relationship that links professional duos is based on trust and sufficient communication. To highlight the importance, Miles and Watkins (2007) identify four main pillars of effective complementarity including communication in addition to shared vision, rewards for achieving common goals and trust. While team members are making complementary works, superior coordination and communication are the necessities.

With increasing level of complementarity work, the requirement of communication is denser (Miles and Watkins 2007). According to Miles and Watkins (2007), constant communication and well-established protocols avoid the potential divergences in effective complementary teams. Regarding the huge organizations that are controlled by co-heads, getting the same answer from each chief is important for the faith of the work done by employees. Related to this fact, former PepsiCo CEO Reinemund, recalling with his relationship with CFO Nooyi, states that they were connected enough to avoid such situations (Miles and Watkins 2007).

On the other hand, while constant communication is a significant element for pairs to be successful, one must be aware of the fact that too much of everything is harmful. In order to practice and focus on personal responsibilities, it is necessary to secure sufficient space for each individual (Gronn 2002). For each member to develop personal competencies, adequate space and autonomy are required besides the effective level of communication. In addition to these facts, Shenk (2014), stresses the importance of space in between pairs by the following words: *"To thrive for the long term, pairs need more than closeness. They must also find an optimal distance from each other, carving out sufficient space in which to cultivate distinct ideas and experiences in order to give a partnership an ongoing frisson"*. There should be a certain amount of separation of pairs, which could contribute to the individualization and long-lasting relationship. As in the case of Michael Eisner and Frank Wells, they stopped sharing the same office in order to be more comfortable with their relationship and, started to communicate and share the news constantly from phone calls or visiting each others' offices (Eisner and Cohen 2012).

2.4.2.6. Conflict

The dynamic work environment, complexity of the tasks and continuous need to change, learn and develop could lead to disagreements about decisions between the pair members. Such disagreements are labeled in social science field as conflict and defined as "perceived differences or incompatibilities, where discrepant views or

interpersonal incompatibilities contribute to the tension of conflict" (Jehn, 1995 p. 257). Deutsch (1969) defines two types of conflict as task and emotional; while Jehn (1997b) has mentioned process conflict as the third type.

To start with, task-oriented conflict is related to making significant choices. Reid and Karambayya (2009) refer funding or special projects as possible reasons of task conflict in pairs, and state that this type of conflict is usually resolved between pairs themselves. Literature states that this type of conflict is actually beneficial for creativity, constitutes well thought decisions and is positively linked to performance (Amason 1996; Eisenhardt 1989b; Mainemelis et al. 2015; Pearce 2004; Peterson 1997; Reid and Karambayya 2009). Similarly, Hunter and colleagues (2012) state that conflict challenges ideas, which is essential for sparking creativity. Likewise, creativity, scholars (Hunter and Cushenbery 2011; Mumford et al. 2003; O'Connor 1998) mention that, adequate level of conflict is required for innovation: when leaders open up their ideas, a healthy level of conflict shapes and refines the input, ensuring the output to be innovative.

Another type of conflict is emotional conflict, which is defined as discrepancy over personal values that contain emotions such as anger and enmity (Reid and Karambayya 2009). According to Reid and Karambayya (2009), even this type of conflict is kept between the pair for some time, it might eventually disseminate to the rest of the organization.

Lastly, the final type of conflict is process conflict which results from the disagreements about task and responsibility distribution among the group (Hinds and Bailey 2003; Jehn 1997b). Reid and Karambayya (2009) states that when one member of the pair goes beyond his duty or when there are different perspectives within the pair about how one task should be done, process conflict can occur. Since this type of conflict might result in emotional conflict easily (Jehn 1997b), it is better to have defined roles and responsibilities from the beginning of the relationship (Jehn and Mannix 2001). However, as narrated afore, due to complementarity and interdependence characteristics of power sharing arrangement, sharp definition of tasks is not simple.

Scholars agree that conflict should be managed rather than being avoided or directly eliminated (Brown 1983; Thomas 1998; Reid and Karambayya 2009). Indeed, as stated above, right amount of conflict is beneficial for the pairs (Mainemelis et al. 2015; Pearce 2004; Reid and Karambayya 2009). Alvarez and colleagues (2007) state that, pairs should learn to compromise in order to find a common solution and handle conflict privately to avoid possible confusions in the organization. Meanwhile, Fjellvær (2010) approaches the subject in a more structured way and state that conflict can be managed by relational (developing relationships), structural (separating or joining domains) or cognitive (understanding alternative logics) practices, yet, his approach targets teams, rather than pairs.

2.4.3. Leadership

Apart from the above-mentioned characteristics of power sharing arrangements and working dynamics, pairs passing through innovation processes must have proper and effective relationships both in between each other (internal) and towards outsiders (external). Pairs could have the greatest ideas and resources, but without the capability of engaging each other or people outside, achieving the shared purpose would be hard to reach. Sharing the power at the top and performing together to create innovative outcomes requires particular traits. Within this context, relationship of pairs can be analyzed under the topic of leadership, which harbors plenty of intelligences in the literature.

Besides having the requisite capabilities and complementary assets, paramount importance is having the right leadership type to conduct the innovation process efficiently and effectively (Oke et al. 2009). As Oke and colleagues (2009) mentioned, depending on the organizational context, recognition and development of the appropriate leadership is crucial for accomplishing innovative outcomes. In the literature, one can encounter with different types of leadership practices. For instance, transformational leadership is based on the inspirational motivation, in which leaders motivate their followers by providing challenge and meaning and developing vision for

the future at the same time (Oke et al. 2009). This leadership approach enables leaders to "motivate team members to go beyond self-interest and focus on group goals" (Currie and Lockett 2007; House and Baetz 1979). Moreover, there is transactional leadership, which is defined as "emphasizing the transaction or exchange of something of value the leader possesses or controls that the employee wants in return for his/her services" by Oke and colleagues (2009). It is based on the assumption that reward based system motivates the followers. Despite the fact that transformational and transactional leadership seems like two different poles, they are complementary traits, and both are necessary for organizational performances (Oke et al. 2009). As Oke and colleagues (2009) state, transactional leadership is effective in more stable and predictable environments, while transformational leadership succeed in relatively uncertain and unstable environments.

Regarding the organizational structure of pairs, above mentioned leadership traits could be categorized as vertical relationships that they have towards people outside their inner circle. If one comes to think about pairs together as a single unit, transformational and transactional leadership approaches are towards to outsiders (external) who are influenced by the engagement of pairs. Yet, the main focus of this dissertation is the internal relationship of pairs. In the literature, different from the traditional leadership approaches, one can encounter the subject of shared leadership, which is the horizontal relationship of pairs (relationship in between) and related to peer influence.

2.4.3.1. Shared Leadership

When analyzed, even though shared leadership is widely used with the similar definitions and characteristics in the literature, different scholars may use different labels to define this power sharing approach. Shared, distributed, collaborative or collective are some of the words that are used to define power division among individuals (Denis et al. 2012). According to Mainemelis and colleagues (2015), despite the existence of different labels, the main idea given by the scholars was always the same; which is

plurality of the leaders, plurality of the leadership roles and a dynamic leadership process with high level of interactions.

Contrary to the traditional leadership models like transactional and transformational approaches, herein, instead of centralized power; leadership is distributed among individuals. In the shared leadership approach, it is assumed that leadership is a set of role functions that can be accomplished by different individuals in different ways (Yammarino et al. 2012). By definition, leadership is the process of doing things through the efforts of others, and in order to achieve something, a business leader alone cannot affect the performance of the company on its own (O'Toole et al. 2002). According to Morgeson and colleagues (2010), shared leadership can be depicted as a team leadership model, which is internal and informal. Moreover, as Carson and colleagues (2007) state, it requires the distribution of leadership influence across different individuals, which is in contrast to the vertical leadership models. Depending on different need of moments, in shared leadership, one can step up and hold the lead for a while but then step back and let other members to lead. According to Yammarino and colleagues (2012), share leadership necessitates sharing information and sharing power among team members, especially at the dynamic environments. Furthermore, shared leadership is a concept with the absence of hierarchical authority, where individuals influence each other by their unique perspectives, knowledge and capabilities (Pearce and Conger 2003). Shared leadership is the situation, where each member is engaged in leadership and collaborate on the decision-making process (Hoch 2013). Related to this approach, French philosopher and writer Albert Camus once said: "Don't walk behind me; I may not lead. Don't walk in front of me; I may not follow. Just walk beside me and be my friend.", which best explains the concept of shared leadership. Lastly, one can find the concept of shared leadership in the nature itself. Thinking about the geese flying in the v-shaped formation best demonstrate an example for the above-mentioned shared leadership approach. According to the need and the moment, the leader goose in front is always changing while they are flying over long distances. In other words, dynamic structure of the work environment requires

team members to openly communicate, share information and exchange roles (Yammarino et al. 2012).

2.4.3.1.1. Shared Leadership in Pairs

Although shared leadership is widely linked with a large number of individuals, or especially with a team, this dissertation mainly focuses on shared leadership structure of dyads. Today many of the global organizations are placing co-CEOs at their control as a response for the world's increasing complexity. Increasing usage of duos on the helm of an organization has resulted in new challenges related to the management of these newborn structures (Hoch 2013). One approach in this context is the shared leadership; "a dynamic interactive influence process among individuals in groups, for which the objective is to lead one another to the achievement of group or organizational goals or both" (Pearce and Conger, 2003 p.1). Actually, even though shared leadership of pairs is not frequently mentioned in the literature, this concept is not new nor unusual. At the top of major corporations of the U.S, there are several past and current examples of shared leadership. Even, there are plenty of companies like Goldman Sachs that are referring to this model as a tradition in the management and administration for many years (O'Toole et al. 2002). Co-leaders arised from corporate mergers of equals, company co-founders, two individuals sharing the job or two different CEOs are the possible origins of shared leadership that are mostly observed in between pairs (O'Toole et al. 2002).

According to de Voogt and Hommes (2007), the distinction between shared, co- and dual leadership is complicated. In order to make sense of different leadership arrangements, they built shared leadership quadrants for executive duos. As it can be seen in the figure 3, two dimensions of leadership relations, which are division of labor and hierarchy are distinguished. De Voogt and Hommes (2007) state that co-leadership is hierarchical and involves division of labor. On the contrary, dual leadership is the state where duos are equal at the hierarchical level. Regarding the merged leadership arrangement, there is neither the hierarchy nor the division of labor. Finally, in the invited leadership arrangement, there is one official leader and invites other to share

the power. With respect to de Voogt and Hommes (2007), leadership arrangements are not always static, meaning that shifting from one quadrant to another is possible over time. This change is mainly dependent on the requirements of the time and personal attributes of each decision, where the pair reposition itself within the quadrants (de Voogt and Hommes 2007).

Hierarchy/ Division of Labor	Overlapping Tasks	Separate Tasks
Subordinate Relation	Invited Leadership	Co-Leadership
Equality	Merged Leadership	Dual Leadership

Figure 3. The shared leadership quadrants (de Voogt and Hommes 2007)

Last but least it is important to stress that while history is full of successful shared leadership cases such as HP's Hewlett and Packard, Berkshire Hathaway's Buffett and Munger, ABB's Barnevik and Lindahl, there are also shared leadership examples ended up in failure as well. O'Toole and colleagues (2002) account for this contradiction and state that partnership of two heads at the top is better than solo leader "when the challenges a corporation faces are so complex that they require a set of skills too broad to be possessed by any one individual". In connection with this, Fausing and colleagues (2015) say that shared leadership is effective for the team performance when the work areas are complex, requiring accurate decision making.

2.4.3.1.2. Shared Leadership and Innovation

According to Schumpeter (1934), one of the most influential economists of the 20th century, innovation is "the commercial or industrial application of something new; a new product, process, or method of production; a new market or source of supply; a new form of commercial, business, or financial organization". Together with, creativity is

defined as "the generation of ideas that are both novel and useful or serve a purpose (Amabile et al. 1996). Researchers (Amabile 1996; Huelsheger et al. 2009) stressed that there is an important link in between these two terms, innovation and creativity; innovation in complex organizational structures is achieved through two main stages, which are the generation of new and functional ideas (referred as creativity) and implementation of these ideas in the organizations. As Amabile (1988) mentioned, innovation is built on creative ideas as the core elements.

Correspondingly, several studies mention the link between plural leadership forms and creativity. Although the importance of personal vision and skills is unignorable, creativity is rarely an act of a lonely genius (Mainemelis et al. 2015). Hargadon and Bechky (2006) mentioned that creativity is achieved when individuals bring together experiences, point of views and ideas to solve a problem. Harvey (2014, p.328) gives the example of Pixar and highlighted that "the critical creative moment at Pixar comes not when group members diverge but when they synthesize diverse ideas". Regarding to this fact, Hunter and colleagues (2012) also pointed out example of dyads such as Steve Jobs and Tim Cook, Robert Oppenheimer and Leslie Groves to state the effect of creativity born within the pairs and lead to innovation.

Taking these in mind, shared leadership approach is the distribution of tasks, which could be an efficient way of managing and administrating strategic moves, and correspondingly contributing to innovation. Researches on the model of shared leadership show that there are several benefits such as improved team effectiveness and enhanced team performance (Ensley et. al 2006; Hmieleski et al. 2011; Pearce et al. 2004). Additionally, there are certain factors such as role complementarities that can increase the success of organizations, which are planning to switch their structure into shared leadership (Yammarino et al. 2012). According to Pearce and Sims (2002), shared leadership surpasses the effects of vertical leadership in the matter of team outcomes. Since the effects of shared leadership in the team-based structures is significant and it is suitable for handling the competitive environment, one possible outcome of this approach is the innovative behaviour of team (West and Farr 1989). Following West and Far (1989), innovation is crucial in the sense of affecting organizational change and

creating competitive advantages. In today's modern world, it is a necessity to understand the relationship between shared leadership and innovation, since innovation became essential for companies to remain competitive and survive in the long term (Amabile 1988; Ancona and Caldwell 1992; Kanter 1988; Mumford 2000). As it is mentioned by Hoch (2013), even though there are limited amount of studies about the linkage of innovation and shared leadership; there is a key role of shared leadership for promoting the team's ability to adapt changes and correspondingly creating innovative outcomes.

2.4.4. Personality

As mentioned before, shared leadership is an approach, in which tasks are managed efficiently, in return contributing to innovative outcomes. Taking this fact in mind, Hoch (2013) states that the level of engagement in shared leadership may be impacted by personality factors, which act upon "loyalty, transparency, fairness, or rather than promoting one's self interest in achieving personal goals". To verify this fact, as assumed in the trait theory, leadership is depended on the personal qualities of the leader (Judge et al. 2002). For instance, every individual is different and not everybody is creative or has creative abilities to achieve innovative outcomes. Considering this fact, it can be said that the major reason behind this is the different personalities of individuals (Chen and Chen 2008).

According to the research of Nakao and colleagues (2000) personality traits are related to socioeconomic status and maternal participation in child rearing. This fact is also supported by Triandis and Suh (2002), who state that culture influences and shapes personality. Moreover, according to Silvia (2006) personality traits are connected to interest, exploration and intrinsic motivation of individuals.

According to Steel and colleagues (2011), personality is made out of complex trait configurations. In the literature, there are plenty of studies examining the possible linkage between personality traits and the innovation. Relatedly, personality is defined through different structural models in theory, defining the personality of an individual in

different ways. For instance, the Five-Factor Model (FFM) or also known as the 5 Big Personality Traits is one of the dominant models, studying the personality under 5 factors, which are neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (Steel et al. 2011). Moreover, Myers-Briggs Type Indicator analyzing 16 personality traits, Whole Brain Model by Ned Herrmann and Personality Type A/B are few of the other models to identify individuals in the matter of their personality characteristics. Different from the existing models, Deloitte also developed a list of business relevant traits and preferences by the consulting of biological anthropologist Helen Fisher. It is named as Business Chemistry Test, which identifies four different work styles related to the personality traits of employees and their combination results in the creative outcomes (Vickberg and Christfort 2017).

Yet, instead of focusing more about these structural models and different personality traits, this dissertation is more interested in the personality traits of pairs as a whole and its linkage to innovation. Unfortunately, regarding to this linkage, literature is lacking information, but in his book Shenk (2014) mention the relationship between order and disorder. Like in the case of Zeus's two sons, Dionysus and Apollo, "they embodied the sensual, spontaneous, and emotional aspects of man (the Dionysian) and the rational, ordered, and self-disciplined aspects (the Apollonian)." (Shenk 2014). "In the Birth of Tragedy", Friedrich Nietzsche (1995) also described these two different oppositional tendencies as the core of creative work. Bearing this fact in mind, anti-pole personalities of dyad can be linked to creativity, which is the main ingredient of innovation. As previously mentioned in the complementarity section, harmonious blending of different poles can be effective in collaborative work.

2.5. Termination

As all good things come to an end, pairs can also terminate their long lasting and fructiferous relationship. Until now, coming together of pairs and their functioning for innovative outcomes have been discussed. Hereupon, it is aimed to broadly touch on whether these innovative pairs are sustaining their relationship or terminate it at

some point. Even though, among the innovative pairs there are some examples of failed partnerships including Unilever, Kraft and Omnimedia, several firms successfully sustain their relationship by referring to the shared leadership structure such as in the case of Goldman Sachs and Citigroup (Arnone and Stumpf 2010). As it can be seen from the mentioned examples, pair relationship can either end or keep going, which is mainly depending on the pairs themselves.

When the termination of innovative pairs' relationship is taken into consideration, voluntary resignation is a way, which happens when one member decides to leave the ongoing relationship (Alvarez and Svejenova 2005). For instance, the co-CEO structure of Dave Pottruck and Charles Schwab in Charles Schwab Corporation ended when Schwab stepped aside and Pottruck continued as the solo CEO (Arnone and Stumpf 2010). Yet, according to Shenk (2014), many individuals in pairs find it difficult to adjust themselves back to circulation when they lose their partners. Moreover, company's board or insufficient results could be another way to terminate the pair relationship inevitably (Alvarez and Svejenova 2005). O'Toole and colleagues (2002) correspondingly state that, if the termination is not through voluntary resignation, usually one partner dominates the board and forces the other out.

The reason why these professional duos terminate their relationship is highly dependent on the individuals. At this point, previously mentioned issues such as trust related to shared context, shared leadership approach, working dynamics and power sharing arrangements are playing key roles for the continuation of the dyad structure. For instance, according to Alvarez and Svejenova (2005), many duos born through mergers and acquisitions terminate within two years. Here, lack of shared context and the bring along effect of trust could be the key reason for their termination.

Moreover, as in the case of Ford motor company, Red Poling and Donald Petersen were competing against each other and failed at shared leadership approach. By putting aside their personal competition, they both saved their relationship, which was about to terminate (O'Toole et al. 2002). Similarly, Michael Eisner terminated his relationship with Michael Ovitz, since they were competing for drawing attention rather than focusing on the shared success (O'Toole et al. 2002). Additionally, Citigroup's co-

leaders did not have sufficient level of communication, which led them to develop diverging views and opinions about the company (O'Toole et al. 2002). In the case of Patagonia, co-founders of the company decided to go to separate ways once they have realized that they had different perspectives about the company future (O'Toole et al. 2002). In depth analysis, Alvarez and Svejenova (2005) categorizes the termination of Sun Microsystem's co-leaders McNealy and Zander in three factors. Firstly, according to Alvarez and Svejenova (2005), the ten-year long relationship of these co-leaders contained collaboration, respect and appreciation but not deep affection. Secondly, acting as co-CEO but formally sharing a vertical structure as CEO and COO was one of the reasons for the dissolution. And last but not least, the difficulties faced by the company in the last year of their collaboration resulted in frictions between two leaders, since McNealy intervened more into daily tasks of the management side.

One well-known example of termination is the split of Facebook's co-founders, Zuckerberg and Saverin, at the very beginning of the company's life. Even though their famously known separation is discussed in several platforms, the reasons of the split are very common. According to Carlson (2012), the very first reason is the lack of cultural commonality between the co-founders. The lifestyle and sense of entertainment for Zuckerberg in Palo Alto was relatively different than the lifestyle of Saverin in the East Coast. Secondly, they had different thoughts and visions about the operation progresses in Facebook. For instance, Saverin run ads of a startup for free, without the authorization of Zuckerberg. Yet, according to Carlson (2012), the breaking point of duo's relationship was when the company needed funding but could not proceed without Saverin's approval, who was one of the biggest shareholders of the company. In Zuckerberg's words, he had to cut Saverin out of the business due to his refusal to 'co-operate'.

On the other side, there are several pairs that managed to keep their relationship for decades. Such examples are "Honda and Fujisawa at Honda, Weinberg and Whitehead and later Rubin and Friedman, at Goldman Sachs" (Alvarez and Svejenova, 2005 p.127). Some professional duos can extend their relationship even more and unite their carriers. United careers are defined by Alvarez and Svejenova (2005) as a true

collaboration of pairs depending on the strength of their relationship and the joint career decisions they make. Such formation is seen when pairs form instrumental intimacy, in which pairs "openly borrow one another's ideas, sympathetically criticize one another's work in progress and in other ways establish interdependence in their cognitive processes" (Farrell, 2001 p.160). Alvarez and Svejenova (2005, p.175) argue that united career pairs "exhibit a tighter coupling of the relationship" since they also take into consideration each other's career paths when making career choices and end up in joint decisions.

Literature claims that united career examples are seen frequently in entrepreneurs, especially the family-related ones and the co-founders (Alvarez and Svejenova 2005; de Bruin and Lewis 2004; Marshack 1998). Co-founders of HP, William Hewlett and David Packard, or co-founders of Microsoft, Bill Gates and Steve Ballmer, are the well-known examples of united careers. Another case of this kind of relationship is Akio Morita and Masaru Ibuka, the co-founders of Sony Corporation. Alvarez and Svejenova (2005) state that their relationship and instrumental intimacy allowed them to overcome their problems. Ibuka's son explains their intimacy by stating "They were bound together by a tie so tight it was more like love than friendship. The connection was so deep that not even their wives could break into it when they were together" (Nathan 1999, p. 2).

2.6. Innovation

Besides all of the above-mentioned topics, it will be beneficial to talk about what is innovation in a comprehensive way. Since now, pairs on the way of their innovative outcome was introduced deeply without going into detail with the word "innovation", yet this section aims to speak of innovation and its related topics within the frame of this dissertation in the light of academic journals.

Firstly, Schumpeter (1934) defines innovation as the implementation of new combinations. Later, Freeman (1974) adds that innovation is accomplished only when the first commercial transaction of the new product and process is achieved. Combining

these two arguments, it can be said that innovation is composed of two parts, which are the idea generation and the conversion of new ideas into business opportunity. Innovation is more than coming up with good ideas, it is the process of growing them into practical use. According to Schilling (2012), technological innovation is the most crucial driver for the competitive success in many industries. Within her book *Strategic Management of Technology Innovation*, Schilling (2012) stresses that innovation can originate from individuals under the image of lone inventor, research organizations such as universities, laboratories or incubators and even more important through the linkage of multiple sources. As mentioned before, innovation is linked with creativity, which is the generation of new ideas (Amabile et al. 1996). Related to this fact, following the words of Sternberg and Lubart (1999), individual's creative ability is the function of his or her intellectual abilities, knowledge, style of thinking, personality, motivation, and environment.

Innovation can come from many sources and also can take many forms (Schilling 2012). In this sense, among product and process; architectural and component, competence enhancing and competence destroying; most common ones are radical and incremental innovation. Dewar and Dutton (1986, p.1422-3), identify radical innovation as "fundamental changes that represent revolutionary changes in technology", while incremental innovation as "minor improvements or simple adjustments in current technology". Basically, what separates radical and incremental innovation is the degree to which an innovation represents a departure from existing practices (Daft and Becker 1978). It is crucial to note that the scope of this dissertation is to investigate and understand the dynamics of the pairs that have reached radical innovation such as Steve Jobs and Steve Wozniak and many other pairs that are already mentioned.

Besides the existence of traditional innovation types which are more focused on the innovation of solutions, Verganti (2016) introduced the innovation of meaning into the literature. Innovation of meaning is a novel vision that redefines the problems worth addressing, it is the novel interpretation of what is relevant and meaningful with respect to the market (Verganti, 2016). In his book *Overcrowded*, Verganti (2016) states that

innovation of meaning lifts the level of interaction with customers to higher levels since it focuses on what is really worth: value for a person. For example, Nest which was co-founded by Matt Rogers and Tony Fadell is a good example for innovation of meaning, as regards to Verganti (2016) it is not an answer to an explicit need or a problem, it is a new possibility that people could find more meaningful: compared to the traditional thermostat manufacturers, they came out with a new proposal in the sense of programming the temperature of a house.

2.6.1. Network Structure and Innovation

In order to achieve a successful innovation, collaborative research and development networks are taking an important place (Ahuja and Lampert 2001). To clarify such collaborations, one can think of joint ventures, licensing and second sourcing agreements, research associations, government sponsored joint research programs, value added networks for technical and scientific interchange, and informal networks (Freeman 1991). Correspondingly, according to Hagedoorn (2002), collaborative research is important for high technology sectors, where single individual or organization is not able to keep all the required resources and capabilities to implement an innovation. With respect to this fact, in the figure 4, worldwide technology alliance network in 1995 is illustrated, where the importance of collaboration can be observed in the technology sector.

Apart from aforementioned attributes of innovation, this section of the dissertation aims to emphasize the network effect on knowledge transfer and the relationship between cognitive distance and innovation. It is worth to mention that the literature does not directly intend to examine the relationship of pairs but take a more general approach and examine the organizations and their members. Throughout this section, individuals are referred as the members of firms and the general outcome is attributed to the organizational innovation. Even though these scholars aim to refer to organizational issues, their findings are important to get insights about bilateral relations of pairs in innovation.
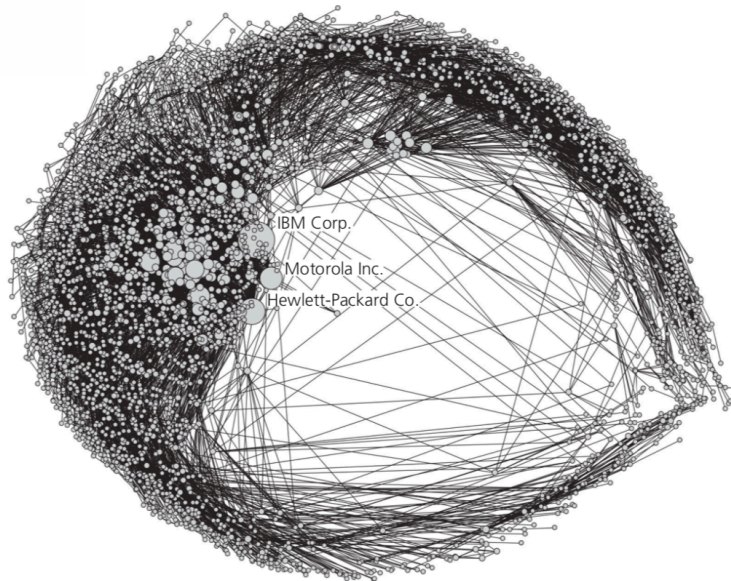
Figure 4. Worldwide technology alliance network in 1995 (Schilling 2012)

2.6.1.1. Network Effect

The importance of knowledge exchange for creating innovative solutions has received wide amount of attention in the literature. Schumpeter's (1934) view on organizational innovation defines knowledge creation as novel combination of different sets of knowledge. Concerning this issue, certain social networks create wealthy resources for knowledge and information exchange (Bergendahl and Magnusson 2014). Within this context, understanding the network theory in companies and applying it to co-leaders in individual basis could be helpful to reason how pairs build innovative outcomes.

The network structure and its relationship with knowledge transfer is explained by Burt (1992) as 'structural holes' theory. Structural holes refer to disconnection among different groups of people and states that information diversity and new idea generation is generally higher in between these different groups of people (Burt 2004). As seen in figure 5, A has more connections with different social circles than B, and A is more likely to attain diverse knowledge even it has equal number of connections as B.
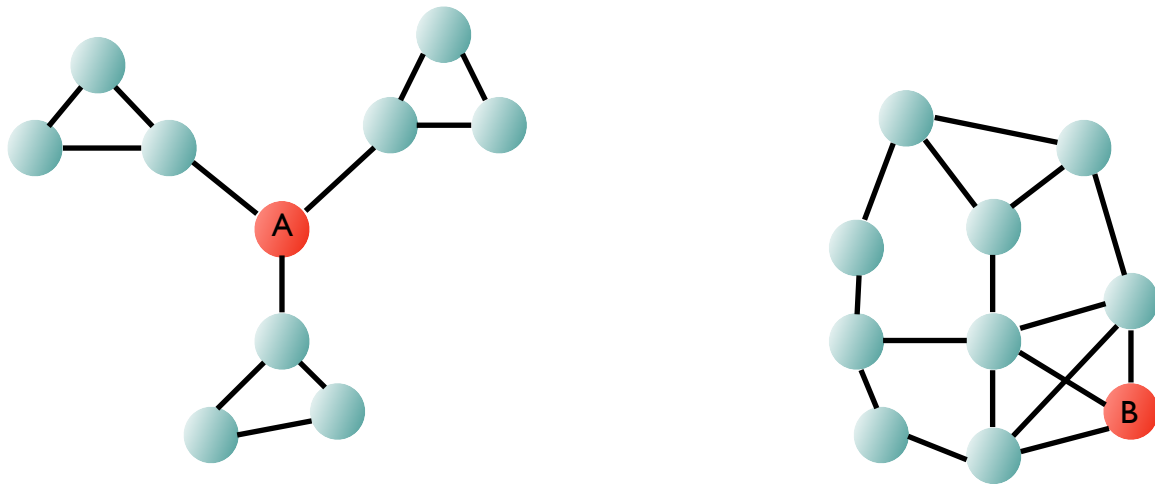
Figure 5. Different Network Structures (https://commons.wikimedia.org/wiki/File:Network_Structure.jpg#/media/File:Network_Structure.jpg)

According to Obstfeld (2005), the presence of structural holes in a network enhances novel ideas and creativity due to confluence of varying social circles. Creating non-redundant and heterogeneous contacts through structural holes lead to varying skills, knowledge and point of views. This theory could be used to comprehend co-leaders' complementary resources of knowledge and their contribution on innovation. On the other hand, Coleman (1988) mentions that a tight network could also have several benefits such as cooperation, trust, and the ability to create knowledge and exchange ideas through repeated interactions.

The network structure can also be addressed from the perspective of the strength of interpersonal ties. Granovetter (1973) defines the strength of a tie as "combination of amount of the time, the emotional intensity, the intimacy, and the reciprocal services which characterize the tie". The tie strength is addressed with two extreme points; strong and weak ties. Strong ties are characterized with frequent interactions among people whose social circles coincide. The stronger the tie between two individuals, the larger the number of people they are both tied to (Granovetter 1973). Creation of a strong tie builds trust (Reagans and McEvily 2003) and mutual understanding (Gilsing and Nooteboom 2005), yet it requires more time to be build.

Similar social networks and strong ties ease the communication and knowledge transfer between individuals (Handley 2006; Hansen 1999; Roberts 2006; Uzzi 1999). On the other hand, weak ties are infrequent relations with people outside an individual's social circle (Granovetter 1973; Kijkuit and Ende 2007). They bring along search benefits and level of autonomy (Hansen 1999; Perry-Smith and Shalley 2003). Several studies associate the weak ties with enhanced creativity due to increased knowledge diversification and differentiated backgrounds (Kijkuit and Ende 2007). Even though knowledge diversity is crucial for creativity, adequate level of mutual understanding is vital for knowledge transfer as well. Mutual understanding is defined by Kijkuit and Ende (2007) as the "ability to understand and build on each other's knowledge base".

To sum up, networks with structural holes and weak ties could be advantageous to enhance creativity by combining different knowledge resources coming from different social circles (Kijkuit and Ende 2007; Obstfeld 2005). On the other hand, dense network structure and strong ties could have the advantage of preventing conflicts and creating a more efficient communication (Coleman 1988; Handley 2006; Hansen 1999; Roberts 2006; Uzzi 1999). There are some studies that mention these two views as complementary instead of opposite. For instance, the findings of Katja (2011) states that combination of strong ties with weak network structures can be optimum for fostering innovation.

2.6.1.2. Cognitive Distance and Absorptive Capacity

As indicated in the network structure section, knowledge exchange is accepted as the core feature of innovation (Schumpeter 1934). The term knowledge contains perception, understanding and value judgements (Nooteboom 2000). Since people experience different social and physical environments throughout life, each person perceives, interprets and evaluates events differently (Nooteboom 2000; Nooteboom et al. 2007). This relative difference in each person leads to cognitive distance, which is a trade-off between novelty and understandability (Cohen and Levinthal 1990; Nooteboom 2000). Cognitive distance can be greater or lesser between different

people. According to Nooteboom (2000), large cognitive distance refers to novelty of ideas while creating the trouble of reciprocal understanding. That is why, he further adds that in order to create a common vision and ease the understanding of each member, organizations should reduce cognitive distance between their employees. Similarly, Brown and Duguid (1991) state that relationships that contain trust, shared knowledge and mutual interest are prone to set an environment for innovation and learning. This type of relationship is entitled as 'close' relationship by Wenger and Snyder (2000). Likewise, Zahra and George (2002) mentioned that people with similar knowledge can absorb new knowledge easily.

However, on the other side, reducing the cognitive distance cuts down the number different and novel ideas, which can cause several problems for the organizations. If an organization strictly focuses and stays in one mindset, it might not be able to see possible threats or opportunities in the environment (Nooteboom 2000). Bergendahl and Magnusson (2015) state that the interaction of people with different knowledge sets enhance the creation of new knowledge, where the distance among people is the spark for creativity. In other words, a large cognitive distance enables different perspectives, which can stimulate creativity, therefore innovation (Hansen 1999; Hargadon and Sutton 1997; Perry-Smith 2006).

As stated in the definition, cognitive distance is a trade-off between novelty and understandability. While a large distance is required for the sake of novel ideas, such large distance creates problems in absorption of generated ideas (Nooteboom 2000). At this moment, absorptive capacity gains prominence since it is the "the possibility to derive knowledge and related benefits from external information and knowledge" (Bergendahl and Magnusson, 2015 p.91). The literature (Bergendahl and Magnusson 2015; Cohen and Levinthal 1990; Zahra and George 2002) mention that the knowledge wealth of a firm influences its capacity to identify and absorb knowledge from external parties. According to Cohen and Levinthal (1990), the knowledge wealth, the absorptive capacity in organizational level, depends on prior related knowledge and diverse background of individuals. The relationship between absorptive capacity and cognitive distance can be more precisely understood through cognitive function.

Noteboom (2000) defines cognitive function as the combination of three elements: cognitive domain, cognitive range and mapping. Firstly, cognitive domain can be identified as the different sets of knowledge and information that each individual possesses. Secondly, cognitive range is categorization of possessed knowledge and information sets. Individuals can have differing range categories according to their environment and experiences. Lastly, mapping is how the possessed knowledge and information is interpreted. In other words, it is how knowledge makes sense for a person. Nooteboom (2000, p.74) defines cognitive distance as "the difference in cognitive function". He states that the difference can be in domain, range or mapping. For instance, two people can interpret the same information very differently, which is an example for having shared domain but difference in mapping. Björk (2012) mentions that people with different domains have higher level of ideation and end up with novel and useful ideas. Similarly, Poetz and Prügl (2010) state that different domains are crucial for sparking creativity. Koestler (1989) also states that normally unrelated knowledge sets cross-fertilize each other when they work together. Bergendahl and Magnusson (2015) highlight that different domains enable different sets of knowledge and information, which is required for knowledge creation process. However, Bergendahl and Magnusson (2015) also mention that specific knowledge creation requires in depth knowledge of a particular domain.

In order to create an effective learning interaction between individuals, the cognitive distances should be bridged through communication and understanding (Cohen and Levinthal 1990). However, bridging does not mean reducing the cognitive distance, which would imply overlapping of both domains and ranges. Nooteboom (2000, p.74) states that, for learning to take place, there should be "limited domain overlap and sufficient overlap between ranges and domains". Nevertheless, as people share experiences and interact densely over long periods of time, the cognitive distance tends to be reduced due to mutual sense making and increased understanding. Consequently, as the cognitive distance diminishes, the collaboration efficiency increases, but the learning potential decreases.

A wider look at the relationship between cognitive distance and innovation performance of firms is carried out by Nooteboom (1992, 1999) who states that, although large cognitive distance has positive effect on learning, after a point, very large cognitive distance wipes out the common mutual understanding, eliminating the common ground to innovate. On the other hand, as mentioned before, short cognitive distance also has negative effect on innovation due to lowered novel ideas, even though absorptive capacity is higher. Nooteboom and colleagues (2007) sum up all these facts by stating that, partners who come together should have such adequate level of cognitive distance that it should be large enough to create novel ideas while keeping the mutual understanding (absorptive capacity) at optimum level. This reasoning is briefly described by an inverted-U shaped learning curve as illustrated in figure 6, which is the mathematical product of a line representing absorptive capacity and novelty value of interaction. As demonstrated in the figure, with increased cognitive distance, absorptive capacity line declines, while the novelty value of interaction line increases (Nooteboom et al. 2007).
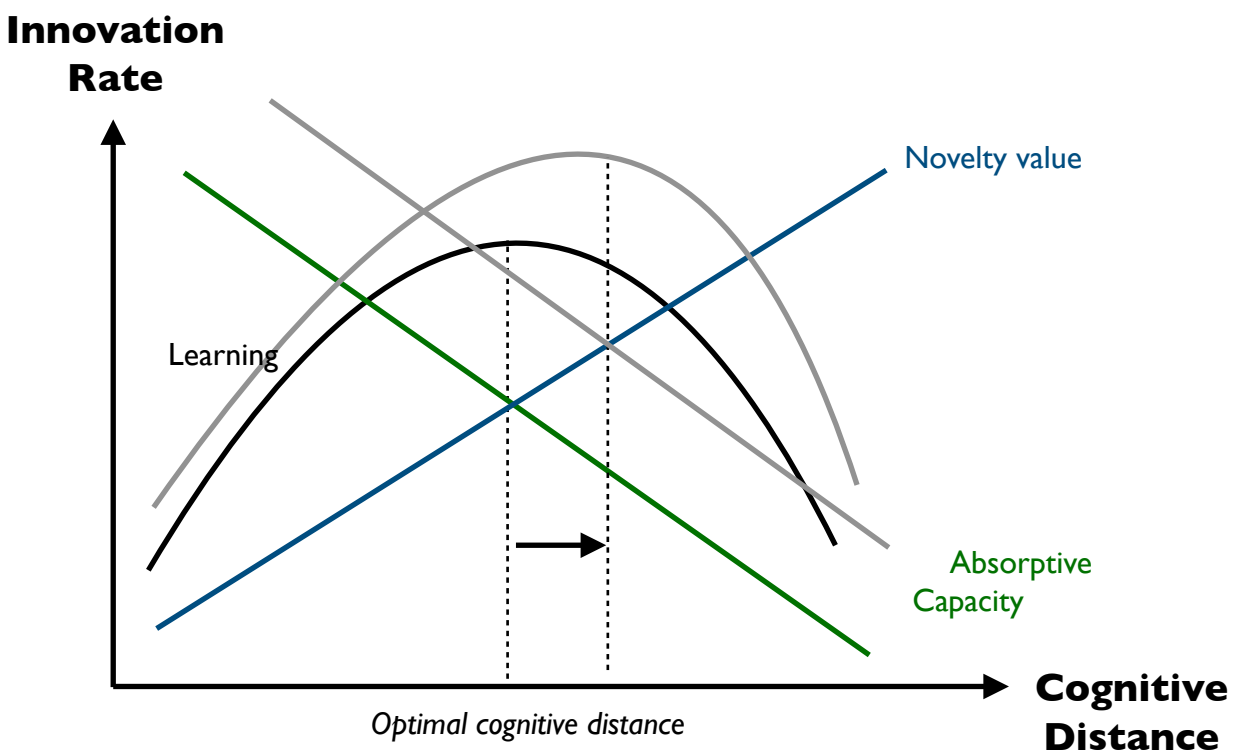
Figure 6. Optimal cognitive distance (Nooteboom et al. 2007)

A further step is to understand what type of innovation is aimed to be achieved. As already mentioned above, innovation can either be radical or incremental. For an innovation to be classified as radical, it should replace the existing norms. Such innovation is entitled as exploration, which is positively influenced by larger cognitive distance (Nooteboom et al. 2007). Since exploration is a search for new opportunities (Hagedoorn and Duysters 2002; Nooteboom 2000), literature state that organizations need to be situated in novel contexts in order to reach radical ideas (Almeida and Kogut 1999; Fleming 2001; Rosenkopf and Nerkar 2001; Rosenkopf and Almeida 2003; Stuart and Podolny 1996). On the other hand, incremental innovation is referred as exploitation, which adds to the existing knowledge base (Hagedoorn and Duysters 2002; Rowley et al. 2000). In such cases, a strong mutual understanding, a short cognitive distance, is beneficial for high level of coordination. Briefly speaking, the trade-off between novelty and understandability does not only affect the interactions among individuals or organizations, but also has a vast implication on the type of innovation achieved.

3. Research Gap & Conceptual Framework

Yin (1994) states that, each empirical research is designed, independently of its type. Hammersley and Atkinson (1995, p.24) emphasize research design by stating that "research design should be a reflexive process operating through every stage of a project". Similarly, Maxwell (2008) states its importance by implying that it is an interactive process, which has an impact on developing and modifying theory and elaborating or refocusing the research questions. Inspired by the model of Maxwell (2008, p.216) related to the research design, this dissertation also consists of five steps focusing on different essential components of the entire study. These five steps are goals, research questions, conceptual framework, methods, and validity. So far, the goal of this dissertation has been mentioned under the introduction section. Related to this goal, the existing theories are explained under the literature review section in order to create a fund of knowledge. From this point on, this section will tackle the research gap and related research

questions; and aims to build a conceptual framework, which will be tested within the subsequent section of methodology and tried to be validated.

3.1. Research Gap and Research Question

As mentioned throughout the literature, Steve Jobs and Steve Wozniak, Larry Page and Sergey Brin, Mark Zuckerberg and Eduardo Saverin are few of the "sparring partners" that are widely recognized in the entrepreneurial environment. Despite the success of these well-known pairs, the emergence and functioning of their relationship with regard to the innovation process were not deeply explored in the literature. As a matter of fact, theories and researches about the pair dynamics and its correlation with the innovation are weak. Regarding the innovative pairs that disrupted the status quo by their outcomes, how they came together, how they worked together, the leadership practice they referred to or other critical success factors are few of the mysteries that one can be curious of. Those taken for granted assumptions could be a way to open new doors to broader topics in the literature with a precise research supported by accurate data analysis. On top of that, literature lacks academically accepted theories or frameworks that could bridge over managerial practices for companies in order to foster innovation. Within this context, this topic can be an action with the opportunity of insights for managerial or organizational practices.

Correspondingly, the relationship and functioning of innovative pairs was identified as a research gap of this dissertation. As the main objective, this study aims to introduce a conceptual framework based on the information gathered from the literature review and deep dive into functioning of pairs. By relying on the gathered insights from the journals, books and real-world cases, it is aimed to bridge the gap between obtained information and its linkage to innovation, which then may be used over managerial practices for companies.

In the previous literature review section, dyad formation was broadly examined about pairs and their togetherness on the way of innovative outcomes. In depth, strengths of pair formation over a singular leader, their gathering, power sharing

arrangements and working dynamics, their leadership approach in between, personality factor and the network effect were analyzed in order to establish a connection of dyad formation with innovation. As a result of this review, one main research problem was constructed in order to assemble different pieces of the puzzle. Research problems incorporate pieces that are obtained from elsewhere, it is not something that exists before, it is something build according to the overall coherence (Maxwell, 2008). In this sense, the following question is identified as the research question of this dissertation, which will also be the base for interviews in the following chapter:

"How do pairs evolve and function to reach innovative outcomes?"

3.2. Conceptual Framework

According to Maxwell (2008, p.222), conceptual framework is "the system of concepts, assumptions, expectations, beliefs, and theories that supports and informs your research". Similarly, Miles and Huberman (1994, p.18) state that it "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them". Throughout the insights from literature review and real cases of innovative pairs, by developing and modifying the theory, it is aimed to construct a conceptual framework, which is illustrated in figure 7.

In figure 7, each box refers to the main building blocks of the overall process leading pairs in the innovation process. Context, personality, shared leadership and pair formation were already mentioned in the section of literature review and there are already de facto theories or practices related to these subjects. Yet, what is missing and correspondingly the main focus of this dissertation is the emergence and functioning of pairs (their dynamics) thoroughly on the way of their innovative outcomes. This lacking was found as a black box, which has certain inputs and leading to an innovation outcome. However inside of this black box: the process of pair functioning should be revealed and clarified. Before interrogating this research gap, in order to explain the

pre-established model in depth and see the bigger picture, it is intended to clarify each arrow and consolidate the links between each box supported by the theory and real-world cases.

As it can be seen in Figure 7, context, which is the starting point of the entire process, is triggering pair formation, functioning and personality concepts. The pair formation concept is assumed as the initial step of the functioning process; it is sort of a milestone to initiate functioning. Moreover, the context and personality affect each other, which is shown by a double-sided arrow. Actually, the concept of personality on its own is a complex and profound subject, which is out of the focus of this dissertation. The reason why it has a coverage on this framework is to show the connections of each box in a solid way. As widely known, leadership is in general related to personality. Therefore, in the framework below, the personality has a linkage with the shared leadership concept, which finally acts as an input for the functioning process. Innovation, which is the main value of this dissertation, is the outcome of functioning. Although, the possibility of termination or the separation of pairs exists, the conceptual framework below is focusing on the innovation outcome, which is not always the end of functioning process but a spin-off through this long and deep process.
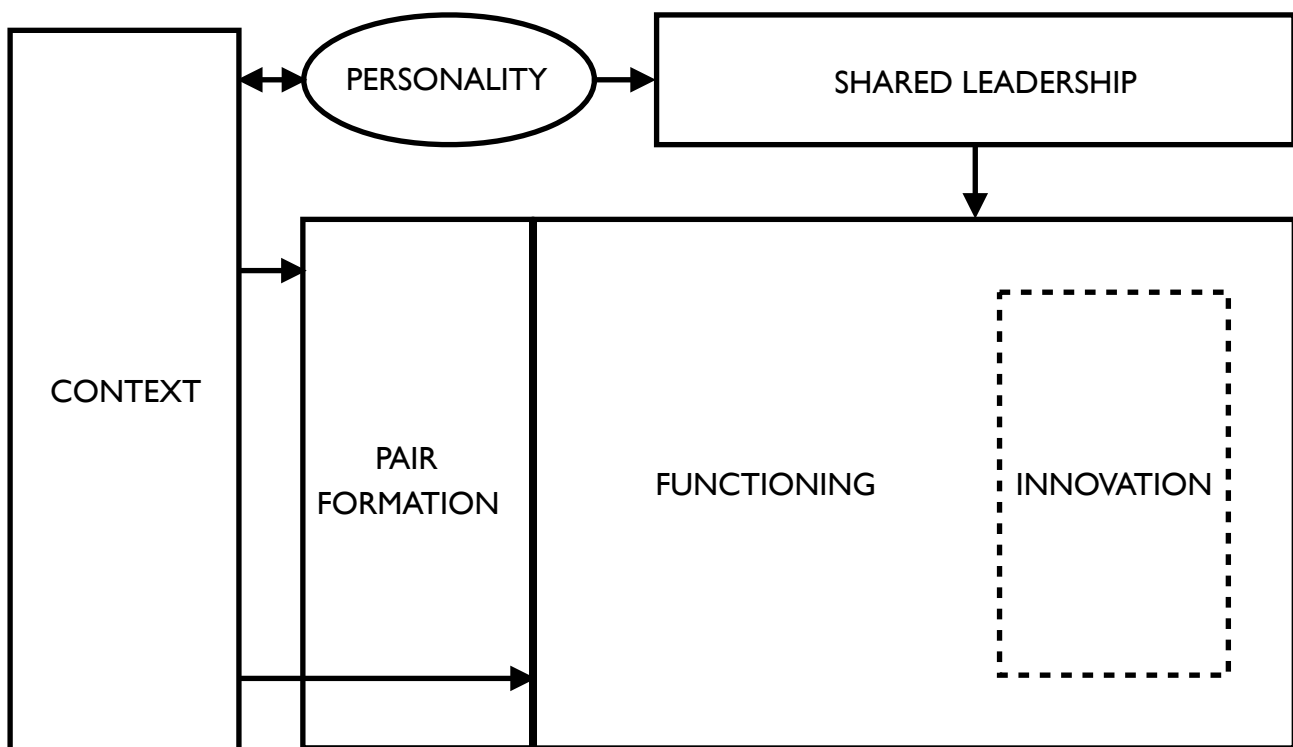
Figure 7. Conceptual Framework

Context → Pair Formation

To begin with, it was observed that the vast majority of widely known pairs in the entrepreneurial ecosystem had a common context such as background, university, previous common job, mutual friend, similar family, similar environment or similar likings. According to a study of how friendships are constituted on a university campus, 41 percent of new pairs met through mutual friends and shared contexts such as classes (Shenk 2014). Additionally, as Farrell (2001) mentioned, being relatively equal in status and resources; social, economic and cultural capital enables balanced exchange and ease the interactions. People usually feel closer and tend to form exchanges when there is similarity in factors like income, education, physical appearance, ethnicity and race (Shenk 2014). For establishing an intimate exchange, trust is an essential factor (Alvarez and Svejenova 2005; Gronn 1999; McAllister 1995). In this matter shared context played an important role by signaling about the counter party's characteristics and ensuring trust.

Certain organizations such as universities or research labs attract individuals that have the similar values and desires (Alvarez et al. 2007). As in the cases of Larry Page and Sergey Brin, Bill Hewlett and Dave Packard coming from the same ecole of Stanford is one of the key elements for them to become a pair and consequently become successful (Alvarez and Svejenova 2005; Flynn 2004). Similarly, Bill Gates and Paul Allen, two men who brought Microsoft and personal computer into our lives are both from the Lakeside School in Seattle (Mejia 2018). Also, Mark Zuckerberg and Eduardo Saverin are both from Harvard University, where they spent most of their times together while working on the creation of the social network Facebook (Carlson 2012).

Furthermore, besides coming from a similar educational background, previous common work is also a significant factor for two individuals to trust in each other and correspondingly form a pair. To give an example, Steve Jobs and Steve Wozniak worked together on a gadget called "blue box", which was one of the initiators of their togetherness (Shenk 2014). As in the case of Matt Rogers and Tony Fadell, before creating the smart thermostat Nest, they worked together at Apple, where they learned a lot from each other (Bergstein 2014). Larry Page and Sergey Brin together worked on

a project of "The Anatomy of a Large-Scale Hyper-textual Web Search Engine" before introducing the famous search engine Google (Flynn 2004). By relying on these facts, it could be assumed that previously working together is an important milestone for pairs in the matter of knowing each other and forming trust. According to a research done by National Bureau of Economic Research, venture capitalists choose their partners by looking at whether they have worked at the same firm or not before (Shenk 2014).

Moreover, similar likings or mutual connections could also be identified within the scope of shared context. In other words, people who like similar activities or interested in similar things, are closer to each other (McPherson et al. 2001). Here, homophily plays a crucial role. As in the example of Bill Hewlett and Dave Packard, they were both interested in electronics, science and hiking, that eased their connection (Ditz 2004). Also, Steve Jobs and Steve Wozniak were both interested in video games, PCs and electronics, which drew Bill Fernandez's attention and conducted towards the introduction of two Steve to each other (Shenk 2014). Similarly, Larry Page and Sergey Brin were both interested in computer science (Flynn 2004). Besides similar likings, spending time together in similar environments and being part of a similar culture could affect individuals in the matter of finding each other. As in the case of Warren Buffett and Charlie Munger, they grew up almost at the same neighborhood in Omaha, where Davis family arranged a meeting for the two men that reminded each other in the eyes of many people (Eisner and Cohen 2012). Steve Jobs and Steve Wozniak spent their youth again at a similar environment, which is the 70s California that shaped their personality a lot (Shenk 2014). Talking about similar environment, family can also be included since it is the first and smallest unit that an individual's future characteristics and mindset is formed with the effect of culture. Despite Larry Page and Sergey Brin were born in two different countries like United States and Russia, both individual's fathers were interested in academics and were professors, which might be one of the smallest links that they have in between (Flynn 2004). Moreover, Steve Jobs and Steve Wozniak are coming from families who has engineering backgrounds, which could definitely affect their mentalities while building their characteristics (Shenk 2014).

As it is understood, having a previous history and shared context can ease the cooperation and create a base to build trust. This comes into prominence especially for strangers, like merger created co-CEOs having no previous common work together. In addition to these facts, homophily could be considered as a way to promote the formation of pairs, who are relatively similar in mind and characteristics. People usually tend to form bonds with the ones who are similar to themselves. All in all, as a starting point of the above conceptual framework, context in general terms including similar likings, family, mutual friends, common places, social, economic and cultural environment, previous common work and the factor of homophily absolutely affects the innovative pair formation. Table 1 illustrates examples of widely known successful pairs who previously had shared contexts before forming their dyad relationship are shown.

Pairs		Shared Context	Outcome	References
Bill Gates	Paul Allen	Lakeside School; Previous common work	Microsoft	Mejia 2018
Bill Hewlett	Dave Packard	Stanford University; Frederick Terman; electronics, science, hiking	HP	Alvarez and Svejenova 2005; Ditz 2004
Mark Zuckerberg	Eduardo Saverin	Harvard University	Facebook	Carlson 2012
Matt Rogers	Tony Fadell	Previous common work in Apple	Nest	Bergstein 2014

Larry Page	Sergey Brin	Stanford University; common research project; similar family structure; passion of computer science	Google	Alvarez and Svejenova 2005; Flynn 2004
Steve Jobs	Steve Wozniak	HP Co. "blue box"; Bill Fernandez; electronics, PCs, video games; growing in California; engineering-based families	Apple	Shenk 2014
Warren Buffett	Charlie Munger	Grocery store of Buffett's father; Growing in Omaha; common network	Berkshire Hathaway	Eisner and Cohen 2012

Table 1. Shared Context of Pairs

Context → Functioning

Assuming social networks as a part of individual's context, it can be said that context is playing a crucial role in the sense of knowledge and information exchange during the functioning process of pairs.

Referring to the structural hole theory, according to Burt (2004), different groups of people within the network of an individual leads to diversity in idea generation process, which could be interpreted as essential for innovation. In other words, due to variance of social circles in a person's context, novel ideas and creativity are enhanced. Additionally, strength of ties within the context of an individual has effects on

knowledge transfer and creativity (Granovetter 1973). While strong ties ease the communication and knowledge transfer (Handley 2006; Hansen 1999; Roberts 2006; Uzzi 1999), weak ties on the other side enhance creativity due to increased knowledge diversification and differentiated backgrounds (Kijkuit and Ende 2007).

As explained before, context is also related to the environment of an individual. Experiencing different social and physical environments induce cognitive distance (Noteboom 2000; Noteboom et al. 2007). Larger this distance is, more the trouble of understanding occurs (Noteboom 2000). For the creation of common vision and understanding, cognitive distance should be reduced (Noteboom 2000). On the other side, this reduction can hamper the creation of different and novel ideas, since one common vision could restrict the creation of varied alternatives (Noteboom 2000). By being able to bridge cognitive distance, knowledge transfer occurs at the optimum level, which is then crucial for the creation of novel ideas and correspondingly innovation. All in all, it can be assumed that context of an individual affects the functioning of pairs.

Context ←→ Personality

Thinking context as a social, economic and cultural indicator, it definitely affects the formation of individual's personality. The place of birth and growth, family, life experiences and many other factors designate the character of a person. In their research, Nakao and colleagues (2000) found that extraversion personality trait is low for children who had experienced over protection, while maturity (emotional control) is high in the children with high socioeconomic status and appropriate child rearing patterns. Additionally, according to their results, intellect (refers to imagination and intelligence) is positively related with high socioeconomic status and maternal participation in child rearing (Nakao et al. 2000). As it can be seen, different personality traits are variously affected from different contextual conditions of family environment.

Triandis and Suh (2002) similarly state that the genetic and environmental influences shape the personality. They especially emphasize the influence of culture,

which is transmitted through language and the means of communication. Influence of culture refers to "shared language, living in the same historic period" and being "sufficiently proximal to influence each other" (Triandis and Suh, 2002 p.135). Individualism is an example to show the influence of culture on personality (Triandis and Suh 2002). According to them, in vertical individualist cultures, such as the US corporate culture, people are inclined to think individualistically, since only the 'best' climbs the hierarchy. On the other hand, in horizontal individualist cultures, such as the Swedish culture, people are focused on self-reliance, independence and uniqueness (Triandis and Gelfand 1998). Hofstede and colleagues (1998) emphasize many more cultural differences that influence personality, yet a deep dive into this subject digress the objectives of this dissertation.

The arrows between context and personality of the conceptual framework are two sided, since it is believed that the personality also affects the context an individual decides to be present. Silvia (2006) states that personality traits are connected to interest, exploration and intrinsic motivation. Therefore, the choices made by individuals guide them to different contexts in life, which in return shapes their behaviors and therefore personality. For instance, Steve Jobs had an interest in Zen Buddhism, for which he ended up in India (Toma and Marinescu 2013). His interest in mediation had an impact on the context, which in return contributed to shape his personality.

Personality → Shared Leadership

Within the conceptual framework of this dissertation, personality influences the shared leadership. Hoch (2013, p.166) defines leadership as "a mediating variable explaining the relationship between input factors of personality and outcomes of performance". Moreover, he states that personality factor influences the degree that team members engage in shared leadership. Similarly, Hogan and colleagues (1994) mention that leadership behavior of a leader is determined by the leader's personality. Arnone and Stumpf (2010) state that successful shared leadership relies on setting roles, rules and responsibilities according to talents and interests of each leader. In a similar

vein, O'Toole and colleagues (2002) mention that roles and tasks in a shared leadership are divided according to interests, skills or personality bent.

Besides the division of roles, personality plays an important role in the formation of shared leadership. Frank Wells and Michael Eisner created a successful role division, since Eisner was the public leader of the company, while Wells was more involved in internal leadership (O'Toole et al. 2002). Even though this role division was managed successfully, later Eisner could not keep a successful relationship with his new co-leader Michael Ovitz, since they both wanted to be under the spotlight (Eisner and Cohen 2012). Both Ovitz and Eisner had a personality trait that led them to desire to be 'in front of the mirror' (O'Toole et al. 2002). Later in his book, Eisner states that Warren Buffett warned him about this fact by stating "Take Charlie and me: I want the spotlight, but he doesn't. So, it works...You will be in conflict with Ovitz from day one, and you will never trust him..." (Eisner and Cohen, 2012 p.52). To sum up, personality of an individual is highly correlated with shared leadership approach within the pair structure.

Shared Leadership → Functioning

When the definition and the application of shared leadership is considered, it can be said that some of the previously mentioned power sharing arrangement qualities like complementarity and commitment; and the essential necessities of working dynamics such as interdependence and communication could be the crucial supporting factors of shared leadership approach.

As mentioned in the definition of shared leadership, it is the approach where leadership is distributed among individuals (Carson et al. 2007). It is the situation, where each member is engaged in leadership and collaborate on the decision-making process (Hoch 2013). According to O'Toole and colleagues (2002), complex challenges of the corporations require set of skills that are not able to be provided by one individual. Here, complementarity of expertise and access to complementary contacts could be the key elements to tackle this issue. Two individuals that are bringing their personal and complementary attributes to the joint work could help the shared leadership

approach, where leaders step up time to time depending on the situation and the challenges.

Besides having complementary skills, commitment (common purpose) is another supporting element of shared leadership approach. Carson and colleagues (2007) identify shared purpose as one of the proximal factors that are likely to influence the development of share leadership. When team members are understanding the primary objectives of team in the similar way, shared purpose exists, and it definitely promotes full engagement and participation of the team members (Carson et al. 2007). Correspondingly, as previously mentioned in the literature review section, like complementarity, commitment is a necessity for creating successful cooperation that co-leaders should demonstrate.

Additionally, according to Pearce and Conger (2003), interdependence is one of the most important boundary conditions for the effectiveness of the shared leadership approach. Fausing and colleagues (2015) states that high level of interdependence is positively related to shared leadership yet, it creates the need of coordination and communication among pairs (Gronn 2002). When task interdependence is high, and the work is complex, shared leadership is likely to be more effective. As regards to Wang and colleagues (2014), effects of the shared leadership are higher when the work is more complex, since being in charge of interdependent tasks allow pairs to work on fields that they are strong in terms of experience, interest and skills (Gronn 2002).

After explaining the building blocks of the conceptual framework, it is decided to interrogate more about the functioning block (figure 8), which requires more explanation at the literature review. Context, pair formation, personality and shared leadership are the concepts that can be considered as the inputs of functioning process. Yet, what is missing is the inside of this black box: functioning of pairs (pair dynamics), which at the end is contributing to the innovation. As already mentioned before, the main issue here is to find the answer of *"How do pairs evolve and function to reach innovative outcomes?"*.
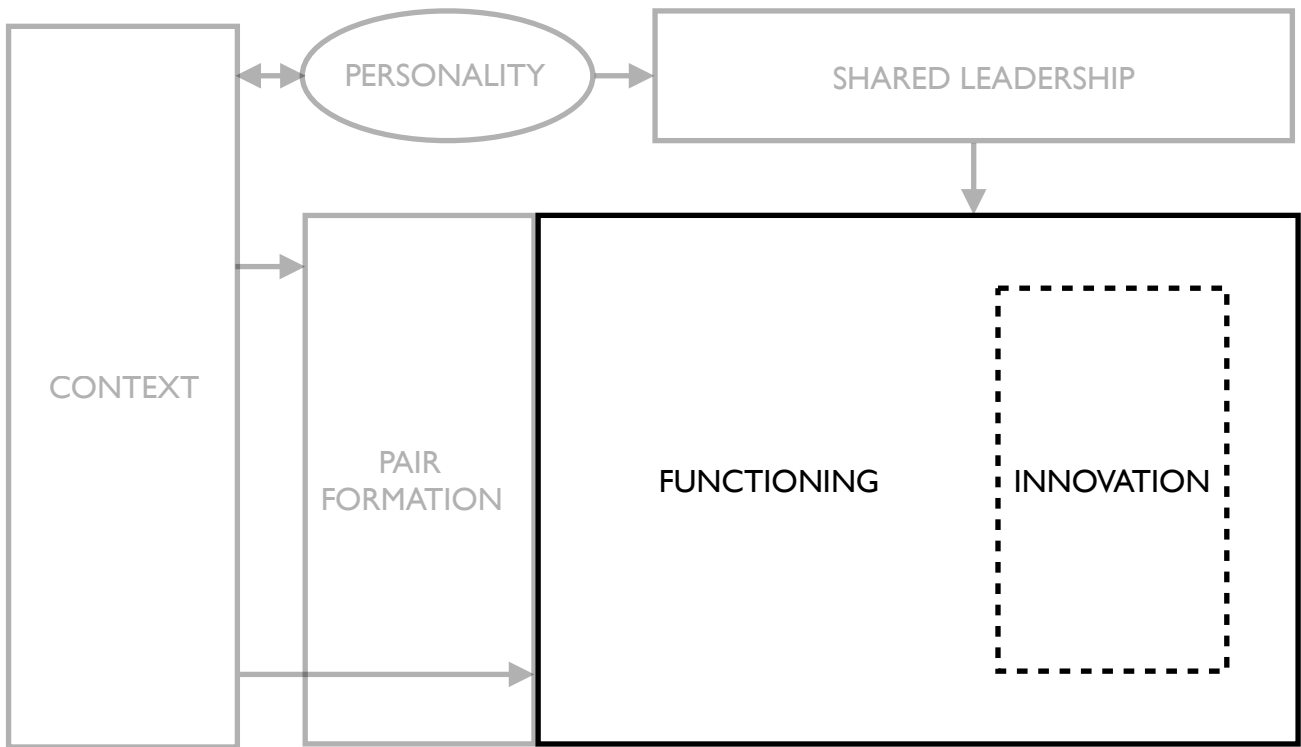
Figure 8. Functioning of Pairs

4. Methodology

Following the research design of Maxwell (2008), this chapter mainly aims to clarify the methodology and the tools that are used in order to test the previously explained framework and find an answer for the research question. The beginning of this chapter concentrates on the reasons to proceed with qualitative research methodology and the case study type that is used in this dissertation. While afterwards, under the topic of Defining the Methodology, it is aimed to introduce the unit of analysis of the investigated phenomenon, selection of the cases that will be analyzed, collection of the data and finally analysis of this data. At the very end of this chapter, under the topic of Evaluating the Case Study, validity and reliability of the executed methodology is aimed to be discussed.

4.1. Research Method

In order to proceed with the research, as a first step it should be decided that whether the research method will be qualitative or quantitative. Qualitative research is

any type of research that uses scientific method of observation to gather non-numerical data (Babbie 2014). Heath (1997, p.1) defines qualitative research by stating, "Qualitative researchers attempt to describe and interpret some human phenomenon, often in the words of selected individuals. These researchers try to be clear about their biases, presuppositions, and interpretations so that others can decide what they think about it all". In other words, qualitative researches are the ones where the findings are not arrived through quantification. On the other side, in quantitative research, data collection process includes data translated into numbers. Briefly speaking, in qualitative research, the aim is to generate and build new theories, while in quantitative research, the aim is to test the existing ones. As regards to this fact, since "Pairs in Innovation" is a phenomenon that is based on human values, a qualitative research method is considered appropriate to test the previously explained framework and find an answer for the research question.

Among several methods of qualitative research, case study is chosen as the most suitable method. Yin (1984, p.23) defines case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundary between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used". According to Yin (2003), there are three types of case studies. The first one is descriptive case study, which aims to portray a profile and focuses on phenomenon description. The second one is explanatory case study, which studies the reflection of theories and hypothesis in the case and focuses on phenomenon role as evidence to prove theory. Lastly, in exploratory case study, field work and data collection are undertaken prior to the final definition of study questions and hypothesis. In this type of case study, the focus is on exploration for mostly unknown phenomenon. In this dissertation, exploratory type of case study is used rather than descriptive or explanatory ones. The reason of such selection is due to studying the undiscovered phenomenon of "Pairs in Innovation" with the help of literature review, field work and data collection.

4.2. Defining the Methodology

4.2.1. Unit of Analysis

Unit of analysis defines what the "case" is in a case study and identifies where the phenomenon investigated is located (Yin 2003). As a unit of analysis, case studies can alternatively consider individuals or whole organizations, or even decisions, social programs, processes, or changes (Yin 2003). Mostly, the unit of analysis depends on the research question and can be later changed if desired. In this dissertation innovative pairs are identified as the unit of analysis. According to Yin (2003), different conditions require different case study designs as it can be seen in figure 9. In single-case study design, single context is the focus of the research while in multiple-case study design, there are more than one context as the focus of the research. Regarding the holistic versus embedded nature of unit of analysis, holistic approach involves a single unit of analysis for each context analyzed, while embedded one involves multiple units of analysis at the same time (Yin 2003). Based on Yin's (2003) 2x2 matrix classification, this dissertation is a multiple-case design with holistic (single unit analysis) approach. It is a multiple-case design since it contains more than one single innovative pair as an experiment, meaning that it includes more than one context to be analyzed and compared. At the same time, it relies on holistic approach (single unit analysis) since there are only outcomes of pairs as a unit of analysis for each context analyzed. It is crucial to mention that conducting a multiple-case study requires extensive resources and time. However, once conducted it provides more compelling and strong evidences compared to single case designs (Herriott & Firestone 1983).

	Single-case designs	Multiple-case designs
Holistic (single unit of analysis)	TYPE I	TYPE 3
Embedded (multiple unit of analysis)	TYPE 2	TYPE 4

Figure 9. Basic Types of Designs for Case Studies (Yin 2003)

4.2.2. Case Selection

After defining the unit of analysis, another major methodological step is to select the cases for the investigation. In case selection, it is crucial to represent entire range of variation and to reach adequate heterogeneity (Maxwell 2008). Representing different patterns of behaviors through multiple cases enables to test the framework and research question from different point of views. Yin (2003, p.46) states that each case should be thoughtfully selected to either predict "similar results (a literal replication)" or "contrasting results (a theoretical replication)". Further several researchers agree that, both having literal or theoretical replications among the case studies is beneficial to achieve solid results (Eisenhardt 1989; Pettigrew 1988; Yin 2003). If the case results are contradictory, the initial propositions should be revised and retested with other cases (Yin 2003).

The main criteria of the case selection to be studied is picking pairs that have reached an innovative outcome. At this point, definition of innovation is critical for consistency. As mentioned before, this dissertation considers innovation as the development of radically novel products, services and processes; more generally in the

matter of business and strategic vision development. In total, 6 entrepreneurial level cases, 7 corporate level cases and 2 cases consisting of collaboration between industry and company are selected, reaching to adequate heterogeneity. It is decided to contact with only Italian and Turkish pairs, due to the limitations of network and language. Italian pairs were contacted through the ongoing project between Politecnico di Milano and Assolombarda (the largest territorial association of the entire entrepreneurial system in Italy). Within this project, they were selected through an elaborative process, where factors such as meaningfulness of the innovation, consistency in between pairs and the impact created (local/international diffusion) are taken into consideration. Initially, this selection process was done individually by different researchers and then aggregated with the others for consistency. Meanwhile, Turkish pairs were reached through the online means by individual efforts of the authors. They were selected from the Turkish online databases, where impact of their innovation, their global access and the rewards they acquired are taken into consideration. Although all cases consist of innovative pairs, their features vary along several characteristics such as the industry they are working in, the time they spent together, their socio-demographic characteristics, their previous experiences and their position in the company. Details of the selected pairs are briefly explained in table 2.

Pair	Gender	Type	Industry	Market	Innovation
1	m/m	Entrepreneurial	Computer Software	B2B	Software as a service tool
2	m/m	Entrepreneurial	Internet	B2C	Online notary service based on blockchain protocol

3	m/m	Entrepreneurial	Wireless	B2C	Predictive Wi-Fi network management software
4	f/m	Entrepreneurial	Information Services	B2B	Platform making prediction of aggressiveness of breast cancer
5	f/f	Entrepreneurial	Textiles	B2B	Sustainable textile application
6	f/m	Entrepreneurial	Air Condition	B2C	Sanitizing air conditioning systems
7	m/m	Collaboration between industry and university	Food	B2C	Packaging technique for grated cheese
8	f/m	Corporate	Building Materials	B2B	Fiberglass bar that is an alternative to steel in concrete structures
9	m/m	Corporate	Mechanical Engineering	B2B	Shape memory string

10	m/m	Corporate	Chemicals	B2B	Binder that keeps lithium oxide together
11	m/m	Corporate	Automative	B2B	Intelligent tyre
12	m/m	Corporate	Mechanical Engineering	B2B	Accelerometer
13	m/m	Corporate	Information Technology	B2B	Electrical development in personal computer
14	m/m	Collaboration between industry and university	Chemicals	B2B	Scientific awarded catalyst that enables polymerization
15	m/m	Corporate	Pharmaceut ical	B2B	Contrast media substance for medical imaging

Table 2. Selected Pairs and their products/services/processes

4.2.3. Data Collection

After defining the unit of analysis and selecting the cases, data collection which is one of the core steps of the research process is initiated. Data collection methods such as archives, interviews, questionnaires, and observations are typically combined in

case studies. As it will be explained in later stages, several resources were considered in order to meet the data triangulation. Data collection can be quantitative, qualitative, or both (Eisenhardt 1989). The case studies in this dissertation are built on qualitative methods, which are based on intensive data of human phenomenon. Due to this reason, the sources of data are mainly the interviews supported by observations and archival data consists of pre-existing documents, videos or similar artifacts. Usage of these data is also crucial for forming a baseline for the interviews.

In this dissertation, semi-structured interviews are mainly executed, which has some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant (Dunn 2005). The questions prepared for the interviews are primarily based on the research question that is aimed to be answered. Even though the research question was the origin of interview questions, the following statement was always kept in mind. Maxwell (2008, p.236) states that "interview questions should be judged not by whether they can be logically derived from your research questions, but by whether they provide the *data* that will contribute to answering these question". On top of this, the background and personal experiences of interviewees were taken into consideration to shape and personalize the questions for each participant. Although the predetermined questions were the starting point of the interviews, some questions were created as the conversation unfolded with the interviewee. The interview involved open questions on several topics such as, the background and history of both the individuals and the duo, the selection reasons of each other, details about their functioning such as the task division, evolution, innovative outcome and the conflicts or challenges faced and the way of their handling. Beyond the answers of the participants, their behaviors and approach to different questions were also examined. However, in several cases observation was limited to interview duration since video-conference was the only feasible way to make an inter-country interview.

4.2.4. Data Analysis

According to Eisenhardt (1989) the main aim of data analysis is to compare the theory with data and interpret it for building a better theory. The interpretation of this data is related to the research question, academic positioning and theoretical framework. As a first step of data analysis, the collected data from the interviews are transcribed and the Italian ones are translated to English using an online software. Data analysis can be qualitative or quantitative depending on the statistical manner taken to analyze the data. For the analysis of the case studies in this dissertation, coding, a qualitative analytic process is performed. Saldana (2013, p.3) defines a code as "a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/ or evocative attribute for a portion of language-based or visual data". Therefore, coding is the process of examining data to create concepts (Strauss and Corbin 1998). The generated codes can either be in Vivo, or constructed codes. In Vivo codes refer to "the terms used by [participants] themselves" (Strauss, 1987 p. 33). These terms can either be a word or a short phase from the data record (Saldana 2013). On the other hand, constructed codes refer to words assigned by the coder based on the conceptual ideas or theories and can be identical with the in vivo codes if necessary.

As data sets are coded, some codes show up repeatedly throughout the text forming a pattern. However, patterns are not only regularities but can also be varying forms. Hatch (2002, p.155) states that patterns can be formed due to "similarity, difference, frequency, sequence, correspondence, or causation". Finding patterns through coding enables to cluster some codes into families called as categories. It is important to underline that recoding, and if necessary, relabeling of codes or categories helps to refine the analysis (Saldana 2013). The codes and categories can be inductive, meaning that identified during coding; or deductive, meaning that theoretically defined codes are used. Once the categories are formed, the analysis progress to a more conceptual and theoretical level, resolving into theory. Saldana (2013) illustrates this transformation through a scheme as indicated in figure 10.

Within this dissertation, both in vivo codes and constructed codes are used while moving from particular labels to general theory. Additionally, inductive coding approach is followed during data analysis, where the codes are identified during the coding process. Further, the data analysis is performed at both a within-case and cross-case level, meaning that each pair interview is first analyzed within itself and later compared to the other pair interviews.
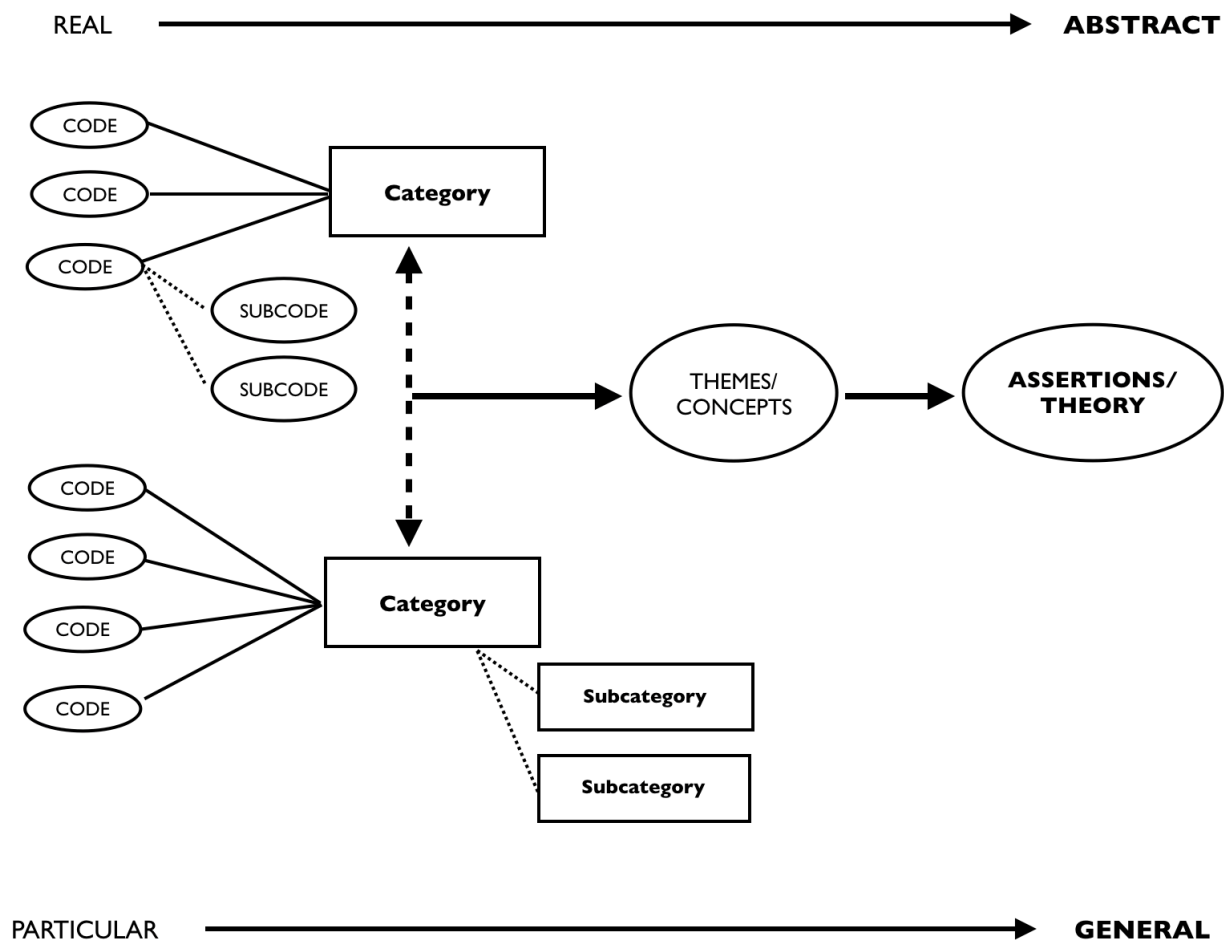
Figure 10. Codes to theory model (Saldana 2013)

4.3. Evaluating the Case Study

Regarding the model of research design by Maxwell (2008, p.216), after mentioning about four steps which are goals, research question, conceptual framework and method, this section focuses on the final step, which is the validity of the study.

Since a case study represents the logical set of statements, its quality can be judged according to some criteria (Yin 2003). However, one should bear in mind that there are no generally accepted criteria or methods to evaluate case study (Eisenhardt 1989). Yet, the set of criteria proposed by Yin are one of the most common ones and it is also selected as the evaluation criteria for this dissertation.

According to Yin (2003, p.33), there are four main tests that the case study should undergo to judge its quality. The first one is 'construct validity' meaning that "establishing correct operational measures for the concepts being studied" (Yin 2003, p.33). In order to increase construct validity this dissertation relies on multiple sources of evidences during the data collection phase. Qualitative data is gathered not only from interviews but also from online documents for the further data triangulation process. In addition to that, most of the interviews are from the firsthand and recorded for further analysis. Second test is 'internal validity' meaning that "establishing a causal relationship, whereby certain conditions are shown to lead to other conditions as distinguished from spurious relationships" (Yin 2003, p.33). This test is for explanatory or causal studies only, which is not the concern of this dissertation. 'External validity' is the third test, which means "establishing the domain to which a study's findings can be generalized" (Yin 2003, p.33). In order to achieve this validity, within this dissertation there are 15 cases offering a strong base for the generalization of the innovative pairs as shown in table 2. Pairs from entrepreneurial and corporate structures that achieved different innovative outcomes in different industries are selected in order to achieve a generalization for the further theory building steps. Finally, the fourth test is 'reliability', which means "demonstrating that the operations of a study-such as the data collection procedures can be repeated with the same results" (Yin 2003, p.33). The goal here is to minimize the errors and biases in the study. Within this dissertation, in order to achieve this validity each step is documented in order not to make external reviewers suspicious about the study. Overall, it can be said that the research design of this study is executed in a way that it demonstrates the quality and validity tests of Yin (2008).

5. Results

This chapter aims to present the findings of the 15 investigated case studies with the methods already explained in the methodology section. It is an important part of the whole dissertation, since this section can be considered as the starting point of the theory development process. For each case study, it is intended to focus on the information that is important for the further theory building and supporting the previously formed conceptual framework. Due to the General Data Protection Regulation (GDPR), members of the pairs are anonymously mentioned without specifying their companies and innovative outcomes. Yet, in order to be transparent and clear about the gathered information, quotations from the interviewees are used. Cases are presented separately for each pair, since it will ease the cross-case comparison and achieve generalization.

5.1. Pair 1

Gender	Type	Industry	Market	Innovation
m/m	Entrepreneurial	Computer Software	B2B	Software as a service tool

Pair 1 met in high school and attended the same university. Pair 1A worked in a digital agency in marketing department. Pair 1B worked in several corporate companies in different departments such as finance and trade marketing followed by an experience as venture analyst. Pair 1 states that they have different likings and hobbies. Although they previously had several startups together, they were working in different companies before this entrepreneurial act. They stated that pair 1A called the other to start a business. Pair 1A describes this moment as *"I described him what I wanted to do and he was convinced immediately"* while pair 1B describes as *"He called me and said, let's quit our works and start a new business...I decided to quit in 3-4 minutes"*. Pair 1A states that he decided to work with pair 1B due to several reasons indicated as *"trust...He was the option I knew the longest. I knew him very well and never saw any wrong moves from him...He is a very presentable person, something I lack… I can act more introvert in nervous moments, he is brave… I wanted to do something on the technical side, I needed someone on the business side...Our backgrounds are similar; same city, same family structure"*. Pair 1B mentions the reasons to work with his pair as *"He is smart and obsessed to learn. I trusted him and was convinced by his obsession to success, patience and determination"*.

At the beginning of their functioning process, pair 1B was responsible of marketing and product design, while pair 1A was responsible of coding and technical side. When the business evolved, pair 1B left the product design and focused more on the marketing side. However, pair 1A states that *"When there is a problem about marketing, I am asked about my opinion because I have experience on that side...When we were in an important exposition, I had to be active and present our startup to*

people as well... Similarly, when needed, he comes and helps to prototype or supports the technical side".

Pair 1B states that *"In the moments that we disagree, we listen to each other carefully and divide the problem into smaller pieces...if it is not something we can divide, we test our ideas as samples to see the best results"* while pair 1A mentions that *"if we are stuck and can't decide, we choose the most rational one...We criticize each other...problems doesn't last long between us...we can have emotional challenges; if I realize that he is down...I make it up to him."*

About the evolution of their relationship, pair 1B says *"We learned each other better, we learned about each other's working styles...Even if something have happened and we failed in this one, I would again work with him"*. Regarding this topic, pair 1A states *"We try not to damage our friendship, we became better friends after work...For sure, in the future, we will have very successful outcomes, I believe in that"*.

5.2. Pair 2

Gender	Type	Industry	Market	Innovation
m/m	Entrepreneurial	Internet	B2C	Online notary service based on blockchain protocol

Pair 2 consists of brothers who had previously worked together in a software company found by them. Pair 2A, the younger brother, is a lawyer who had interest in blockchain technology. Pair 2B, did his master studies in England and founded the software company. Later, they turned back to their hometown and started to work on an online notary based on the blockchain technology. Pair 2A states the reason why they work together as *"Because he is my brother… It was his project, but we started together...We decided to do it together because we completed each other...One of us*

has law knowledge, the other one has probability, planning, resource management and program design knowledge. We are two opposite characters that can achieve good results when combined." while pair 2B mentions that "*(The person to work with) should be someone that believes when you don't. Someone that has compatible background… Equal both in education and beliefs… This (entrepreneurship) is a wild job, that's why you need a wild bond; this exists organically with my brother… How we need to combine legal side with technical side emerges with his talent and experience*".

When their idea emerged, they decided to move the company to Vietnam due to several factors such as cost and the quality of the human resources. Pair 2B left the hometown and started to live in Vietnam for the sake of the job, which is defined by pair 2A as a "*sacrifice made for success*". Although they are in different countries, usually they hold meetings twice a day, talking about all aspects of the business.

About their functioning, pair 2A says that "*…Only one CEO can not be efficient and spend his time correctly. There should be two people. When an external person comes, he should see the right person in front of him because people like to meet the CEO. In terms of internal management, pair 2B is more in the operational side, I am more on the external side.*". Regarding the responsibilities, pair 2B says that, "*We are invited to conferences, I have to go there, but at the same time, I have to follow the technological improvements in the world… Pair 2A does the meetings and stays in the front line while I work on the technology at the back without any pressure*". Regarding the task division, pair 2B continues by "*80% of the time, I am in the technical side and he is in the law side, but in hesitant moments, the one with reference does what he wants*".

Both pairs state that they argue mercilessly and criticize each other a lot. Pair 2A says that "*the deep criticizes balance us…we overstep the boundaries… New ideas are born from our arguments*" while pair 2B adds "*when you are siblings, you can make the harshest criticism, which leads to right answers*". About the challenges they faced, pair 2B mentions "*people criticized… we needed to stick up together and face them*".

About the evolution of their relationship, pair 2A says *"We learned about each other in a deeper way...leading to understand each other better and communicate faster...we know some points very well, as like two peas in a pod"*.

5.3. Pair 3

Gender	Type	Industry	Market	Innovation
m/m	Entrepreneurial	Wireless	B2C	Predictive Wi-Fi network management software

Pair 3 had previously worked together at a wireless network company for 6 years. During this period, they attended common meetings and common workshops. They wrote patents together and they were doing a job, which is similar to their current job at their previous company. Although they were not from the same grade, they attended the same university: they had common colleagues from there. As pair 3B mentions *"We are almost at the same age, both of our fathers are lawyer, we grow up at same economic conditions"*. For the reason why they came together, Pair 3A says that *"Coming from same family structures and having same values made us think that this partnership could be long-termed"*. Apart from all, although they are coming from a same background pair 3B states that they have complementary skills. He states that *"He has coding experience, I have academic experience, since he was a product manager, he talked with customer a lot, but I mostly talked with the customer related to the technical part of the product... We can say that complementing each other on business dimension and academical-technical dimension"*.

Regarding their task division, they both state that *"Actually we didn't have a strict role division for a long time and divided the technical problems into two parts"*. Additionally, pair 3B says that *"Based on our experiences, we lead the processes,*

basically we share it". Regarding the leadership in between, pair 3A says that *"All decisions were taken together, there was not a specific leader, leading was depending on the personal experiences"* and pair 3B says that *"We have a leadership that is depending on the situation".* Related to their communication both pair state that they are frequently in contact but trying to keep the distance, for instance as pair 3A state that their social networks are different. As regards to their relationship, pair 3B states that *"I know what he thinks about an idea, and he knows what I think. I shape my speech according to that… I try to think what he would comment and reshape my ideas accordingly".*

In order to avoid the conflicts that are mostly related to the product they are developing pair 3A says that *"We are allowing each other to perform based on individual beliefs whether the other is not satisfied with that at the beginning".* Since pair 3 is still experiencing a growing phase for company, they are both stressing the fact that it is a challenging task. Related to this issue pair 3A says that *"Startups are challenging, and it is not easy to keep the same motivation everyday…When the energies don't match, one side motivates the other one… Being alone in a work is hard both in moral and economic terms".* Regarding the personality of pair 3, 3B states that *"Our personality is related to our childhood, which is almost similar"*, while 3A states that *"We have a balance: he is more emotional, and I am more rational".* Finally, regarding their vision, pair 3B says that *"Our expectations match"* and stresses the fact that this is a crucial parameter to be successful for partners.

5.4. Pair 4

Gender	Type	Industry	Market	Innovation
f/m	Entrepreneurial	Information Services	B2B	Platform making prediction of aggressiveness of breast cancer

Pair 4 consists of a married couple stating that their personal and scientific history overlap. They have been working together for almost ten years but launched their startup almost a year ago. Pair 4A studied general pathology, medicine and met Pair 4B in an organized scientific meeting. Pair 4B is a physicist who had several international experiences before. About their formation, pair 4A states that *"we met, and we formed this scientific cultural understanding...but didn't immediately start working together"*. Pair 4B agrees with this saying and adds *"we started talking about science"*. The reason why they did not start working together immediately was explained by pair 4A as *"we were afraid that it would be a field of conflict"*. Working together as a pair was suggested to them by a friend who knows both of them very well. At the beginning of their common studies, they spent some time to build a common knowledge level. Pair 4A explains this by *"It was very difficult at first because we had to smooth out the language. I started to explain him how biology worked…I start learning his stuff: I learned how to program, how to use coding…He started to study my stuff, I gave him some lessons to explain my problem"*.

Their functioning is divided among several fields, pair 4A states that their roles are *"quite clear, even if I understand what he does...we never want to invade each other's field so much"*. After the official launch of their startup, pair 4A is responsible of the biology field, takes care of the general vision and keeps contact with outside world. On the other hand, pair 4B is responsible of the operational part, including math, accounting and finance. Pair 4B comments on it by stating *"…in my opinion we both have a piece by Leonardo and a piece by Ludovico. Then we are not a scientist and a manager, we are 2 scientists and we both do business."*. Regarding the innovative path, Pair 4A states that *"(we are) always exchanging feedback, updating...innovation comes from (our) discussions...I am usually the one who puts the idea out there. I have an idea, but then you have to make that idea real. He is important in this"*.

According to pair 4B, one big challenge was at the beginning of their startup creation explained as *"we started from being scientists, so far from any logic to sell something"*. Pair 4A adds that *"everyone was criticizing us and asking us how to handle*

the rest...It takes a lot of work...It is good to be a couple...at good times and bad times".

Looking back to their experience, pair 4B states *"We passed from contributing to our own field to open a new field"* while pair 4A adds *"I have the courage to face up...alone I would face it with fear"* and adds that *"The one thing gave me a lot of confidence was his transparency"*.

5.5. Pair 5

Gender	Type	Industry	Market	Innovation
f/f	Entrepreneurial	Textiles	B2B	Sustainable textile application

Pair 5 consists of two fashion designers that met at the university. They were roommates and shared a lot of their lives. They both worked on similar but different thesis topics, which was about analyzing a territory and connecting its key elements to fashion. The thesis that was done by pair 5B forms the base of their innovation, which also brought a patent. Following the graduation, pair 5A started to work for design studio as an assistant of project manager, she has both design and communication side. While pair 5B started to work for a brand. After two and half years, they quit their jobs and started to work on their enterprise.

Related to their coming together, pair 5B states that she doesn't have any doubts about calling pair 5A for starting the business, she adds that *"We were a team before, it was just change of sector… It is important to be close together and have the same philosophy and the same line"*. Like in any other businesses, there were also ups and downs: sudden changes for them as well, yet they managed to overcome them. As pair 5A states there was a natural balance in between: *"When I am down, she is a little more optimistic than me… it is a natural balance"*. In addition, pair 5B says that *"Here is*

the luck of being two. When one is down, the other pulls and vice versa" and she adds *"I have seen several guys starting on their own, they were a lot in trouble, they don't have anyone to deal with or make assessments... Instead, we have continuous exchange of views... it helps us"*. Related to their relationship pair 5A says that *"We are in a same boat, we both want the same thing, we are friends and so there is a basic affection, and then there is desire to work professionally"*.

Regarding the functioning of pair 5, pair 5B states that *"We both have eye on everything, we believe that the vision of the other is important to give added value ... So often one does all the work and then switches to other to check or if you want to add"*. On the other side pair 5A says that *"Dolce and Gabbana... They are couple, they have defined roles that we don't have"*. They state that they have mutual trust, pair 5B explains this issue by saying that *"We have known each other for a long time, working together on a daily basis has consolidated"*. They said there is an open approach in between allowing each side to try to work on the idea whether it is absurd at first sight.

5.6. Pair 6

Gender	Type	Industry	Market	Innovation
f/m	Entrepreneurial	Air Condition	B2C	Sanitizing air conditioning systems

Pair 6 is a married couple, in which 6B invented a patented machine for sanitizing air conditioning systems. Pair 6A is a computer scientist who has previously worked in sales agent and did innovative projects in large corporate companies. Pair 6B worked in a maintenance team for air conditioners and became obsessed about solving the problem of insufficient cleaning methods of them. At that time, existing cleaning methods were neither efficient nor healthy. Pair 6B narrates the day he imagined the answer to his problem by stating *"I saw the problem and said I must absolutely solve*

this thing...What turned on the light bulb was when I went to these two elderly people (for maintenance)...at that moment I knew the answer". Pair 6A narrates the day when pair 6B comes home early with several tools and starts to work on the product by *"He said that he found the solution but did not tell me. He was so busy doing it… I believed it immediately... I saw it as a genius idea"*. Once the device was built and started to function, pair 6B's friend was interested and offered to patent it through his company.

Regarding their functioning, pair 6A takes care of the business side, while pair 6B is responsible of the technical side. Once the idea was being patented, pair 6A started to do research about what was going on in the industry and existing studies about health problems related to air conditioning. Although they talk about distinct role divisions, pair 6A mentions the times when pair 6B also made calls to customers to develop their business. At the same time, pair 6A became competent about the technical side of the product as well. Pair 6B defines their dynamism by stating *"What comes to my mind is completeness, because we are two...one completes the other"*. Pair 6A briefly explains their idea exchange leading to success by stating *"(We) spent Sundays there to study, and even when we went around maybe if we didn't talk about this topic, we would not have been so strong, in my opinion"*.

They mention several challenges throughout their path including economic difficulties, not having expertise on launching startups, creating the right business model and finding customers at the beginning. Pair 6A explains those moments by stating *"...there were moments when he was in despair and said enough...then I was going on, we pushed each other in the moments of discouragement...When one was in psychological decline, the other one pushed...(being) a couple united us"*. Pair 6B adds that *"If it had been with another person, I don't know if the thing would have gone as far as it went"*.

5.7. Pair 7

Gender	Type	Industry	Market	Innovation
m/m	Collaboration between industry and university	Food	B2C	Packaging technique for grated cheese

Within this section of the results it is important to mention that, in the name of pair 7B someone close from the family is talking.

Pair 7 consists of an industry man (pair 7B): an entrepreneur specialized in food sector and a professor (pair 7A) that has achievements on the academic fields. Regarding their formation, as pair 7A says *"He contacted me since I was already dealing with that technique of packaging"*. Pair 7B helped pair 7A in the matter of supporting the materials and laboratory for their common research. According to pair 7A *"He was a person willing to listen and also willing to challenge"*. As explained by pair 7B, the context was not favorable and capable to understand the significance of innovation. There was a big challenge against the ones who considered pair 7 as very technical and unscientific. Within this context, according to pair 7B the role of the university was important, who stated that *"There were other companies that produce plants and materials and there was us, the food company… And there was university, in addition to doing research, finding data, at that time there was no law and therefore the role of the scientist was fundamental"*.

Regarding to their communication, pair 7A mentions that *"So if he talked about cars and the market, I would shut up and listen, and he would do the same when I talked about analytical results… We were always talking to him not to anyone else as a counterpart"*. As pair 7A says, they were truly trusting on each other. Regarding the functioning, they were working together, and they were feeling on the same side. As pair 7B says *"Packaging was his job and doing research was professor's job…. It was an*

affinity of interest that was at the heart of their relationship". Related to the complementarity, pair 7A says that *"We provide the solution and they allowed us to do tests… He gave us what was missing, and we had the opportunity to test"*. From another perspective, pair 7B mentions that *"It was an entrepreneur's passion for technical side, wanted to achieve technical results… He had a great capacity to innovate, he was an experimenter, he was so passionate about the machines"*. As they mention, their innovation was a co-creation. As pair 7A mentions *"He was not a passive recipient, ... his role of experimenter and participation in the creation of knowledge, where trust is necessary since two intelligences stimulating each other… We were not in parallel but interlocking in the management of that problem"*. Regarding this co-creation, pair 7A states *"He knew the machines, so he could give indications on the materials that these machines could work with, on the problems of making the package, on the sealing of the closure… conflicting with the researcher"*. Pair 7A adds to this issue by saying that *"He contributed by conflicting the expectations of the researcher"*.

There was a crucial moment for this company, which was a conference supporting the initiative and their Pair 7B also contributed although it was not his main profession. Regarding to this case, pair 7A states *"He wasn't used to talk in public, he was a salesman"*. In addition to that conference, regulatory was another obstacle for pair 7, but they didn't give up. Related to this fact, pair 7A says that *"Regulations was an obstacle…I thought it was an insurmountable. Luckily, Ferrari has gone ahead anyway"*. As pair 7B adds *"He was at certain age and professor was young… He says no worry; we will make it anyway"*.

5.8. Pair 8

Gender	Type	Industry	Market	Innovation
f/m	Corporate	Building Materials	B2B	Fiberglass bar that is an alternative to steel in concrete structures

Pair 8 consists of a C-level executive (pair 8A) and a technical manager (pair 8B). The first contact in between these two was made through a job interview, where the company was looking for technical expertise. Pair 8B was selected to the company after successive interviews. As pair 8A says *"He had the right characteristics for us"* and on the other side pair 8B says *"I was impressed by the organization"*.

Throughout the time, pair 8A changed her role within the company. She was first in charge of administration and human resources and her father was responsible for the technical-commercial part. Then she created innovation, filled patents. Pair 8B was always into coming up with new technical innovations, regarding this issue he says that *"I think it is part and parcel of my duties to present an extra technical innovation every six months"*. There was a fair of composites where they participated together. Regarding this issue, Pair 8B says that *"We do not often go to the fairs together, I go more to see the technical part instead the part of application and relationship with other companies"*. It was a short and intense fair and it was a turning point for their business, since they met with so many enthusiastic people and contacted with important suppliers: there was an enormous reaction to their stand.

Together they faced with many difficulties, one of them was the economic crisis. But pair 8B states that *"With her, our relationship was accelerated by the fact that you have to deal with things that are illogical… You did everything right and the customer is not there… You have to face these problems together"*. According to pair 8b *"She is transparent about the information in her hand… We have many moments in which the*

exchange of the information is very vertical and fast". Regarding this information exchange in between, pair 8b adds that *"It is important to share information and involve people since you can work better together... It is part of our structure and also personal characteristics"*. Additionally, pair 8b states that *"She was always trying to understand what I did and do the best and over the years positions are redefined... I was hired as commercial technician, but in fact today I am a technical manager"*.

5.9. Pair 9

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Mechanical Engineering	B2B	Shape memory string

Pair 9 consists of two colleagues who have never previously worked together. Pair 9A is the founder of the innovation center, which operates independently from the parent company. Pair 9B has been working on a specific technology for decades. They met at an event in a museum and pair 9A had the chance to see the new material that was introduced to the company by pair 9B. They started talking about the possible application fields of the material, where they both immediately saw great opportunities. Pair 9A narrates his memories about that time by stating *"...I saw partially in this technology the solution...I spent all evening and night doing patent researchers"*.

Regarding their functioning process, pair 9A states that *"This project is born from this meeting and a series of phone calls... day and night, lubrications... I felt that it was an important opportunity... We took this journey together"*. Pair 9B mentions that he has been obsessively working on this technology for years and tries to include people because *"If you keep a project to yourself and let another do a little bit, these projects don't go anywhere."*. About their decision-making approach, pair 9A states that *"in all important moments and decisions, it was always me and him"* while pair 9B adds *"we never spend hours discussing something, impossible."*. Regarding their dynamism, their

description of themselves shows their similarities and differences. Pair 9A describes himself as *"I tend to be passionate about technology, but not one technology in particular, because when it deepens I get bored...I need someone who goes deep into things; that is something I really struggle"* while pair 9B talks about himself as *"I am a person who has always been curious and who likes to do everything. In the end I have this attitude not to stop on one thing...creative inspiration is something I have always had inside"*.

One challenge they faced was financially since the project was a medium- long term investment. Pair 9A states that they have invested a lot and got first revenues five years later. Pair 9A explains their success by stating *"We know that to do great things you have to have courage and look far...There were patents about this subject, which had gone nowhere because everyone stopped on a difficulty. We experienced them later. What they failed to do was to hold on"*.

About the importance of being together in this journey pair 9B says *"the couple's discourse is important. Often finding balance alone is difficult."* while pair 9A adds *"if we hadn't done it together, we would have shut down much earlier…"*.

5.10. Pair 10

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Chemicals	B2B	Binder that keeps lithium oxide together

Pair 10 consists of a technical guy (pair 10A), who has engineering background and has been working on the polymers for many years and a scientist (pair 10B), who is specialized in industrial chemistry. They were both working as a part of an international chemical company but in different countries. Pair 10 started to work together with a

company project. Regarding the innovation that they came up with, the company plays a crucial role that pushed the relationship between the product and the application.

Although pair 10A had the technical background, due to the requirement of the job he became the business guy without making any business school. Some people moved to another part of the company and he became competent about marketing side. Regarding this issue, pair 10A states that *"I did not relocate and that was the triggering moment. That is basically how I moved from more technical support to market development...My background was engineering, I have technical background, I did not make any business school, I learned how to do business through my career... I started to visit customers..."* and pair 10B states that *"He will explain the market, why especially the market of this product started to grow..."*. When they saw an opportunity at the market, pair 10B started to look at the application of the product although his expertise was different. Related to this issue, pair 10B says *"My expertise was on the polymer science, but I started to look at the application, how it works...I translated from idea to practice..."*.

Regarding their collaboration, pair 10B mentions that *"He was able to translate this kind of information coming from the market... And for my side, I was able to develop a competence... We built knowledge on the application"*. In addition, pair 10A states that *"It was the conjunction of two things, both parties were fundamental to move the project forward"*. Related to the hard times that they faced, pair 10A says that *"First feedback was not fully positive, so it was at some point fully black and sometimes white. Managers were saying that are you sure that it is going to be successful. And the challenge we had was we had to believe in success of this material and continue to move forward"*.

5.11. Pair 11

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Automative	B2B	Intelligent tyre

Pair 11 was formed some decades ago in a corporate company. At that time, pair 11A was responsible from managing a 'losing' company and thought that the only possible way to relaunch was through the technology. For that reason, he sent a young engineer (pair 11B) to Germany to learn about the latest developments. Although pair 11B was sent there as an engineer to understand the latest developments, he recreated the company (by firing people and rearranging the company structure) and managed to take some approvals from their customers. Pair 11A recalls the beginning of their relationship by saying *"a natural attraction"*.

Regarding their perspective on working dynamics, pair 11A states that *"Only through a search for a synthesis of component people's thoughts in different areas, you can do new things...open to different, open to new...having good ideas is useless if there is not the ability to share them and to be able to synthesize them with others"*. Pair 11B adds *"Listen...listen to others, understand the views of the people around and then extract the best from them all"*. About the communication between them, pair 11A says *"When he said something… I understand it too although I am not a technician"*.

One challenge faced by them was the people who did not believe that their innovation would be successful. Pair 11A states that *"...many people have always thought it was a wrong idea...it was my craze, supported by pair 11B"*. Throughout the interview, pair also mentions some difficult challenges, some moments of crisis that push their collaboration to the next level and help the company grow. They state that they faced several challenges together and it is clearly observed that in each of them they made decisions together. Pair 11A repeats the question *"I asked him: Can we do it?"* several times for several challenges they have faced. Pair 11B states that the

method to handle a challenge is to break it up to smaller challenges. Pair 11A talks about their success by saying *"unconsciousness, courage, competence...there was a bit of everything...There was so much expertise on the part of pair 11B... I knew the skills we had inside"*.

5.12. Pair 12

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Mechanical Engineering	B2B	Accelerometer

Pair 12 have met in a corporate company. At that time, pair 12A was much more experienced and pair 12B was a young successful physics graduate at the beginning of his career. Pair 12A had the vision that a specific technology with specific material would be a breakthrough. However, including his colleagues, people were saying that he was crazy, and it was not possible. Pair 12A wanted to learn more about this technology and decided to send pair 12B to a university in United States to work with a professor. Pair 12A explains the situation as *"I was struck by his mental freshness, ability to easily jump from one point to another… He immediately appeared as a prominent character, a leader"*. Pair 12B refers to these moments by saying *"He called me and said; Do you want to work in this technology? He gave me an article"*. During this international experience pair 12B learned precisely about the management and technical side and returned back after a year to work with pair 12A.

Regarding their functioning dynamics, pair 12A mentions that *"We really design by phone, we can understand each other, we have worked 20 years together"*. Also, regarding pair 12B he mentions several times that he is gifted with having a vision.

The pair had several difficult times because they were not able to be successful with the technology in many markets. They had trial and error approach and admit that

they lost money. However, they never stopped believing in the technology and its possible applications.

5.13. Pair 13

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Information Technology	B2B	Electrical development in personal computer

Within this section of the results it is important to mention that, in the name of pair 13, information is gathered from second hand sources since this selected case is from the history.

Pair 13 consists of a general manager (pair 13A) and an engineer (pair 13B) in the technical side. Pair 13A started his career in the company's technical side and took part in several inventions of successfully sold products. Later, pair 13A became the general manager of the company. When pair 13A was the general manager, his collaboration with a young engineer (pair 13B) started. Pair 13B, holding degrees from electrical and aeronautical engineering, had a vision to create an innovative product that could create a new segment in the market by passing from mechanics to electronics. Once pair 13B explained his idea, pair 13A was amazed by this solution and stated that *"...seeing this machine working, I understand that era of mechanics is over and a new path begins"*.

However, the conditions at which the pair functioned was difficult; the company had recently lost its leader and lacked guidance. The new directors managing the company did not believe that electronics was the solution for company's survival. Pair 13 realized that in order to continue to work on electronics, they had to do it in secret. That is why, pair 13B started to work in a small electronics team without the approval of the new management. He was backed up by pair 13A, who was seen as a respected

leader in the company. Pair 13A was able to open doors for pair 13B without using the traditional communication means in the company. Since the electronics department was sold to another company by the management, pair 13A's support was crucial to develop the technology. While building the product, the interviewee mentions that pair 13B did not select the latest technology in the market to continue but used the one that suits the best to his vision.

Once the product was successfully completed, it was shown in an exposition as a 'company strategy'. It gathered a lot of attention both during the exposition and later in the media leading to several sales. Although the new managers of the company did not agree to start the production at first, pair 13A disagreed by stating *"Engineer does what he wants, we don't understand anything about electronics, we leave it to young people"*. This conversation enabled the start of the production. Pair 13A was aware of Pair 13B's capacity, that is why, he was willing to take risks about this innovation. The interviewees later state that pair 13A defended pair 13B on several occasions and he was the one who understood the possible applications and philosophy of what pair 13B wanted to achieve. Pair 13A is the enabler of the innovation with his attitude and foresight, and he is defined as a person who would fight for the things they knew that were right. On the other side pair 13B was seen as the genius in the company and he was trusted by pair 13A.

5.14. Pair 14

Gender	Type	Industry	Market	Innovation
m/m	Collaboration between industry and university	Chemicals	B2B	Scientific awarded catalyst that enables polymerization

Within this section of the results it is important to mention that, in the name of pair 14, information is gathered from second hand sources since this selected case is from the history.

Pair 14 consist of a scientist (pair 14A) and a managing director (pair 14B) of a chemical company. Pair 14A has created his own school and gave lectures there. On the other side, pair 14B was instrumental in the industrialization of their outcome: giving sources for enabling the discovery. Pair 14A was aware of the fact that industry was playing an important role for the development of this research. There was a unique relationship between the school and industry.

Pair 14A has undisputed leadership in his field and amazed his students with continuous evolution of his research. Pair 14A was a very successful scientist with more than 600 publications. Pair 14B was a great entrepreneur, who was believing in the relationship with the university. There was a compatibility of characters between them and they were very cooperative. At those times the cooperation between university and industry was not very well appreciated and even was criticized. There were not bad times since they were in competition with the world and they were always ahead of the others with international awards. They were in constant contact; they were calling each other most of the times. Pair 14A was always listening and doing what pair 14B wanted. Pair 14A was always nodding and ended up with what pair 14B asked for. In addition to this fact, there always was mutual respect and trust between the two.

Pair 14A had great insights but at the same time he was aware of the boundaries of his researches. He immediately called pair 14B when there was an important event related to the patent. He saw the opportunity at another scientist's patent and discussed it directly with pair 14B for the copyrights. At the end they arrived at an agreement.

As a matter of fact, they had previous collaborations. They made a unique plant together. Even once, they had a trip together to the United States to study the research system and the organization of the industry.

When the results of the effort were not good enough, pair 14A was always kept trying instead of stopping. Throughout the discovery of their outcome, pair 14B was financing the activities that are carried out by pair 14A. Pair 14B took full responsibility on the risks. Even more important than his financial contribution, pair 14B helped out regarding the mobilization of required people and structure. It was the great intuition of pair 14B that made the difference. On both sides, there was the courage to throw the heart over the obstacle. They did this since there was the mutual trust.

5.15. Pair 15

Gender	Type	Industry	Market	Innovation
m/m	Corporate	Pharmaceutical	B2B	Contrast media substance for medical imaging

Within this section of the results it is important to mention that, in the name of pair 15, information is gathered from second hand sources.

Pair 15 consists of an entrepreneur (pair 15A), who studied chemistry and a scientist (pair 15B), who played an essential role in the development of pharmaceutical research. They met at a research laboratory in Switzerland, where pair 15B was working. Pair 15A immediately understood that pair 15B was the right person for his desire of opening research laboratories in Milan. Pair 15B had a foresight about contrast media; a semi-unknown niche where large pharmaceutical companies and large groups did not believe in. Pair 15B agreed to work in the research laboratories as the technical director after seeing pair 15A's tenacity and will to get something important. They both had long-term visions, so they had glimpsed the possibility of success.

In their relationship, there was a huge amount of respect for everything; a respect for the roles. They also had absolute blind trust between them. Once, pair 15A defines pair 15B by stating that he had *"the willingness to listen and to appreciate very*

much of what I was proposing him". Similarly, pair 15B had a great affection for pair 15A, they always had good relationship.

During their relationship, they fed each other a lot. What pair 15B carried out was supported by pair 15A's insights. Since pair 15A graduated from chemistry, they were able to share the same language, the same skills. Although being the entrepreneur, pair 15A also had the intellectual tools to understand if there was a potential in that thread and was very passionate about research often went to the laboratory. The interviewee states that they had a deep shared direction. He mentions the times when pair 15B would show the results to pair 15A, where pair 15A would define the goals and tell in which stage they are in their process. At these times, they used to meet very often. The interviewee states that although they did not work side by side, they saw each other in daily basis.

The challenge they faced was to believe and keep the vision. Also, being in a competition with big groups required lots of belief and confidence. The research was very complex, and the creative process required a lot of dedication and faith of both the researcher and the entrepreneur. They had to imagine but meanwhile invest energy and keep on without immediate feedback. The interviewee states that pair 15A always said, *"Come on! Come on!"* when he saw a spark of something potentially positive and this made the scientist (pair 15B) do his job better. The interviewee talks about the pair dynamics by saying *"A very strong understanding and a very strong belief. An unshakeable faith"*.

To sum up, 212 codes are gathered from the interviews. Following the model of Saldana (2013), all codes are clustered according to their similarities and in total nine categories are obtained. Further, these categories are clustered once more according to their similarities and three main propositions are built. Proposition 1 consists of 60 codes under three different categories. Proposition 2 consists of 62 codes under two different categories. Proposition 3 consists of 90 codes under four different categories. In the following chapter, each proposition and related categories will be discussed in detail.

6. Discussion

This chapter aims to address the research gap through the results of the interviews. It was already mentioned that based on the literature review and real world cases, a conceptual framework was built. The main reason for constituting such framework was to see the big picture that shows the main building blocks leading to innovation of pairs. Following that, functioning building block became the main focus, since it was defined as the black box that has various inputs leading to the innovation outcome. Overall, functioning of pairs, was determined as the main research gap that brought the question of *"How do pairs evolve and function to reach innovative outcomes?"*.

Within this section, under the Theory Building chapter, as a first step, previously formed conceptual framework is supported by the findings from the 15 cases. In order to strengthen the gathered data from the literature review and real-world cases, each arrow is supported through the codes from interviews. Secondly, as one of the main objectives of this dissertation, three different but related propositions are built in order to contribute to the literature. Finally, under the chapter of Enhancement, for stronger

verification of the propositions and eliminating the risks of biases, real world cases are introduced.

6.1. Theory Building

6.1.1. Supporting the Conceptual Framework

Remembering the conceptual framework that is illustrated in figure 11, there are some building blocks representing the path of the innovative pairs. Context is both triggering pair formation and functioning, while share leadership is acting as another input for the functioning building block. In order to support the linkage between each block, there is also personality in between context and shared leadership. Connections between each building block was already explained by the theory and real-world cases. Hereinafter, relying on the results that are gathered from the 15 interviews, it is intended to make these relations even stronger.
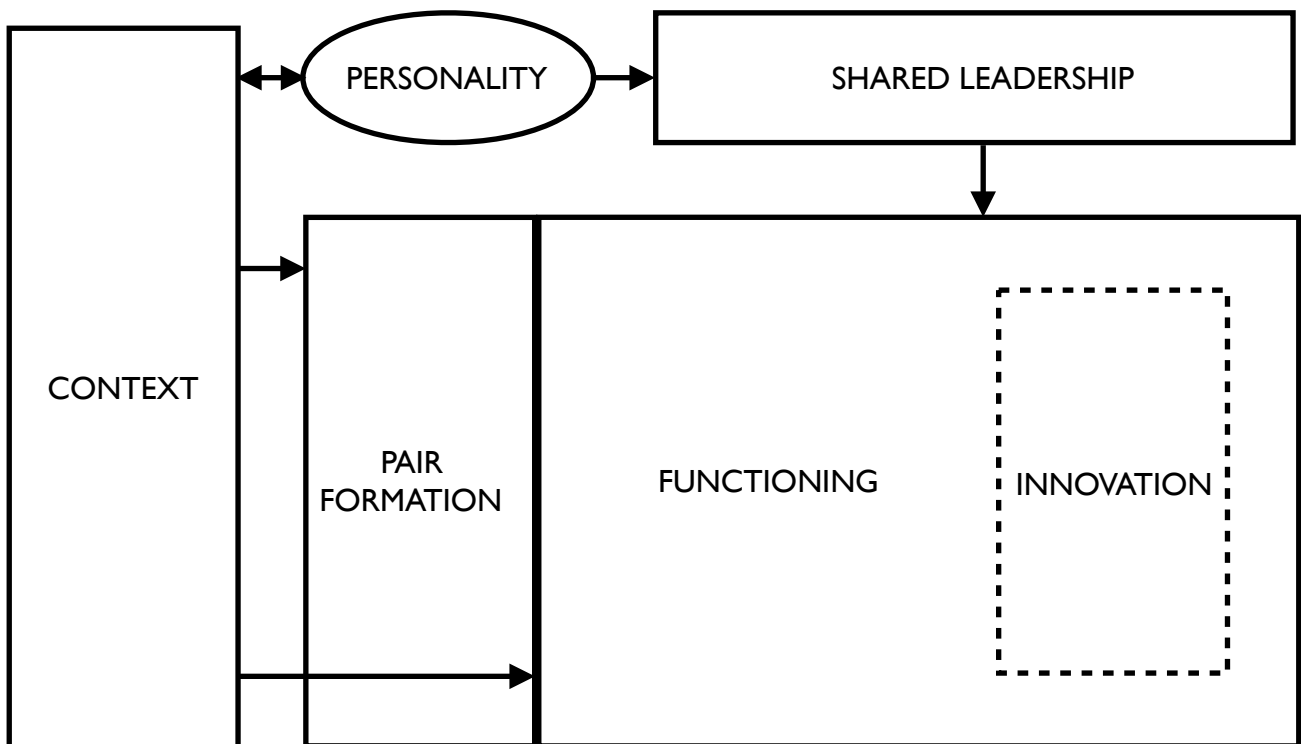

Figure 11. Conceptual Framework

Context → Pair Formation

This connection can be considered as the most obvious one among the other connections. Previously mentioned, context can refer to the background, study, job, friend, family, environment or likings. Having shared context is playing a crucial role for the pair formation step, which is the milestone for the functioning process. Coming from similar values, experiencing similar incidents or even growing at the same environment have significant impact for the pair formation. According to the results of 15 case studies, it was found out that the great majority had shared a common context before forming their dyad structure. Observed pairs and their shared context is illustrated in table 3.

For instance, pair 1 met in high school and they attended the same university. They previously had several startups together, as one of them mentioned *"Our backgrounds are similar; same city, same family structure"*. Pair 2 consists of two brothers. Their common context is the family they come from. They have common values. Regarding the Pair 3, they previously worked together at a company for 6 years. During that period, they attended common meetings and workshops. They even wrote patents together. Related to their commonalities, one of them says that *"We are almost at the same age, both of our fathers are lawyer, we grow up at same economic conditions…Coming from same family structures and having same values made us think that this partnership could be long-termed"*. In addition to all, they studied at the same university. Pair 4 consists of a married couple stating that their personal and scientific history overlap. They have been working together for almost ten years but launched their startup a year ago. Pair 5 consists of two fashion designers that met at the university. They were roommates and shared a lot of their lives. They both worked on similar thesis. Pair 6 is a married couple. Pair 8, 9, 10, 11, 12 and 13 worked under the same company, where they had shared values of the common corporate culture. Pair 14 had previous collaborations. They made a unique plant together. Even once, they had a trip together to the United States to study the research system and the organization of the industry. Finally, regarding the pair 15, they both graduated from chemistry, where they were able to share the same language and same skills.

PAIRS	Shared Context
Pair 1	high school, university, work
Pair 2	family
Pair 3	university, work
Pair 4	work, marriage
Pair 5	university
Pair 6	marriage
Pair 8	company
Pair 9	company
Pair 10	company
Pair 11	company
Pair 12	company
Pair 13	company
Pair 14	previous collaborations
Pair 15	study field

Table 3. Pairs and their shared context

Context → Functioning

Context is playing a crucial role in the sense of knowledge and information exchange during the functioning process of pairs. While strong ties ease the communication and knowledge transfer (Handley 2006; Hansen 1999; Roberts 2006; Uzzi 1999), weak ties on the other side enhance creativity due to increased knowledge diversification and differentiated backgrounds (Kijkuit and Ende 2007). Based on the information gathered from the literature review, it was already said that combination of strong ties with weak network structures can be optimum for fostering innovation.

When examining the 15 cases that consists innovative pairs, above mentioned combination is also observed at the majority. Table 4 briefly shows this combination. In general, it can be said that while differences in between individuals enhance creativity, similarities ease the mutual understanding and knowledge transfer. Within this sense, having differentiated contexts is linked with the weak ties, while having common context refers to the strong ties.

PAIRS	Combination of Ties
Pair 1	Different hobbies, different jobs; same high school, same university, same startups
Pair 2	Different occupation, different countries; same family
Pair 3	Different social networks; similar families, same work network, same school network
Pair 4	Different field of expertise; marriage
Pair 5	Different work network; same school network, close friends
Pair 6	Different work network; marriage
Pair 9	Different fields of expertise; same corporate culture
Pair 10	Different countries; same company
Pair 11	Different country experiences; same corporate culture
Pair 12	Different country experiences; same corporate culture
Pair 15	Different career path; similar background

Table 4. Pairs and their network tie combinations

Context ←→ Personality

Since the research question of this dissertation is interrogating more about functioning of pairs, information related to this connection was barely obtained. Within the boundaries of the interviews, questions are directed more in the matter of functioning process of pairs and their evolution.

Still, related to this fact, a supportive code was obtained from one of the pairs. As mentioned before, context of an individual affects the formation of individual's personality. Relatedly, pair 3 say: *"Our personality is related to our childhood, which is almost similar... We are almost at the same age, both of our fathers are lawyer, we grow up at same economic conditions"*.

Personality → Shared Leadership

Same as before, this connection also lacks the supportive information from the cases, since the focus was more on the functioning. Still, as widely known leadership is in general related with personality. As already mentioned in the literature review section, O'Toole and colleagues (2002) state that roles and tasks in a shared leadership are divided according to personality bent. As a supportive element for this fact, one member of the pair 1 say that *"...He is a very presentable person, something I lack... I can act more introvert in nervous moments, he is brave... I wanted to do something on the technical side, I needed someone on the business side"*. Moreover, such connection can also be observed for pair 6, where one says that *"Characteristically he is shy...he is the genius, but he needs someone to go around to tell people for him"*. Roughly speaking, it is a fact that these two examples are supporting the linkage between personality and shared leadership. While pairs are sharing the decision-making process, they inevitably rely on the personality factor.

Shared Leadership → Functioning

In definition shared leadership is the approach where leadership is distributed among individuals (Carson et al. 2007) and collaborate on the decision-making process (Hoch 2013). There are several examples from the cases, which are supporting the connection between shared leadership and functioning building blocks. For instance, pair 2 say that *"We decided to do it together because we completed each other... We are two opposite characters that can achieve good results when combined... in terms of internal management, pair 2B is more in the operational side, I am more on the external side"*. Moreover, regarding to this fact, pair 3 say that *"Based on our experiences, we lead the processes, basically we share it... All decisions were taken together, there was not a specific leader, leading was depending on the personal experiences"*. Additionally, this approach was also observed at the pair 5, where they say *"We both have eye on everything, we believe that the vision of the other is important to give added value … So often one does all the work and then switches to other to check or if you want to add"*. Pair 7 stating that *"We were not in parallel but interlocking in the management of that problem"* also reveals out the approach of shared leadership. Finally, looking at the pair 11, it was observed that they faced several challenges and in each of them they made decisions together.

6.1.2. Building the Propositions

In the previous section, conceptual framework that illustrates the path of innovative pairs are supported by the 15 cases. As mentioned before for several times, since the most valuable building block related to innovation was selected as the functioning, which lacked deep analysis in the literature, research was concentrated more on this part. Regarding this issue, all the interviews are coded with the direction of understanding dyad functioning. Within this scope, after long and compelling data analysis process, three main propositions raised. These propositions will be explained in detail in the following section.

Proposition 1: Pairs go beyond their boundaries throughout the functioning process.

Proposition 2: Pairs react to challenging moments by emotional support.

Proposition 3: Pairs exchange ideas for critical reflection.

From this point on, it is aimed to discuss and introduce the path that arrives to these three propositions. As a methodology, relying on the interviews, codes are generated to form categories and then to progress more to the theoretical level (Saldana 2013). During the data analysis process, both in vivo codes and constructed codes are used while moving from particular labels to general theory. Following chapters give place to this theory building process for each proposition.

6.1.2.1. Proposition 1

From the interviews, generated codes are categorized under three main titles, which are fluidity, involvement and transformation. By analyzing the content of the codes and considering the working dynamics of the observed dyads, "Pairs go beyond their boundaries throughout the functioning process" proposition is achieved. This progress is shown in table 5 below.

Category	Proposition
fluidity	Pairs go beyond their boundaries throughout the functioning process
involvement	
transformation	

Table 5. Progress to reach Proposition 1

From this point on, codes related to each category are briefly described. In the table of codes, the numbers in brackets represents the number of the pairs.

Fluidity

As mentioned by Gronn and Hamilton (2004), pairs bring separate and distinct attributes to their joint work. Once the pair structure is formed, two distinct individuals initially might have defined zones and boundaries, which can be referred as a rigid structure. However, several scholars mention the importance of interdependence, where pairs need to rely on and interact with each other to reach their goals (Campion et al. 1993; Fausing et al. 2015; Guzzo and Shea 1992; Wageman and Baker 1997). Similarly, during the interviews, pairs explained how their strict and rigid divisions fade away and their limits disappear with time. They share and exchange the process to create an outcome endorsed by the visions of both. These pairs state that it is not possible to associate one person with a distinct part of the business, yet the whole process is the result of interwoven efforts of pairs.

One outstanding example related to this fact can be observed at pair 4. They are mentioning that there are not such distinct role divisions on their working dynamics. They are not like Leonardo (the scientist) and Ludovico (the entrepreneur), instead they have pieces from both. Another example is pair 5 that consists of two designers. They talk about their dynamics by stating that *"We don't have defined roles; one does all the work and then switches to other to check or to add"*.

Once the codes are gathered up, a pattern of 'fluidity' emerges. This is a fluidity in the sense of breaking the boundaries, integrating through the process and talking about an outcome that cannot be associated to only one, but to both of the individuals. This term objects to rigidity, where individuals can distinguish their exact roles, competences or perspectives among the process. Similarly, Shenk (2014) explains that at first glance, pairs can be associated with distinct roles, yet in a deeper look their roles and ideas tangle through the innovative path. This is the point where 'we' notion comes forward. In table 6, codes related to fluidity category are listed.

"our responsibility divisions occur naturally" (1)
"we don't have a concern as 'you or me', we are just focused on the outcome" (2)
"in hesitant moments, the one with reference does what he wants" (2)
"we didn't have a strict role division" (3)
"based on our experiences, we lead the processes, we share it" (3)
"being two creates a close working space" (3)
"we both have a piece by Leonardo and a piece by Ludovico" (4)
"we are not a scientist and a manager; we are 2 scientists and we both do business" (4)
"we both have an eye on everything" (5)
"vision of the other is important to give added value" (5)
"one does all the work and then switches to other to check or to add" (5)
"Dolce and Gabbana…, they have defined roles that we don't have" (5)
"one took over from the other and pushed it" (6)
"I feel that we are part of the same organism" (7)
technical guy disagrees with the business woman about the strategy (8)
"in the end I have this attitude not to stop on one thing" (9)
"multipotential is a resource in one person" (9)
"in all important decisions it is always me and him" (9)
"it wouldn't be fair to say that I was the guy who opened the market, or he was the guy who developed the product" (10)
"(if you talk about exact role division) forget it. You can never do it if you are alone" (10)
"freedom is what determines the ability to innovate... freedom of minds and thoughts" (11)
one would show the results to the other, for him to define the goals and tell in which stage they are in their process (15)

Table 6. Codes of Fluidity

Involvement

Although pairs might have fluidity on their working dynamics, at the basis of their dyad formation, they have some competences and previous experiences that place them into defined zones. For instance, a scientist is expected to take care of the technical side, while the manager is expected to take care of the business side. Yet, throughout the interviews with pairs, it is observed that majority of them get involved to the other's zone. This involvement can either be by supporting the other at the defined

tasks or contributing intellectually. A similar notion can also be observed in the studies of Gronn and Hamilton (2004) about co-principalship. Within their study, these scholars observe a specific method of working relation called overlapping, where pairs substitute for each other (Gronn and Hamilton 2004).

Within the interviews, several pairs talk about significant contributions of their partners in very crucial moments, which usually become the turning point. For instance, pair 1 consist of a business guy, who likes to talk to people and technical guy, who likes to talk to machines, as assimilated by themselves. They attend an important international exposition, where they have to show themselves off. At that time, the one who is not talkative, and not responsible from customer relationships, also takes part and contributes to his pair for the development of their product. As seen from this example, especially on the moments of crisis and when there is a need, the one who is less capable of that task contributes to the other for the sake of their outcome. Similarly, talking about pair 8, there is the moment when the technical guy also attends a fair with his pair, where they promote the project and draw attention. During the interviews, pairs state that the presence and contributions of the other member resulted positively. This contribution can also be seen as the advantage of being two, since one takes responsibility when the other is no longer able to cope with the situation. In other words, involvement of the other eases the process.

This involvement does not always have to be at the moment of crisis. Since the structure of the dyad gives them the confidence of daring, pairs can also help each other out through the functioning process. Although it is not his/her main role within the pair formation, one can dare to get involved at the other's field. For instance, regarding the pair 7, there is an industry man, who is actively participating on the development of packaging technique and even sometimes he is conflicting with the professor, who is an expert on this subject. While talking about this topic, pair 7 states *"We were not in parallel but interlocking in the management of that problem"*.

As seen above, pairs contribute to each other's responsibilities and interfere each other with ideas. Although it might not be their exact field, they can get involved at the other's. These pairs do not see their responsibilities as distinct divisions, instead they

talk about them as a whole and get involved in all aspects. Most of the time, this involvement helps the pair in the path to achieve the desired outcome. As mentioned by Gronn (2002), having some degree of involvement in tasks reduce the likeliness of decision errors, since pairs are aware of each other's duties and performances. Taking all these facts in mind, the codes explaining this category are named as 'involvement' which are presented at the table 7.

"when we were in an important exposition, I had to be active and present our startup to people as well" (1)
"as a technical guy, I never say 'I don't speak to customer'...whoever has availability helps" (1)
"when needed, he comes and helps to prototype or supports the technical side" (1)
"I support him on his tasks" (1)
"we both have specializations... but whoever finds a reference shares it, no matter about what" (2)
"when he finds the right news on his side, that are important for me, he shares with me" (2)
"as the technical side, I don't have time to do the meetings" even though the other pairs is a lawyer, he helps" (2)
"I bring an idea; he takes it from me and makes it real" (4)
"there has always been a curiosity on my part to explore other fields" (4)
"realization of the idea needs a co-participation" (4)
"involving in the development was a kind of mission that I saw it for myself" (6)
he also made calls to customers to develop their business (6)
"he was not a passive recipient" (7)
"his role of experimenter and participation in the creation of knowledge" (7)
"we were not in parallel but interlocking in the management of that problem" (7)
"it is the entrepreneur's passion for the technical side" (7)
"conflicting with the researcher" (7)
"(we were) co-creating" (7)
one attended a fair that he doesn't usually attend (8)
"for me it was logical to be both at the fair" (8)
technical guy interferes about the innovation's impact on the market (8)
"I try to understand how I can influence and give my added value" (9)
"people have to feel that the stuff is theirs, there shouldn't be not in my garden thing" (9)

the experienced engineer supported the younger one's idea in the managerial side (13)
he was very passionate about research often went to the laboratory (15)

Table 7. Codes of Involvement

Transformation

From the interviews, it is observed that members of the pair can change their roles or boundaries throughout the innovative journey and end up with different competences at the final state. Fluidity of the boundaries and the involvement at the other's zone might be the supporting reasons to achieve this transformation. Mostly, interviewees talk about these moments as a natural shift, which occurs as a reflection of the journey's requirements. In order to understand it better, having a look at pair 10 shows that, although one member started his career at a more technical field, according to the needs of their product development and company structure, he learns how to do business and skips to the marketing side. He starts to deal more with customers rather than technical side. Similarly, analyzing pair 11, it is observed that one member transforms from the engineering to the business side due to the requirements of his replacement within the company. It can be said that instead of a stable positioning, there is the evolvement of the boundaries. Besides these, when the pair 6 is taken into consideration, the wife becomes so competent about the technical side that during the interviews, she was also able to give indications as much as the husband does.

When the codes are gathered up related to this topic, it is observed that individuals extend or transform their competences in such a way that it helps the innovation to grow solidly and cooperatively. That is why, this category is labeled as 'transformation', where the extension does not only develop the individuals' abilities, but also enhances the pair dynamics and the innovative outcome as well. As a supporting view, Hunter and his colleagues (2012) put emphasis on the differing and specialized skills of leaders to reach large-scale innovation. The codes under this category are presented in table 8.

"within time, I became competent about marketing and business development, he became competent about technical side" (3)
"although we both are from the technical side, we embraced the new sides of the work like finance, HR, IT" (3)
"we expanded, neither of us did what we do today" (4)
"we passed from everyone contribute to their own field to open a new field" (4)
"we started from being two scientists...moved to business" (4)
"we are designers, but we did all the calls for sales campaigns" (5)
she became competent about the technical side of the product (6)
"over years, positions are redefined" (8)
"I moved from more technical support to market development" (10)
"I learned how to do business through my career… I started to visit customers" (10)
"normally, I have technical background...but in this, I am the business guy" (10)
he was sent there as an engineer, yet he recreated the company (11)
he learned precisely about the management and technical side (12)

Table 8. Codes of Transformation

With regards to the literature, it is a common fact that majority of the innovative pairs have complementarity in terms of tasks, expertise, perspectives or roles and so on (Miles and Watkins 2007). It is obvious that complementarity enables individuals to bring their strengths into the table and learning from each other (Gronn 2002). This trait is also observed in most of the pairs of this study, yet what is different or in other words valuable for the literature is that over time they tend to go beyond their zones. According to the findings, it is obtained that boundaries of the pairs are disappearing, and they are going beyond their limits in terms of competences or roles. This change is observed under categories of fluidity, involvement and transformation. These categories explain how pairs' boundaries vanish and their competences extend through the process. That is why, 'Pairs go beyond their boundaries throughout the functioning process' is selected as a proper definition for the first proposition. This proposition and its relation to the functioning will be investigated in the sense making section.

Before skipping to the further chapters, related to the above proposition, inspired by the model of Gronn and Hamilton (2004), boundaries of each pair and their

evolution over time is positioned in figure 12. As it can be seen, although pairs (indicated with numbers) started their functioning process either from duplication or complementarity, over time a change occurs at the majority. Throughout their functioning process, their limits tend to disappear and at the end a shared space emerges. For instance, pairs 3, 5, 10, 12 start their functioning within the same boundaries and then over time they tend to go beyond, while on the other side pairs 1, 2, 4, 6, 7, 8, 11, 15 start as complementary zones and then at the end cross their regions. This shift was not observed in pairs 9,13,14 from the interviews.
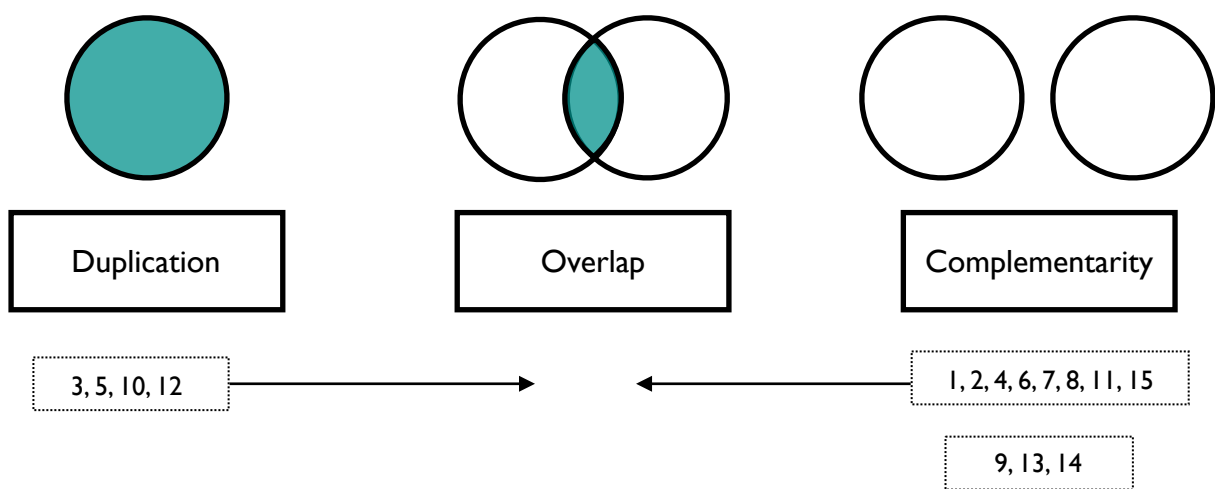
Figure 12. Evolution of the Pairs in their Functioning Process

6.1.2.2. Proposition 2

From the interviews, generated codes are categorized under two main titles, which are motivating each other and handling challenge. By analyzing the content of the codes and considering the working dynamics of the observed dyads, "Pairs react to challenging moments by emotional support" proposition is achieved. The path to achieve this proposition is shown in table 9.

Category	Proposition
motivating each other	Pairs react to challenging moments by
handling challenge	emotional support.

Table 9. Progress to reach Proposition 2

From this point on, codes related to each category are briefly described. The numbers in brackets represents the number of the pairs.

Motivating Each Other

Initially, it should be mentioned that the path to innovation is considered as a tough experience by the majority of the interviewed pairs. Building something breakthrough or managing the entrepreneurial conflicts are not easy tasks. Throughout the interviews, the uncertainty of the innovative process, long payback times, and emotional challenges are mentioned several times to describe the difficulty of the innovative path. One pair defined the process as an *"emotional rollercoaster"*, where there is always ups and downs during the entire journey. Being two at these situations might be the solution for this challenge. When one is down, the other can reach out and take the other from the hardship. Gronn (2002) state that such successful or unsuccessful outcomes allow pairs to experience common emotions and push them to create peer support. Majority of the interviewees talked about the importance of being two in the journey and several of them said that they would not be able to make it alone or with someone else. Similarly, Alvarez and colleagues (2007) state that when difficulties arise, having a partner reduces the feeling of loneliness at the top, lowering the stress level of the individuals.

While interrogating how the pairs succeeded or stayed together at such times, a pattern of motivation was discovered, there was a kind of support in between. As it is understood, there is the influence of the dyad structure on the presence of motivation. Supporting that, pair 6 mentions *"When one was in psychological decline, the other one pushed, being a couple united us"* and pair 15 stresses the importance of belief

and faith on the other. Overall, it is realized that, pairs motivated each other throughout the journey and the category 'motivating each other' was born. The codes related to this category are presented in table 10. One outstanding code, which also can be interpreted as a 'summary' of this category is a quote by pair 2: "*the most important reason of our success is that we always motivated each other*".

"we both do mistakes and successful things; nobody is responsible from anything alone" (1)
"startup is an emotional rollercoaster...but I never had doubts about him" (1)
"if I realize that he is down...I make it up to him" (1)
"the most important reason of our success is that we always motivated each other" (2)
"we don't say to each other 'you did it wrong' but always say 'you can do better' " (2)
"we are responsible of each other's success and failure" (3)
"it is not easy to keep the same motivation everyday" (3)
"when the energies don't match, one side motivates the other one" (3)
"being alone in a work is hard both in moral and economic terms" (3)
"it is good to be a couple; I have the courage to face up" (4)
"you have to work together, at good times and bad times...be motivated...as a couple" (4)
"alone I would face it with fear" (4)
"when I am down, she is a little more optimistic than me" (5)
"when one is down, the other pulls and vice versa" (5)
"we have created a lot of strength for each other" (5)
"knowing that one can count on the other...we are constantly backed up" (5)
"there were moments when he was in despair and said enough, then I was going on" (6)
"we pushed each other in the moments of discouragement" (6)
"when one was in psychological decline, the other one pushed, being a couple united us" (6)
"you need to have a lot of patience, being a couple helps in this sense" (6)
"let's move forward, we move forward because it is the right thing" (7)
what I believe is "never sit down, never think that what you did is good" (8)
"if we haven't done it together, we would have shut down much earlier" (9)
"finding the balance alone is difficult" (9)
"we said 'we can do better' " (10)

the creative process required a lot of dedication and faith of both the researcher and the entrepreneur (15)
"a very strong belief...an unshakeable faith" (15)
"Come on! Come on!" when he saw a spark of something potentially positive and this made the scientist do his job better (15)

Table 10. Codes of motivating each other

Handling Challenge

As mentioned in the previous section, creating an innovation is not a piece of cake. The vast majority validate that there are really hard challenges that blocks the ongoing functioning process. When pairs are asked to talk about these challenges they faced, variable amount of cases emerged. In general, there were difficulties regarding the product development, carrying the innovation from 'lab to the industry', financial situation, intangibility of the results, market success or doubtful colleagues about the outcome and so on. These challenges could result in task based, emotional or process based conflict between pairs (Hinds and Bailey 2003; Jehn 1995; Reid and Karambayya 2009).

Although pairs mentioned diverse challenges, it is realized that at the end, in some way, they were able to solve these conflicts. Most of the time pairs stick up together to unclog the functioning process instead of blaming the other about the hardship. Solving these problems are one of the most crucial abilities of such pairs, since at the other way around, the ongoing process of two could terminate and hamper the generated innovation. Reid and Karambayya (2009) especially add that task based conflict is usually resolved between pairs themselves. In a similar vein, Alvarez and colleagues (2007) state that pairs should learn to compromise in order to find a common solution and avoid possible confusions. Analyzing the interviewed pairs, there is the pattern of getting over such difficulties, which is labeled as 'handling challenge'. The codes related to this category are presented in table 11.

"in a conflict, he becomes supportive to solve it immediately" (1)
"the times when the customer was complaining, and we couldn't make enough money... I never interrogated his partnership" (1)
"people criticized… we needed to stick up together and face them" (2)
"we overcame emotional challenges together" (2)
"when there is a conflict, if one side really believes in a solution, the other one supports until the last moment" (3)
"if we are in conflict, both sides try to find a common path" (3)
"when we told them about startup...everybody was criticizing us and asking us how to handle the rest... with will and being motivated" (4)
"even when we heard the criticism, we wanted to try, we were ready to take it in" (4)
"they told us 'we are in, you will sell a lot' but they never called back...we picked up the list and started looking for another" (5)
"(while facing problems) the fact of having a laugh and saying, 'tomorrow will happen again, but that's fine'...being two is the key" (5)
"when there was discouragement on the part, one took over from the other" (6)
"we had to win over those who considered us to be very technical and unscientific" (7)
"there was concern, but the conviction was so much" (7)
"regulations were an obstacle…I thought it was an insurmountable. Luckily, he has gone ahead anyway" (7)
"with her, our relationship was accelerated by the fact that you have to deal with things that are illogical" (8)
"you did everything right and the customer is not there, you have to face these problems together" (8)
"in challenging moments, what you failed to do is probably to hold on" (9)
"there were patents about this subject, which had gone nowhere because everyone stopped on a difficulty" (9)
"first feedback was not fully positive, we had to believe in success of this material and continue to move forward" (10)
"the challenge we had was that we had to believe" (10)
"it was a question of being convinced of the success and keep going" (10)
"many people have always thought it was a wrong idea...it was my craze, supported by him" (11)
they also mention some difficult challenges, some moments of crisis that push their collaboration to the next level and help the company grow (11)
they faced several challenges together and it is clearly observed that in each of them they made decisions together (11)
one supported the vision of the other (13)

when electrics department was sold, he found himself alone...the other allowed him to develop an innovative technology (13)
they are born in difficult situation but decided to work for the sake of their vision (13)
everybody in the company knew that one supported the other for his needs towards challenges (13)
when the company didn't want to start the production, one defended the innovation for the other (13)
one defended the other on several occasions... he was both the protector and enabler (13)
there was the courage... over the obstacle (14)
when the results of the effort were not good enough, he always kept trying instead of stopping (14)
being in a competition with big groups required lots of belief and confidence (15)
the challenge they faced was to believe and keep the vision (15)

Table 11. Codes of handling challenge

When motivating each other and the handling challenge labels are combined, the inevitable emotional support of pairs especially at the hard times emerges. The emotional support given by being two is referred by the pairs as a reaction to the tough ongoing functioning process. Consciously or not, pairs handle such challenges by motivating each other, they try to support the flow and give the feeling of "You are not alone". At this point, the 'we' notion comes forward. Considering these two labels and combining them, the second proposition of 'Pairs react to challenging moments by emotional support' is achieved. The reasons why pairs approach to each other through emotional support will be investigated in the sense making section in detail.

6.1.2.3. Proposition 3

From the interviews, generated codes are categorized under four main titles, which are sharing ideas, constant communication, learning and filling the gaps. By analyzing the content of the codes and considering the working dynamics of the

observed dyads, "Pairs exchange ideas for critical reflection" proposition is achieved. The path to achieve this proposition is shown in table 12.

Category	Proposition
sharing ideas	Pairs exchange ideas for critical reflection.
constant communication	
learning	
filling the gaps	

Table 12. Progress to reach Proposition 3

From this point on, codes related to each category are briefly described. The numbers in brackets represents the number of the pairs.

Sharing Ideas

Analyzing the pairs' daily interactions, there is one common behaviour, which is the idea exchange throughout their functioning process. Talking about the idea generation and implementation steps, majority of the pairs mentioned that sharing each other's' perspectives and knowledge was the key for the advancement of their innovation. They cared about the other's opinion and tried to get some critical reflection. Through idea sharing, their thoughts and projects were enhanced and evolved. Similarly, O'Toole and colleagues (2002) mention that in pair formations, individuals can challenge each other with their ideas in order to make better decisions and achieve stronger business results.

As widely known, blending different point of views creates more opportunities, which is crucial to develop a breakthrough outcome. Farrell (2001) states that pairs create a special relationship where constructive criticism is observed. This type of criticism improves the environment, where pairs can smoothly discuss their opposing ideas. During the interviews, pairs mentioned that synthesis of ideas and criticism was

how they ended up with innovative outcomes. There are certain examples that validates this fact. Especially at the case of pair 14, information exchange in between industry and university enables outstanding results. At this point, several interviewees added that they were thankful about their pair's ability and willingness to listen. Pair 11 explains the importance of idea sharing by stating, *"having good ideas is useless if there is not the ability to share them and to be able to synthesize them with others"*. The codes related to this category, 'sharing ideas', are presented in table 13.

"we are able to handle criticism from each other" (1)
"we listen to each other very well" (1)
"at the beginning, I was skeptical about sharing some different perspectives, now this doesn't happen" (1)
openly talking to each other (2)
"we jauntily talk to each other" (2)
"our criticisms are brutal" (2)
"the criticism that overcomes the boundaries brings us new ideas" (2)
"clashing ideas is useful for innovation" (2)
sharing information (2)
always sharing important news (2)
"we criticize each other, we get out of the comfort zone" (3)
"innovation came out from that discussion" (4)
"creating a discussion made our idea emerge" (4)
"transparency... there is no secrets to me" (4)
"a couple bursts...if one doesn't want to listen" (4)
"we have a continuous exchange of views" (5)
"there is always 'Do you like this?' or ' I will send this to you, what do you think?" (5)
"surely the starting idea was hers...but then the desire to explore it together...we have made a lot of strength for each other" (5)
"he told me about the problem of elderly people and his will to solve" (6)
"it took couple of days to to explain the solution in his mind" (6)
"if we wouldn't talk about this topic, we would not have been so strong" (6)
"if he talked about cars and the market, I would shut up and listen, and he would do the same when I talked about analytical results" (7)
"he was able to listen" (7)

"he was willing to challenge me" (7)
"she is transparent about the information in her hand" (8)
"we have many moments in which the exchange of the information is very vertical and fast" (8)
"I think it is important to share information and involve people because together you can work better" (8)
"if you keep the project to yourself and let another do a little bit, these projects don't go anywhere" (9)
"having good ideas is useless if there is not the ability to share them and to be able to synthesize them with others" (11)
"only through a synthesis of what is thought by competent people you can make new things" (11)
"one's own opinion becomes a good or brilliant opinion if combined with the others'" (11)
"innovation is a dialogue mechanism... bringing different experiences and point of views on the development" (11)
one explained his vision and ideas to the other (13)
it was his attitude and foresight that allowed the other to develop the technology (13)
they shared the knowledge between university and industry (14)
he immediately called him when there was an important event related to the patent (14)
the willingness to listen (15)
during their relationship, they fed each other a lot (15)
what one carried out was supported by the other's insights (15)

Table 13. Codes of sharing ideas

Constant Communication

Sharing ideas is enabled by communication. According to Farrell (2001), creative solutions are emerged not while individuals are working alone in an isolated way, but while they are together in constant communication. It is a critical nuance of the functioning process. After analyzing the interviews, it is revealed that pairs are constantly in contact either by phone or daily meetings. This communication is not only bounded within the working hours, but includes nights, weekends and any moment that required an interaction. Although some pairs were not always in the same physical place during their journey, majority of the them explain their interaction as frequent.

They keep informing each other on the processes and they get updated. By being on the same page, idea exchange is eased, and development process is enhanced. The relationship that links professional duos is based on trust and sufficient communication (Alvarez and Svejenova 2005). Relatedly, pair 2 mentions that they were sharing the news immediately on each side in order to fasten and strengthen the development. Communicating constantly is not only crucial for decision making, but also for the relations with external players. From an outside perspective, in order to stay stronger, both sides should be on the same page. Merging all these facts and related codes, the label of 'constant communication' showed up. Table 14 presents the codes related to this category.

weekly meetings (1)
"there is almost no day that I haven't seen him in the past years" (1)
daily based small meetings to tell about what is going on in each side (2)
meeting twice a day (2)
"we share important news immediately" (2)
daily often meeting (3)
"our meetings got even more frequent once we found the idea" (3)
"there was a time when we were not working from the same place...but we were in constant contact...today we are in the same office" (3)
"we are married...we have been working together for about 10 years" (4)
"(exchange of ideas) is very daily, and it helps us" (5)
"working together on daily basis" (5)
"we spent Sundays there to study" (6)
"he usually calls me all the time" (7)
working together every day since 2008 (8)
"this project is born from a series of phone calls…day and night, lucubration, we took this journey together" (9)
"(I) often phone him on Saturday and Sunday evenings" (9)
"we have been working many years on this project together" (10)
"we worked 20 years together" (12)
they were in constant contact (14)
they were calling each other most of the times (14)
they used to meet very often (15)

they saw each other in daily basis (15)

Table 14. Codes of constant communication

Learning

Compared to the engagement level of members in a team structure, dyad is composed of two people that are more connected to each other. Working as a pair brings different expectations and responsibilities. In order to work smoothly, pairs need to learn about each other well and understand the working style of their partner. Within a dyad structure, since there is only the other one to lean on, each member must know the inside out of his/her peer. According to Alvarez and colleagues (2007), emotionally compatible co-leaders are able to develop a special institution to understand each other without even saying a word.

In a pair formation, individuals might have strengths and weaknesses. Knowing and acting based upon these aspects will make the functioning fluent. Over time, pairs are able to decode their partner. The path of sharing ideas and constant communication enables pairs to learn more about each other's way of thinking and habits. Furthermore, pairs can improve their skills through learning from each other's strengths (Gronn 2002). For sure, the adequate level of understanding comes with time and effort, yet pairs state that the learning leads to eased collaboration and faster progress. An important explanation regarding to this topic was done by pair 3, who mentioned that by spending time together, they started to understand and learn what the other part would think and reshape their thoughts according to that. This harmony created between the pairs is labeled as 'learning'. The codes regarding to this category are presented in table 15.

understanding the working style (1)
"we became better friends after work...we learned about each other so much" (1)
"because we worked together before, we exactly learned who is able to do what" (1)
"working together gave us the chance to understand each other" (2)
"we learned about each other in a deeper way" (2)

"leading to understand each other better and communicate faster" (2)
" we learned who does what so well, that we don't need to question it" (2)
"I know what he thinks about an idea, and he knows what I think" (3)
"I shape my speech according to that" (3)
"I learned our temperaments...through working together...I didn't know them when we were friends" (3)
"we learned how each side reacts in stressful moments" (3)
"I try to think what he would comment and reshape my ideas accordingly" (3)
"at the beginning, each of us did his own thing, we were afraid of conflict...then we gained confidence" (4)
"in the beginning...the idea was to understand how we work together" (5)
"by doing some previous projects, we realized that we were well placed to work together" (5)
"you need to learn each other very well... if not you may give up" (6)
"she always tried to understand what I did and do" (8)
"we get to know each other better" (9)
"when he said something, I understand it too although I am not a technician" (11)
"we can understand each other; we have worked 20 years together" (12)
they have very strong understanding of each other (15)

Table 15. Codes of learning

Filling the Gaps

Sharing ideas, constant communication and learning through the functioning process help pairs to fill the gaps of each other. At the beginning of their formation, individuals might have some gaps that the other has the intellectual to fill. Their collaborative journey pushes the boundaries in between and encourage individuals to rely on each other's knowledge about specific sides of the business (Fausing et al. 2015). This can be count as one of the most important advantage of being two. Having a partner, which has different intellectual level on different topics could enhance the other's weak side. For instance, the members of pair 4 are specialized in two different branches of science, which are physics and biology. When they started to work together, they had to *'smooth out the language'*. That is why, they give each other lessons about their own expertise. Moreover, looking at the pair 7, exchange of

knowledge in between industry and academy enables to fill the gap of each sides. Both sides give each other what was missing. They give each other the ability to look to a problem from another angle. At this point, having different knowledge and being able to share them plays an important role to build this category which is labeled as 'filling the gaps'. The codes related to this category are presented in table 16.

"we fill the gaps of each other perfectly" (1)
"it was very difficult at first because we had to smooth out the language" (4)
"I started to explain him how biology worked…I start learning his stuff" (4)
"I gave him lessons and explained the problem (4)
"I learned how to program, how to use coding…He started to study my stuff, I gave him some lessons to explain my problem" (4)
"still now I ask for explanation on certain things" (6)
"...our relationship...gave me the ability to look at the business world" (7)
"He gave us what was missing, he explained what was missing to us" (7)

Table 16. Codes of filling the gaps

When all categories under this proposition are considered, a broad cycle can be observed. Pairs need to share their ideas for various reasons, the most important one is to enhance their innovation. This sharing needs to be constant to reach adequate level of understanding. The continuous communication among pairs enables them to learn about each other's habits, thoughts and working dynamics. At the same time, all of these categories help pairs to fill the gaps of each other, since the functioning process force their boundaries. Increasing the understanding and knowledge of each other's thoughts enable pairs to criticize each other and share their ideas even more. Due to this communication and interaction cycle, the third proposition is named as 'Pairs exchange ideas for critical reflection'. This proposition will be deepened in the sense making section.

To sum up, relying on the data analysis of the executed interviews 3 main propositions are provided as an answer to the research question, which was *"How do*

pairs evolve and function to reach innovative outcomes?". In table 17, how these propositions are structured are shown comprehensively.

Categories	Propositions
fluidity	Pairs go beyond their boundaries throughout the functioning process. (1)
involvement	
transformation	
motivating each other	Pairs react to challenging moments by emotional support. (2)
handling challenge	
sharing ideas	Pairs exchange ideas for critical reflection. (3)
constant communication	
learning	
filling the gaps	

Table 17. Coding Tree of the Propositions

6.1.3. Intimate Space

Dyad structure is special for many cases. Power sharing executives need to function through a trusting and comfortable relationship, since making mutual complex decisions necessitate a strong level of trust among pairs (Alvarez and Svejenova 2005; Alvarez et al. 2007; Gronn 1999; McAllister 1995). On top of that, trust needs to be backed up by a common purpose in order to achieve mutually desired outcomes (Alvarez et al. 2007). At this point, common purpose refers to creating a shared vision through mutual values, unified decision making and sufficient communication ((Alvarez and Svejenova 2005; Alvarez et al. 2007; Miles and Watkins 2007).

As mentioned by Gronn and Hamilton (2004), for leader duos, trust allows other party to enter their shared role space. In order to create an intimate environment, where pairs can learn from each other and be able to criticize, trust plays a crucial role (Döös

2015). With this regard, Farrell (2001) explains that pairs working together create an environment of 'instrumental intimacy', which is unique for dyad structure reflecting and interacting together. Within this intimate space, pair seems to provide an intimate and protected psychological environment, where two individuals feel free to share ideas, listen and focus on critical feedback from the trusted peer, and therefore reframe their vision. In order to support the above mentioned key building blocks of the intimate space, which are trust and shared vision, Table 18 presents quotes from the interviews.

Pair 1	"Trust is important when you start a new business. He was the person I knew the longest. I knew him very well and never saw any misdoing of him. I analyzed our past, and I wanted to select someone I can trust"
	"He called me. We decided to quit our jobs and work together in few minutes"
Pair 2	"There are acrobats in circus, when one falls the other one holds him. Our job is like working in the circus but without having a safety net. Who would you trust? I trusted my brother. We have an unquestionable trust"
	"Innovative pairs embrace similar values and unite...We dreamed big"
Pair 3	"We previously worked 6 years together where we became closer...We have been to several international trips due to work."
	"We realized an opportunity in our technology...we both were looking for it...we both had entrepreneurship in our minds...after figuring out that our families and values are similar as well, we knew that this would be a long-term relationship"
	"We met and we formed this scientific cultural understanding...we had a vision"

Pair 4	"We were married… in fact we needed a facilitator… who said, 'you have very interesting things…if we start to talk you will see that we will pull out something'. Our discussion with my husband continued at home…at the end of the summer, a first real project was born"
	"Trust comes from the great scientific esteem. I have seen how he deals with things… We have been observing each other for many years…the ability and the vision to go beyond the paradigm"
Pair 5	"By doing some group projects (in the university), we realized that we were well placed to work together…moving from university project to real work…It is important to be close and have the same philosophy".
	"Trust surely came with years. We have known each other since 2010. We matured in university projects. In early work, we grew up together"
Pair 6	"Above all we were a couple, husband and wife…Trust we have come from our relationship… More than anything else we went on trust"
	"He had this idea…I believed in it immediately"
Pair 7	"He invited me to the company and told about his goal…that's when we started dating, doing things together"
	"There was an intellectual fall in love. There was mutual trust…because I felt that we were the part of the same organism"
Pair 8	"I interviewed him, I liked him immediately…The relationship was created even before this innovation, we liked it better than others"
	"(Inventors) only saw our passion"
Pair 9	"We start talking to each other at this event…we both understand immediately that there was a great opportunity to bring in our fields… we decided to take a journey together to visit a scientist…then we decided to go together"

Pair 10	Shared understanding of polymers and their potential applications in the industry brought the pair an idea. They were willing to collaborate since they were working in the same company.
Pair 11	"I was managing a losing company and decided to send this young engineer to Germany. He overturned the situation in a short time"
	"What I recognized at the beginning was a person who wanted to change a situation I didn't like"
Pair 12	"People were skeptical about the idea. Yet, I sent one of my people to learn the technology. When he came back, I gave him responsibility. I was struck by his mental freshness…He had a vision"
Pair 13	One had the vision and the other was able to see this vision and support it. "Engineer does what he wants, we don't understand it…we leave it to young people". He supported his pair because he was aware of his capacity.
Pair 14	There was a mutual respect and trust between them. They trusted each other through the process. Both of them were able to understand the importance of the collaboration between university and industry, which was not common.
Pair 15	At the first meeting he immediately understood that he was the right person for what he wanted to do. There was also an absolute trust, blind between them. They had these long-term visions.

Table 18. Elements that create the Intimate Space

With this dissertation, it is aimed to move beyond functioning of pairs and deeply investigate the dyad structure associated with breakthrough innovative outcomes. In the previous section, through an exploratory study, three different propositions are unveiled as an answer to the research question of *"How do pairs evolve and function to reach*

innovative outcomes?", yet what is still missing is the relationship of these propositions with intimate space in a wider perspective.

In order to understand this, first the intimate space should be deeply investigated. The intimate space is created by opening the doors of a comfort zone for the other. The unquestionable trust and passion for the common vision unites the pairs to see their problems as a whole and work for achieving the best together. Within the dyad structure, there is not distinct role or task division, instead there is the common space, where each can involve to the ongoing development. There is the notion of us. In order to stay stronger, there is engagement with each other like two distinct tree branches intertwining and building a common space. The courage to overcome the limits and dare to interfere are enabled by the existence of intimate space.

In the light of trust and shared vision, eliminating the boundaries creates a fluidity among pairs and expands the pair competences through the journey. This is a space, where pairs dare to challenge each other and enhance their togetherness. The intimate space, where pairs' fluidly take over the distinct responsibilities creates an environment to openly share their most preserved ideas. These ideas are not judged but criticized for the common goal. Criticism improves the shared space, where pairs can smoothly discuss their opposing ideas. The relationship, where pairs have the freedom to critically reflect their ideas helps them to combine and emerge new perspectives, which is crucial in the path of innovation. They can share and dare the unconventional ideas of each other easily.

Through the path of innovation, pairs face several problems or conflicts. Providing breakthrough outcomes are not piece of cake both in terms of mental and physical aspects. Yet, they support and motivate each other emotionally. Understanding the power of this support passes through the elements that create the intimate space, which are trust and shared vision. The trust and shared direction oblige pairs to support each other. Within this context, tandem bicycle is an outstanding example, where pair dynamics in the matter of mutual support can be seen. Imagine two cyclists riding on a tandem, they have a common role which is to arrive a point, and they have to trust each other, since the actions of one will directly affect the other. In this path, they are both obliged to support

and motivate each other to reach the common goal. Promoting this fact, Shenk (2014), described the functioning of pairs as a two part of a system that is self-regulating the equilibrium, it is the situation when "one who remains on the shore is always able to throw a life preserver to whoever goes under water". Both individuals want to achieve the set goal so much that the challenges they face must be overcame immediately.

Referring to Shenk (2014), a table with three legs make it stable and two legs are for walking and jumping. It is easy to move and keep going with 2 people, but additional people can bring several obstacles to the ongoing process. For creative outcomes, one leg is not sufficient, two legs would bring the creativity and although three legs provide stability, it would kill creativity. Within a dyad, members have the courage to dare. The intimacy between pairs is a space for creativity, which is a key element for innovation. It is where the pair truly opens up and shares their uncommon ideas.

In short, pair structure is advantageous, since two individuals together are able to achieve a unique common intimate space. The intimate space gives pairs courage to go beyond the boundaries, freedom to critically reflect and an obligation to support each other. This intimate space is created by mutual trust and shared direction. This space is not brought by each pair as two complementing pieces of Lego yet, it is a one single Lego piece as a whole. It can be imagined like an empty piece of paper waiting to be filled by a pen with the efforts of two, it is neither the two different papers sticking together nor two different pens writing on their own. This unique combination carries pairs and their ideas to further advanced steps in their innovation journey. That is why, there are remarkable amount of cases, where pairs led the greatest innovations and will keep leading in the future. The way how intimate space is born and its effect on the provided propositions are illustrated in the figure 13.
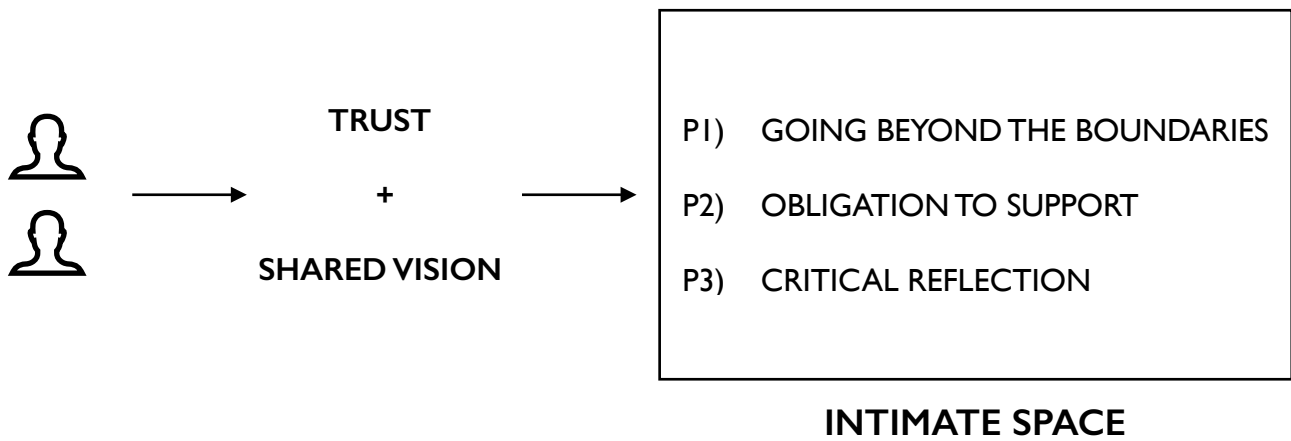
TRUST

+

SHARED VISION

P1)   GOING BEYOND THE BOUNDARIES

P2)   OBLIGATION TO SUPPORT

P3)   CRITICAL REFLECTION

INTIMATE SPACE

Figure 13. The way how intimate space is born and its effect on the provided propositions

6.2. Enhancement

Within this section, it is aimed to consolidate the previously provided propositions with the real-world cases. Although they were formed based on precise data collection and data analysis, supporting them with multiple sources will strengthen the propositions and make them more reliable. As stated by Denzin (1970), variety of sources are integrated during qualitative studies, which is known as triangulation. Similarly, according to Eisenhardt (1989), using multiple source of evidence or so called "data triangulation" provides stronger verification of constructs and hypothesis. Aim of such approach is to eliminate the risk of biases or limitation of a specific method. Furthermore, it brings a generality to the explanations. In this sense, literature, books and documentaries are scanned from the beginning in order to find innovative pairs that have overlapping functioning attitudes with the provided propositions. As a result, following cases are constituted, which include pieces that have linkages to the previously mentioned propositions of this study.

Steve Jobs and Steve Wozniak

Thinking about the innovative pairs that left a trace by their outcome, Steve Jobs and Steve Wozniak are the names that obviously come to minds at first. As widely known, Steve Wozniak was always remembered as the technical guy behind the great innovation of Apple computer. Within the organizational chart of Apple, he remained as the engineer with his outstanding technical knowledge and skills. Shenk (2014) labeled Steve Wozniak as the doer, who is free from the responsibilities of managing the business or other people. On the other side, Steve Jobs was the most recognized visionary within the computer industry leading Apple with great innovations such as iPod and iPhone (Shenk 2014). Yet, in one of his interviews, Steve Wozniak states that "Jobs was always pushing me as an engineer, could you possibly add this something, could you possible add that something?", despite the fact that he was not an engineer, there was the interference of Steve Jobs all the time on the design and engineering part of their products (Associated Press 2011). Relying on the several documentaries about their relationship, Jobs was always conflicting with Wozniak (Associated Press 2011; BrEacK 2013). Regarding this conflicting, Steve Jobs stressed its importance by giving the metaphor of polished rocks at a tumbler based on a childhood memory with an old man. He states that "The same common stones that came in through rubbing each other, creating a little bit of friction and creating a little bit of noise had come out these beautiful polished rocks". He adds that "This is my metaphor on a team that is working on something that are really passionate about… Bumping up against each other, having arguments, having fights sometimes and making some noise, by working together they polish each other. They polish the ideas and what comes out is the beautiful stones" (BrEacK 2013). Overall related to the dynamics in between Jobs and Wozniak, it can be said that the trust formed over the years and shared passion about the computers created an intimate space, where Jobs felt free to go beyond the boundaries and dare against the technical wiz Steve Wozniak. They clashed their ideas throughout their functioning and as a result, one of the most innovative outcomes of the last decades emerged.

Tony Fadell and Matt Rogers

Further innovative pair within this context is Tony Fadell and Matt Rogers that previously worked in Apple together and came out with the innovative outcome of smart thermostat Nest. The dyad is formed when Rogers first explained his plans about starting something different and new. From the interview with Matt Rogers, it is observed that the pair had already created a comfort zone to freely criticize each other. The freedom to critical reflection on the strength of intimate space is as follows: "I had some ideas about building a smart home or home automation company. Tony was very quick to say, "That's a horrible idea. Smart homes are for geeks and nerds, not for consumers, it doesn't make any sense." (James 2013). Although Tony Fadell was against this idea, he was not also comfortable with the traditional thermostats as well. In fact, they both had the similar visions and their previous common work at Apple eased their functioning. Regarding their dyad structure and its advantages, Rogers states that "I think having a partner is really important. Tony and I talk about this all the time. Two is better than one. I wouldn't do it alone and he wouldn't do it alone. Having a partner is different than having senior executive employees. Having a true partner to lean on and talk with and work through problems with through the good times and the bad times (because sometimes those can happen on the same day), I wouldn't do it any other way" (James 2013). As one can see, being two enabled them to work against problems, they stick up to each other at the bad times and they braced up themselves towards obstacles.

Warren Buffett and Charlie Munger

Different from the previously mentioned pairs, instead of novel products or services, Warren Buffett and Charlie Munger can be considered innovative in the matter of business and strategic vision development. They are an inspiration with their dynamics and their investment business with more than $736 billion in assets (Huddleston 2019). Working together more than 40 years and being friends almost for 60 years brought this successful relationship that doesn't include any arguments as they stated in one of their interviews (Huddleston 2019). At the same interview, Buffet stated that he is still learning something from Munger by spending time with him. Supporting

his partner's view Warren Buffett says: "You get two people like that who really like and trust one another, and have been together for a long time, you're going to learn a lot from each other, and you're going to advance faster. So the learning machine is working faster" (Eisner and Cohen, 2012 p.40). Regarding their relationship, Warren Buffett mentions that "…There is never any 'I told you so'…if we disagree, we probably won't do a deal, but if I decide to do it, that's fine. He is behind me one hundred percent…He is just with me basically" (Eisner and Cohen, 2012 p.47). Stressing one of the hard times of their functioning, Buffet states that "…things don't work sometimes. He is just with me basically…Charlie went on the board with me, flew back and forth… he worked harder on that deal than any other" (Eisner and Cohen, 2012 pp.47-8). Moreover, as it can be understood from the following lines of Buffet, there is the exchange of ideas and perspectives all the time: "It is beneficial to have a partner who will say, 'You're not thinking straight'… Total isolation doesn't work. You need interaction, putting your own thoughts into expression; you learn things just from doing it…If he was interested in something, and wanted to talk it over, I was interested in it as if I had my whole net worth in it" (Eisner and Cohen, 2012 pp.36-43). Taking all these quotes in mind, they were supporting each other at the challenging moments, and they were frequently exchanging ideas, which enabled them to learn from the other.

Frank Wells and Michael Eisner

Another pair that successfully collaborated relatively different than the previously mentioned ones is Frank Wells and Michael Eisner, who are the first outsiders to run a family company, Walt Disney. Throughout the book written by Eisner and Cohen (2012), Eisner talks about his relationship with Wells, which can give helpful insights about their dynamics within a creative industry. Eisner states that they were not competitive with each other. In fact, they did not have two distinct zones and dealing with two distinct things, yet they were a single unit working together, which is explained by Eisner in the following lines: "Even if our titles were different, in the executive suit we operated as a single unit, keeping nothing from each other" (Eisner and Cohen 2012, p.26). Similarly, through the book, Eisner mentions that people believed he was the wild and creative CEO generating

ideas, and Wells was the calm and soothing president "controlling" him. Yet, he underlines that this statement was not correct. As a matter of fact, Wells was as crazy as him and he also took part to enhance the creative part as well. Eisner mentions that "Frank would instantly become the idea's biggest cheerleader… Frank believed in me… responding with instant passion about new ideas was just part of that overall support" (Eisner and Cohen, 2012 p. 18). This constant support was also promoted by the close communication in between, which is defined by Eisner as "...we came into each other's offices anyway about twenty times each over the course of that morning, sharing the news and comparing notes from phone calls…" (Eisner and Cohen 2012, p.10). Taking these quotes into consideration, it is clear that the duo was able to create an intimate space, where they learned to behave as a single unit, instead of two distinct parts of a machine. The statements also show that contrary to what is believed, there was a fluidity at the idea generation and implementation.

7. Conclusion

In this final chapter, reasoning about the innovative pairs and their functioning process is finalized by mentioning the contributions both to the theory and managerial implications. Up to this point, the topic of pairs in innovation is covered in length and breadth. After providing propositions as the answer for the research question, this chapter mainly aims to share the value of the overall findings that might be useful both for the theory and also for the managerial practices. In addition to all, at the very end of this chapter, main limitations of this study and the opportunities for the further studies will be touched on sincerely.

7.1. Theoretical Implications

On a theoretical perspective, this study aims to contribute to the leadership and innovation theories about the functioning of innovative dyads. Within the literature review section, great deal of topics is discussed and gathered respecting the timeline of the pairs' evolution. The positioning of pair structure among the single individual and

team is wrapped up, and the literature is extended by attempting to find different perspectives on this regard (Alvarez and Svejenova 2005; Miles and Watkins 2007; Pearce 2004). Based on the information gathered from the literature, a conceptual framework that constitutes the building blocks leading pairs to be innovative is introduced. By achieving this, theory regarding the pair dynamics is modified and developed respectably. On top of these, regarding the functioning of pairs, three main propositions are provided overall. Henceforward, the contributions regarding the propositions are explained respectively.

As widely known, complementarity is a trait, where dyads can rely on two distinct and separate attributes (Gronn and Hamilton 2004). It is stated as a necessity to working usefully together (Gronn 2002). Besides, looking back at the many innovative pairs, complementarity in terms of roles, tasks, expertise and cognitive are widely recognized (Alvarez et al. 2007; Alvarez and Svejenova 2005; Miles and Watkins 2007; O'Toole et al. 2002). Yet, this study is defending that within the pair structure, there is a special trait of intimacy. By having this, pairs are breaking the boundaries in between and instead of being two complementary members, they become a single unit, where they achieve the fluidity within their functioning process. It should be mentioned that proposition 1, which is about going beyond the boundaries, is not defending against the notion of complementarity, instead it is stating that at the basis of the pair formation, complementarity is playing a crucial role. Yet, by the existence of intimacy in between two individuals, pairs can go beyond their distinct complementing boundaries and achieve a shared space of working. Bearing these in mind, instead of linking complementarity trait to pair structure, it makes more sense to link it to team structure. Within a team, due to the lack of intimacy, going beyond the boundaries is not easy to achieve. In team structure, members are for sure complementing each other with the personal competences and roles that is contributing to the innovative outcome. All in all, as a substantial contribution, this study is suggesting that complementarity is a trait of team structure instead of pair structure. Although, complementing factors takes place for the pair formation, on their functioning process they are going beyond these distinct complementing boundaries.

Moreover, while talking about the functioning process of pairs, the challenges through the journey cannot be overlooked. The dynamic work environment and continuous challenges can lead to disagreements between the pair members, which can result in conflict. The conflict can be task, emotion or process related (Deutsch 1969; Jehn 1997). It is argued that right amount of conflict can be beneficial for creativity and innovation (Amason 1996; Eisenhardt 1989b; Hunter et al. 2012; Hunter and Cushenbery 2011; Mainemelis et al. 2015; Mumford et al. 2003; O'Connor 1998; Pearce 2004; Peterson 1997; Reid and Karambayya 2009). Yet, scholars agree that conflict should be managed rather than being avoided or eliminated (Brown 1983; Thomas 1998; Reid and Karambayya 2009). There are several approaches suggested by the scholars to manage conflict including relational, structural or cognitive practices such as separating or joining domains (Alvarez et al. 2007; Fjellvær 2010). In the light of the findings, this dissertation indicates a new perspective to handling challenges, where the emotional support is the main approach to solve the problems. Consciously or not, pairs handle challenges by emotional support, which leads to proposition 2. What this study brings to the table is that the pairs feel obliged to support each other in difficult moments for the sake of achieving their common goal. In other words, facing the challenges together and supporting each other is a duty for the pair members to achieve the common targets. Such emotional support is enabled by the intimate space, which is created by mutual trust and shared direction. Overall, it is suggested that pair structure harbors emotional support in challenging moments, which can be interpreted as a conflict handling method.

Finally, an important advantage of being pair is the ability to bring different set of skills, experiences and most importantly ideas into the table. Ideas that are the result of two different minds are powerful and each individual refers to his or her own strength (Miles and Watkins 2007; O'Toole et al. 2002). What pair is able to achieve is to clash their ideas and criticize each other to bring out richer and stronger views (Verganti 2016). At this point, creating a constructive and positive environment is fundamental to sustain a productive pair relationship. According to this study, such environment is created through the intimate space which is enabled by trust and common vision. This

dissertation expands the limits of idea exchange and state that a successful idea exchange requires high level of critical reflection, which is achieved by the previously introduced intimate space. The bond between pair dynamics and idea exchange also touches the first proposition, going beyond the boundaries, since pairs can also go beyond their limits with their ideas and perspectives.

All in all, this study introduces new insights about the pair functioning process, which was referred as a black box prior to this study. The aim here is to deep dive into the pair dynamics and understand how innovative pairs function. The introduced propositions merge together in a broader sense under the intimate space, which renders the possibility of a close interaction that could not be observed within a team structure.

7.2. Managerial Implications

Many authors regarded innovation as a critical source of competitive advantage in an increasingly changing environment (Dess and Picken, 2000; Tushman and O'Reilly, 1996). Mone and colleagues (1998) state that innovation capability is the most important determinant of the firm performance. Additionally, it is crucial to remind that innovation can originate from the linkage of multiple sources (Schilling 2012). Herein by, interpreting the theoretical findings to support managerial practices plays a crucial role for the practical application of this study. According to the obtained results, where the main focus is on the dyad structure, possible ways to foster innovative outcomes in a managerial level is introduced.

Before digging deep into dyadic relationship, it is better to understand the positioning and benefits of pair structure among an individual and a team. With regards to creativity and innovation, individual, pair and team structures play a crucial role. Individual can be able to imagine and dream alone without depending on the others. Importance of personal vision and skills cannot be ignored through the creative path (Mainemelis et al. 2015; Sternberg and Lubart 1999). On the other side, the structure of team is important, where more ideas, perspectives and skills complement each other

and enhance creativity that can lead to innovation (Alvarez and Svejenova 2005; Miles and Watkins 2007; O'Toole et al. 2002; Pearce 2004). Yet, as Farrell (2001) states "Groups created a sense of community, purpose and audience but truly important work ended up happening in pairs".

Dyad structure is special for many cases. It is the form in between individual and team. In dyad structure there is the intimacy, which cannot be found at the other structures. Individuals alone cannot be able to clash ideas; they can only imagine and dream relying on their personal skills. On contrary, in a team composed of more than two members, engagement is less. Imagine 10 people are clashing ideas and trying to be open to the rest; intimacy at this situation is hard to achieve. Within the team, unconventional idea sharing is tough. Yet, regarding the pairs, intimacy is possible. Sharing is easier and more comfortable compared to the team structure.

Considering these positive aspects, firms should give importance to this smallest unit of a team, which is dyad. As previously mentioned, intimacy is the key element that lacks within a team. Enabling an intimate space is possible by providing an environment made out of trustworthy relations and common vision. Trust can either be provided by a person or an event, but it is also highly correlated with the shared context. According to the findings of this study, shared context plays an important role on the pair formation. That is why, while building a dyad structure, firms should also consider the previous relations of the members or commonalities that will support the genesis of trust. On the other side, the seeds of common vision can be spread by the company as well. This aspect can be gained by aligning individuals with the company's corporate culture, mission and vision. Companies can give importance to this aspect with the help of HR departments.

Having trustworthy relations with the partner and aiming to achieve the same target would definitely create an intimate space, where dyads could work fluently. Within this space, pairs would give permission to each other in order to discover more about their dynamics. They would do it by constantly exchanging ideas and filling the gaps of each other. After a point, due to their loyalty on the mission, they would feel obliged to support the other if there are any challenging moments. Although they

might be coming from two distinct fields and they might be responsible from two distinct tasks on the way of creating innovative outcomes, they would definitely feel confident about interfering to the other's field. They would dare to go beyond their limits and reflect on the idea generation. This involvement would bring the creativity and as widely known, creativity is a source of innovation.

Formation of pairs within a company can be useful to foster innovation in the smallest unit of a team. The ideas that are shaped at this level will be stronger and richer due to critical reflection of the dyad members and will be carried to the team level in a stronger sense. This early criticism can be useful to increase efficiency and quality of ideas within the innovative path of a company. Besides, when members go beyond their boundaries in the dyadic relationship, employees with different responsibilities and perspectives will be contributing to the other individual's responsibilities. This will bring new and diverse perspectives to the company, where each individual could be able to exchange ideas. However, it is important to mention that some effort will be required to delicately form the dyadic structures and help them to sustain an intimate space for their future collaboration. Also, companies relying on this approach might require finding methods to evaluate the pair success with previously set parameters and be open to adjust dyad structures, if needed. Pair formation, success evaluation and possible adjustments are extra efforts that the company should bear in mind.

7.3. Limitations and Further Researches

Since this is an exploratory case study research, it would be fair to mention that there were some limitations. Under Evaluating the Case Study section, the quality of the executed methodology was already discussed, yet looking at the study from a wider perspective, the extent of the selected cases could be wider, including innovative pairs from different countries. Limitations in terms of the accessible network and time period of the study allowed the analysis of only pairs from Italy and Turkey. Additionally, within the study both in terms of most selected cases and all real-world cases, only the

successful pairs were chosen and analyzed. In order to enhance the propositions and look at the context from another perspective, also unsuccessful pairs could have taken place within the study. Seeing what went wrong and why they failed could gave different insights and improved the quality of the process. Regarding to this fact, the main reason to analyze only the successful ones is that literature mainly gives part to the ones who achieved successful results, the ones that become unsuccessful couldn't manifest themselves. Similarly, regarding the case selection, it was not easy to find pairs that failed in their innovative journeys, since they do not have the outcomes to show themselves.

In addition to what has been said, 15 cases that are investigated during the entire study includes pairs that are at the different stages of their evolution. There were cases, in which the pairs were inexperienced and at the very early stages of their growing, while there were also other cases, in which the pairs had broad experience throughout the years, even terminated their functioning years ago. Having pairs in different maturity levels were both advantageous and disadvantageous in some aspects. Including pairs at the different stages of their path and relying on various sources strengthened the entire study, yet on the other side, the dynamics in between experienced and inexperienced pairs could be incoherent and created discrepancy at some points. On top of that, the pair selection process was subjective and open to biases. Especially the impact of entrepreneurial cases could be under or over valued since they are on an unstable growing phase.

As mentioned before, from the conceptual framework only the functioning part was interrogated since the main linkage of the innovation was found in that building block and it was a research gap that was not pointed out before. Yet, for further research steps, the conceptual framework could be interrogated comprehensively in order to deep dive into the other building blocks, revealing more propositions that might have connection with the innovative outcome. Moreover, it is obvious that considering the dynamics in between two individuals, personality is playing an important role. As previously mentioned, since the personality on its own is a broad topic to be discovered, it is only positioned at the conceptual framework to strengthen the linkages

in between the building blocks and show that this study is aware of this factor. A further study can interrogate personality on its own and question how it affects the dynamics of the innovative pairs.

Overall, it could be said that the literature includes plenty of sources related to the linkage between innovation and team structure. Yet, the smallest unit of the team, the dyad and its relation to innovation does not take place sufficiently. With this study, it was aimed to contribute to the literature about this lack and open a road for the further studies regarding the pairs in innovation. The interviews that are used for this dissertation and the codes gathered give important insights about the pair relationship, which can be a starting point for further studies.

7.4. Closure

Once and for all, this dissertation draws the attention to the underestimated phenomenon of innovative pairs. By gathering data and making analysis of 15 selected cases, a value-added framework and 3 propositions are created. On top of that, based on the findings, some managerial practices are suggested, which can be applied in companies to foster innovation. Overall, literature is enriched by contributing a new perspective of innovative pairs and within this context a basis for further research is provided.

Contrary to common belief, instead of relating the success of innovative pairs to the complementarity trait, this dissertation comes out with another perspective and suggests that pairs are advantageous by being able to create an intimate space. Leveraging on the applied qualitative study, it is revealed that dyad formation is able create such intimacy by the key elements of trust and shared vision. Within this space, pairs can go beyond their boundaries, support each other emotionally through the obstacles and reflect their perspectives by the frequent exchange of ideas.

References

Ahuja, G. & Lampert, C. M. (2001). Entrepreneurship in the Large Corporation: A Longitudinal Study of How Established Firms Create Breakthrough Inventions. *Strategic Management Journal,* 22, 521–543

Aiello, C. (2018). "Ex-Apple CEO Sculley: Tim Cook got Wall Street to fall in love with what Steve Jobs built", retrieved on 2019/03/16 at: [https://www.cnbc.com/2018/08/03/ex-apple-ceo-john-sculley-compares-tim-cook-to-steve-jobs-as-leaders.html]

Almeida, P. & Kogut, B. (1999). Localization of knowledge and the mobility of engineers in regional networks. *Management Science*, 45(7), 905–917

Alvarez, J. L., & Svejenova, S. (2005). Sharing Executive Power Roles and Relationships at the Top. Cambridge: Cambridge University Press.

Alvarez, J. L., Svejenova, S. & Vives, L. (2007). Leading in Pairs. *MIT Sloan Management Review,* 48(4), 9-14

Amabile, T. M. (1996). Creativity in context. Boulder, CO: Westview Press.

Amabile, T., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. Academy of Management Journal, 39, 1154-1184

Amabile, T.M. (1988). A model of creativity and innovation in organizations. *Research in Organizational Behavior*, 10, 123-167

Amason, A.C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: Resolving a paradox for top management teams. *Academy of Management Journal*, 39, 123–148

Ancona, D. G. & Caldwell, D. F. (1992). Bridging the boundary: External process and performance in organizational teams. *Administrative Science Quarterly*, 37, 634–665

Arnone, M. & Stumpf, S. A. (2010). Shared leadership: From rivals to co–CEOs. *Strategy & Leadership,* 38(2), 15-21. doi:10.1108/10878571011029019

Associated Press. (2011, October 6). Wozniak Tearfully Remembers His Friend Steve Jobs [Video File]. Retrieved from https://www.youtube.com/watch?v=dKXEGrzHUo

Babbie, E. (2014). *The Basics of Social Research* (6th ed.), Wadsworth Cengage, 303–304

Bacharach, M. (2006). In: Gold, N., Sugden, R. (Eds.), Beyond Individual Choice: Teams and Frames in Game Theory, *Princeton University Press.*

Bergendahl, M. & Magnusson, M. (2014). Creating Ideas for Innovation: Effects of Organizational Distance on Knowledge Creation Processes. *Creativity and Innovation Management,* 24(1), 87-101. doi:10.1111/caim.12097

Bergstein, B. (2014). "35 Innovators Under 35", retrieved on 2019/04/20 at: [https://www.technologyreview.com/lists/innovators-under-35/2013/inventor/matt-rogers/]

Bernard, Z. (2018). "The rise of Dropbox CEO Drew Houston, who just made the Forbes 400 after taking his company public", retrieved on 2019/04/21 at: [https://www.businessinsider.com/how-drew-houston-created-dropbox-2018-1?IR=T]

Bessant, J., Lamming, R., Noke, H. & Phillips, W. (2005). Managing innovation beyond the steady state. *Technovation*, 25(12), 1366-1376

Björk, J. (2012). Knowledge Domain Spanners in Ideation. *Creativity and Innovation Management*, 21, 17–27

Boring, E.G. (1950). Great men and scientific progress. *Proceedings of the American Philosophical Society*, 94(4), 339-351

Boucher, V. (2012). Structural Homophily. *International Economic Review,* 56(1), 235-264. doi:10.1111/iere.12101

BrEacK. (2013, April 29). Steve Jobs - The Lost Interview [Video File]. Retrieved from https://www.youtube.com/watch?v=TRZAJY23xio

Brown, J.S. & Duguid, P. (1991). Organizational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation. *Organization Science*, 2, 40–57

Brown, L.D. (1983). Managing conflict at organizational interfaces. Reading, MA: Addison-Wesley

Burt, R. S. (1992). *Structural Holes.* Cambridge, MA: First Harvard University Press.

Burt, R. S. (2004). Structural holes and good ideas. *American Journal of Sociology*, 110, 349–99.

Campion, M.A., Medsker, G.J. & Higgs, A.C. (1993). Relations between work group characteristics and effectiveness: implications for designing effective work groups, P*ersonnel Psychology*, 46(4), 823-850

Carlson, N. (2012). "How Mark Zuckerberg booted his co-founder out of the company", retrieved on 2019/04/20 at: [https://www.businessinsider.com/how-mark-zuckerberg-booted-his-co-founder-out-of-the-company-2012-5?IR=T]

Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2007). Shared leadership in teams: An investigation of antecedent conditions and performance. *Academy of Management Journal*, 50, 1217–1234.

Castillo, M. (2017). "Reed Hastings' story about the founding of Netflix has changed several times" retrieved on 2019/04/21 at: [https://www.cnbc.com/2017/05/23/netflix-ceo-reed-hastings-on-how-the-company-was-born.html]

Chen, J., & Chen, I. (2008). Personal traits and leadership styles of Taiwan's higher educational institutions. *Journal American Academy of Business Cambridge* 12(2), 145-150

Cohen, W.M. & Levinthal, D.A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35, 128–152

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95–120

Conger, J. A. & Kanungo, R. (1987). Toward a behavioral theory of charismatic leadership in organizational settings. *Academy of Management Review,* 12, 637–647

Daft, R. L. and Becker, S. W. (1978). Innovation in Organizations. *New York: Elsevier*.

De Bruin, A. & Lewis, K. (2004). Toward Enriching United Career Theory: Familial Entrepreneurship and Copreneurship. *Career Development International*, 9(7), 638–646

De Voogt, A. & Hommes, K. (2007). The signature of leadership: Artistic freedom in shared leadership practice. The John Ben Sheppard Journal of Practical Leadership, 1, 1-5

Denis, J., Langley, A. & Sergi, V. (2012). Leadership in the Plural. *The Academy of Management Annals*, 6(1), 211-283. doi:10.1080/19416520.2012.667612

Denzin, N. K.. (1970). Sociological methods: A sourcebook. Chicago: Aldine.

Dess, G. G. and Picken, J. C. (2000). Changing roles: leadership in the 21st century. *Organizational Dynamics*, 28, 18–34

Deutsch, M. (1969). Conflicts: Productive and destructive. *Journal of Social Issues*, 25, 7–41

Dewar, R.D. & Dutton, J.E. (1986). The Adoption of Radical and Incremental Innovations: An Empirical Analysis, *Management Science*, 32(11), 1422-1433

Ditz, L. (2004). "High Achieving Dyslexics: Bill Hewlett" retrieved on 2019/08/22 at: [https://lizditz.typepad.com/i_speak_of_dreams/2004/07/high_achieving_.html]

Döös, M. (2015). Together as One: Shared Leadership Between Managers. *International Journal of Business and Management*, 10(8). doi:10.5539/ijbm.v10n8p46

Dunn, K. (2005). Interviewing, I. Hay (ed.) *Qualitative Research Methods in Human Geography* (2nd edn). Melbourne: Oxford University Press, 79–105

Eisenhardt K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550

Eisenhardt, K.M. (1989b). Making fast strategic decisions in high-velocity environments. *Academy of Management Journal*, 32, 543–576

Eisner, M., & Cohen, A. (2012). Working together: Why great partnerships succeed. New York: Harper One.

Ensley, M. D., Hmieleski, K. M., & Pearce, C. L. (2006). The importance of vertical and shared leadership within new venture top management teams: Implications for the performance of startups. *Leadership Quarterly*, 17, 217–231

Farrell, M. P. (2001). Collaborative circles: Friendship dynamics & creative work. Chicago, IL: University of Chicago Press.

Fausing, M.S., Joensson T.S., Lewandowski, J. & Bligh, M. (2015). Antecedents of shared leadership: empowering leadership and interdependence. *Leadership & Organization Development Journal*, 36(3), 271-291

Feld, S. (1981). The focused organization of organizational ties. *American Journal of Sociology*, 86(5), 1015-1035

Feld, S. (1982). Social structural determinants of similarity among associates. *American Journal of Sociology*, 47(6), 797-801. doi: 10.2307/2095216

Feld, S. (1984). The structured use of personal associates. *Social Forces*, 62, 640–652

Fjellvær, H. (2010). Dual and unitary leadership: Managing ambiguity in pluralistic organizations. *Norwegian School of Economics and Business Administration*

Fleming, L. (2001). Recombinant uncertainty in technological search. *Management Science*, 47(1), 117–132

Flynn, L. J. (2004). "The Google IPO: The Founders; 2 Wild and Crazy Guys (Soon to Be Billionaires), and Hoping to Keep It That Way" retrieved on 2019/07/18 at: [https://www.nytimes.com/2004/04/30/business/google-ipo-founders-2-wild-crazy-guys-soon-be-billionaires-hoping-keep-it-that.html]

Freeman, C. (1974). *The microeconomics of industrial innovation*. Harmondsworth: Penguin Modern Economic Texts.

Freeman, C. (1991). Networks of Innovators: A Synthesis of Research Issues. *Research Policy,* 20, 499-514

Gabarro, J. J. (1987). The Development of Working Relationships. *Handbook of Organizational Behaviour*, 172–189

Gillies, T. (2017). "The two amigos: Warren Buffett, Charlie Munger and a 57 year old partnership", retrieved on 2019/04/20 at: [https://www.cnbc.com/2016/05/06/warren-buffett-and-charlie-munger-the-omaha-ties-that-bind.htm]

Gilsing, V. & Nooteboom, B. (2005). Density and strength of ties in innovation networks: an analysis of multimedia and biotechnology. *European Management Review*, 3, 179–97

Granovetter, M. S. (1973). The Strength of Weak Ties. *American Journal of Sociology*, 78(6), 1360-1380. doi:10.1086/225469

Gronn, P. (1999). Substituting for Leadership: The neglected role of leadership of the couple. *Leadership Quarterly,* 10(l), 41-62

Gronn, P. (2002). Distributed Relationship as a unit of Analysis, *The Leadership Quarterly*, 13, 423–451

Gronn, P. & Hamilton, A. (2004) 'A Bit More Life in the Leadership': Co-Principalship as Distributed Leadership Practice. *Leadership and Policy in Schools*, 3(1), 3-35

Guzzo, R.A. & Shea, G.P. (1992). Group performance and intergroup relations in organizations, in Dunnette, M.D. and Hough, L.M. (Eds), *Handbook of Industrial and Organizational Psychology, 2nd ed.,*3, 269-313

Hagedoorn, J. (2002). Inter-Firm R&D Partnerships—an Overview of Major Trends and Patterns since 1960. *Research Policy,* 31, 477–492.

Hagedoorn, J. & Duysters, G. (2002). Learning in dynamic inter-firm networks—the efficacy of quasi-redundant contacts. *Organization Studies*, 23(4), 525–548

Handley, K., Sturdy, A., Fincham, R. & Clark, T. (2006). 'Within and beyond communities of practice: Making sense of learning through participation, identity and practice'. *Journal of Management Studies*, 43, 641–53

Hammersley, M., & Atkinson, P. (1995). *Ethnography: Principles in practice* (2nd ed). London: Routledge.

Hansen, M.T. (1999). The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*, 44, 82–111

Hargadon, A. & Sutton, R. (1997). Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly,* 42, 716–749

Hargadon, A. B. & Bechky, B. A. (2006). When collections of creatives become creative collectives: A field study of problem solving at work. *Organization Science,* 17, 484-500

Harper, D. A. (2008). Towards a theory of entrepreneurial teams. *Journal of Business Venturing*, 23(6), 613-626. doi:10.1016/j.jbusvent.2008.01.002

Harrison, R. (2005). Learning and development. London: Chartered Institute of Personnel and Development.

Harvey, S. (2014). Creative synthesis: Exploring the process of extraordinary group creativity. *Academy of Management Review,* 39, 324-343

Heath, A. W. (1997). The Proposal in Qualitative Research . *The Qualitative Report*, *3*(1), 1-4

Herriott, R.E. & Firestone, W.A. (1983). Multisite qualitative policy research: optimizing description and generalizability. *Educational Researcher*, 12(2), 14-19

Hinds, P.J. & Bailey, D.E. (2003). Out of sight, out of sync: Understanding conflict in distributed teams. *Organization Science,*14, 615–632

Hmieleski, K. M., Cole, M. S., & Baron, R. A. (2012). Shared authentic leadership and new venture performance. *Journal of Management.* doi:10.1177/0149206311415419.

Hoch, J. E. (2013). Shared Leadership and Innovation: The Role of Vertical Leadership and Employee Integrity. *Journal of Business and Psychology*, 28(2), 159-174. doi:10.1007/s10869-012-9273-6

Hogan, R., Curphy, G. J. & Hogan, J. (1994). What we know about leadership. *American Psychologist*, 49, 493–504

Huddleston, T. (2019). "Warren Buffett and Charlie Munger haven't had a fight in 60 years — here's why" retrieved on 2019/07/19 at: [https://www.cnbc.com/2019/01/31/warren-buffett-on-his-successful-relationship-with-charlie-munger.html]

Huelsheger, U. R., Salgado, J. F., & Anderson, N. (2009). Team-level predictors of innovation at work: A comprehensive meta- analysis spanning three decades of research. Journal of Applied Psychology, 94, 1128–1145

Hunter, S. T., & Cushenbery, L. (2011). Leading for Innovation. *Advances in Developing Human Resources,* 13(3), 248-265. doi:10.1177/1523422311424263

Hunter, S. T., Cushenbery, L., Fairchild, J., & Boatman, J. (2012). Partnerships in Leading for Innovation: A Dyadic Model of Collective Leadership. *Industrial and Organizational Psychology*, 5(04), 424-428. doi:10.1111/j.1754-9434.2012.01474.x

James, S. (2013). "Q&A: Matt Rogers, Nest co-founder, on good ideas" retrieved on 2019/07/19 at: [https://www.zdnet.com/article/qa-matt-rogers-nest-co-founder-on-good-ideas/]

Jehn, K.A. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly*, 40, 256–282

Jehn, K.A. (1997b). A qualitative analysis of conflict types and dimension in organizational groups. *Administrative Science Quarterly*, 42, 530–557

Jehn, K.A. & Mannix, E. (2001). The dynamic nature of conflict: A longitudinal study of intergroup conflict and group performance. *Academy of Management Journal*, 44, 238–251

Judge, T. A., Bono, J. E., Ilies, R., & Gerhardt, M. W. (2002). Personality and leadership: A qualitative and quantitative review. *Journal of Applied Psychology,* 87(4), 765-780. doi:10.1037//0021-9010.87.4.765

Kanter, R. M. (1988). When a thousand flowers bloom: Structural, collective and social conditions for innovation in organization. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior*, 10, 169–211. Greenwich, CT: JAI Press.

Kijkuit, B., & Ende, J. V. (2007). The Organizational Life of an Idea: Integrating Social Network, Creativity and Decision-Making Perspectives. *Journal of Management Studies*, 44(6), 863-882. doi:10.1111/j.1467-6486.2007.00695.x

Koestler, A. (1989). *The Act of Creation*. Penguin Books, London.

Koster, F., Stokman, F., Hodson, R. & Sanders, K. (2006). Solidarity through networks. The effects of task and informal interdependence on cooperation within teams, *Employee Relations*, 29(2), 117-137

Lazarsfeld, P.F. & Merton, R.K. (1954). Friendship as a social process: a substantive and methodological analysis. *In Freedom and Control in Modern Society*, 18–66

Lie, E. (2010). "10 Business Partnerships That Went Down In Flames", retrieved on 2019/04/20 at: [https://www.businessinsider.com/11-excruciating-business-partner-breakups-2010-11?IR=T#jamie-dimon-and-sandy-weill-6]

Lubart, T. I. & Sternberg, R. J. (2015). The Concept of Creativity: Prospects and Paradigms, in Handbook of Creativity, Cambridge, England: Cambridge University Press

Mainemelis, B. and Kark, R. and Epitropaki, O. (2015) 'Creative leadership: a multi-context conceptualization.', *Academy of management annals*, 9(1), 393-482. doi: 10.1080/19416520.2015.1024502

Marshack, K. (1998). Entrepreneurial Couples: Making It Work at Work and at Home. Palo Alto, CA: Davies-Black.

Maxwell, J.A. (2008). Designing a qualitative study, *Qualitative Research*. doi: 10.4135/9781483348858.n7

McLean, L. D. (2005). Organizational culture's influence on creativity and innovation: A review of the literature and implications for human resource development. *Advances in Developing Human Resources*, 7, 226-246

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 27, 415-444

Mejia, Z. (2018). "Microsoft exists because Paul Allen and Bill Gates launched this high school business first" retrieved on 2019/07/19 at: [https://www.cnbc.com/2018/10/16/microsoft-exists-because-paul-allen-and-bill-gates-launched-this-high-school-business.html]

Miles, M. B., & Huberman, A. M. (1994). Qualitative data analysis: An expanded sourcebook (2nd ed.). Thousand Oaks, CA: Sage.

Miles, S. A., & Watkins, M. D. (2007). The Leadership Team. Complementary Strengths or Conflicting Agendas? *Harvard Business Review,* 2(10)

Mone, M. A., McKinley, W. and Barker, V. L. (1998). Organizational decline and innovation: a contingency framework. *Academy of Management Review*, 23, 115–32

Morgeson, F. P., DeRue, D. S., & Karam, E. P. (2010). Leadership in teams: A functional approach to understanding leadership structures and processes. *Journal of Management*, 36, 5–39.

Mumford, M. D. (2000). Managing creative people: Strategies and tactics for innovation. *Human Resource Management Review*, 10, 313–351

Mumford, M. D., Connelly, S., & Gaddis, B. (2003). How creative leaders think: Experimental findings and cases. *Leadership Quarterly*, 14, 411-432.

Mylavarapu, S. (2016). "Nest Co-Founder Matt Rogers On The Secrets To Nest's Success", retrieved on 2019/04/21 at: [https://techcrunch.com/2016/02/18/nest-co-founder-matt-rogers-on-the-secrets-to-nests-success/?guccounter=1&guce_referrer_us=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_cs=uRq88tuZejq78Ggs4J45ew]

Nakao, K., Takaishi, J., Tatsuta, K., Katayama, H., Iwase, M., Yorifuji, K., & Takeda, M. (2000). The influences of family environment on personality traits. Psychiatry and Clinical Neurosciences, 54(1), 91-95. doi:10.1046/j.1440-1819.2000.00642.x

Nathan, J. (1999). *Sony: The Private Life.* Boston: Houghton Mifflin.

Nicholson, N. (2000). Executive Instinct: Managing the Human Animal in the Information Age. New York: Crown Business Books.

Nietzsche, F. W., 1844-1900. (1995). The birth of tragedy. New York: Dover Publications

Nooteboom, B. (1992). Towards a dynamic theory of transactions. *Journal of Evolutionary Economics*, 2, 281–299

Nooteboom, B. (1999). Inter-Firm Alliances: Analysis and Design. Routledge, London.

Nooteboom, B. (2000). Learning by Interaction: Absorptive Capacity, Cognitive Distance and Governance. *Journal of Management and Governance,* 4(1/2), 69-92. doi: 10.1023/a:1009941416749

Nooteboom, B., Vanhaverbeke, W., Duysters, G., Gilsing, V. A., & Oord, A. V. (2007). Optimal Cognitive Distance and Absorptive Capacity. *SSRN Electronic Journal*, 36, 1016-1034. doi:10.2139/ssrn.903745

O'Connor, G. C. (1998). Market learning and radical innovation: A cross case comparison of eight radical innovation projects. *Journal of Product Innovation Management*, 15, 151-166.

O'Toole, J., Galbraith, J., & Lawler, E. E. (2002). When Two (or More) Heads are Better Than One: The Promise and Pitfalls of Shared Leadership. *California Management Review,* 44(4), 65-83. doi:10.4135/9781452229539.n12

Obstfeld, D. (2005). Social Networks, the Tertius Iungens Orientation, and Involvement in Innovation. *Administrative Science Quarterly,* 50(1), 100-130. doi:10.2189/asqu.2005.50.1.100

Oke, A., Munshi, N., & Walumbwa, F. O. (2009). The Influence of Leadership on Innovation Processes and Activities. Organizational Dynamics, 38(1), 64-72. doi:10.1016/j.orgdyn.2008.10.005

Pearce, C. L. (2008). Shared leadership: Reframing the hows and whys of leadership. Thousand Oaks, CA: Sage Publ.

Pearce, C. L., & Sims, H. P., Jr. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive,

directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice, 6*, 172–197.

Pearce, C. L., Yoo, Y., & Alavi, M. (2004). Leadership, social work and virtual teams: The relative influence of vertical versus shared leadership in the nonprofit sector. In R. E. Riggio, S. Smith-Orr, & J. Shakely (Eds.), *Improving leadership in nonprofit organizations,* 180–204

Pearce, C.L, (2004). The Future of Leadership: Combining Vertical and Shared Leadership to Transform Knowledge Work, *The Academy of Management Executive*, 18(1), 47- 59

Pearce, C.L. & Sims, H.P. (2000). Shared leadership: toward a multi-level theory of leadership, *Team Development*, 7, 115-139

Perry-Smith, J. E. & Shalley, C. E. (2003). The social side of creativity. a static and dynamic social network perspective. *Academy of Management Review*, 28, 89–106

Perry-Smith, J.E. (2006). Social Yet Creative: The Role of Social Relationships in Facilitating Individual Creativity. *Academy of Management Journal*, 49, 85–101

Peterson, R.S. (1997) A directive leadership style in group decision making can be both virtue and vice: Evidence from elite and experimental groups. *Journal of Personality and Social Psychology*, 72, 1107–1121.

Pettigrew, A. (1988). Longitudinal field research on change: Theory and practice. National Science Foundation Conference on Longitudinal Research Methods in Organizations, Austin.

Poetz, M.K. & Prügl, R. (2010). Crossing Domain- Specific Boundaries in Search of Innovation: Exploring the Potential of Pyramiding. *Journal of Product Innovation Management*, 27, 897–914

Raymond, C. (2017). "Travis Kalanick: 'You Can Either Do What They Say or You Can Fight for What You Believe'", retrieved on 2019/04/21 at: [https://www.success.com/travis-kalanick-you-can-either-do-what-they-say-or-you-can-fight-for-what-you-believe/]

Reagans, R. & McEvily, B. (2003). Network structure and knowledge transfer: the effects of cohesion and range. *Administrative Science Quarterly*, 48, 240–67

Reid, W., & Karambayya, R. (2009). Impact of dual executive leadership dynamics in creative organizations. *Human Relations, 62(7), 1073-1112.doi: 10.1177/0018726709335539*

Roberts, J. (2006). Limits to communities of practice. *Journal of Management Studies*, 43, 623–39

Rosenkopf, L. & Almeida, P. (2003). Overcoming local search through alliances and mobility. *Management Science*, 49, 751–766

Rosenkopf, L. & Nerkar, A. (2001). Beyond local search: boundary- spanning, exploration, and impact in the optical disc industry. *Strategic Management Journal*, 22, 287–306

Rost, Katja (2011). The strength of strong ties in the creation of innovation. *Research policy*, 40(4), 588-604.

Rowley, T., Behrens, D. & Krackhardt, D. (2000). Redundant governance structures: an analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal*, 21(3), 369–386

Saldana, J.M. (2013). The coding manual for qualitative researchers, Los Angeles: Sage Publications.

Schilling, M. A. (2012). Strategic Management of Technology Innovation (4th Edition), New York (NY): McGraw-Hill

Schilling, M. A. (2018). Quirky: The remarkable story of the traits, foibles, and genius of breakthrough innovators who changed the world. New York: Public Affairs

Schumpeter, J. A. (1934). *Theory of Economic Development*, Cambridge, MA: Harvard University Press

Schumpeter, J.A. (1950). *Capitalism, Socialism and Democracy*. Harper & Row, New York, NY.

Shenk, J. W. (2014). Powers of two: Finding the essence of innovation in creative pairs. Boston: Houghton Mifflin Harcourt.

Silvia, P. J. (2006). *Exploring the psychology of interest*. New York, NY, US: Oxford University Press.

Steel, G. D., Rinne, T., & Fairweather, J. (2011). Personality, Nations, and Innovation. *Cross-Cultural Research*, 46(1), 3-30. doi:10.1177/1069397111409124

Sternberg, R. J. (Ed.). (1999). *Handbook of creativity*. Cambridge, UK: Cambridge University Press.

Stewart, R. (1991). Role sharing at the top: A neglected aspect of studies of managerial behaviour. In S. Carlson (Ed.), *Executive behaviour*, 120–136

Strauss, A. L. (1987). Qualitative analysis for social scientists. New York: Cambridge University Press.

Strauss, A. & Corbin, J. (1998). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory. Thousand Oaks, CA: Sage Publications, Inc.

Stuart, T. & Podolny, J. (1996). Local search and the evolution of technological capabilities. *Strategic Management Journal*, 17, 21–38

Takala, T. (1998). Plato on leadership. *Journal of Business Ethics*, 17(7), 785-798. doi:10.1023/a:1005789531144

Thomas, K. W. (1998). Conflict and negotiation processes in organizations. *Handbook of industrial and organizational psychology*, 2, 651–717

Toma, S. & Marinescu, P. (2013). *Steve Jobs and modern leadership*. Manager, 17(1), 260-269

Triandis H. C. & Gelfand M. (1998). Converging measurements of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology*, 74,118–128

Triandis, H. C., & Suh, E. M. (2002). Cultural Influences on Personality. Annual Review of Psychology, 53(1), 133-160. doi:10.1146/annurev.psych.53.100901.135200

Tushman, M. L. and O'Reilly, C. A. (1996). Ambidextrous organizations: managing evolutionary and revolutionary change. *California Management Review*, 38, 8–30

Uzzi, B. (1999). Social relations and networks in the making of financial capital. *American Sociological Review*, 64, 481–505

Venkataraman, S., 1997. The distinctive domain of entrepreneurship research. *Advances in entrepreneurship, Firm Emergence and Growth* 3, 119–138.

Verganti, R. (2016). *Overcrowded*. doi:10.7551/mitpress/ 9780262035361.001.0001

Verganti, R. (2016). The Innovative Power of Criticism. *Harvard Business Review*.

Vickberg, S.M. & Christfort, K. (2017). Pioneers, Drivers, Integrators, and Guardians. Harvard Business Review.

Wageman, R. & Baker, G. (1997). Incentives and cooperation: the joint effects of task and reward interdependence on group performance, *Journal of Organizational Behavior*, 18(2), 139-158

Wang, D., Waldman, D., & Zhang, Z. (2014). A meta-analysis of shared leadership and team effectiveness. Journal of Applied Psychology, 99(2), 181-198. https://doi.org/ 10.1037/a0034531

Wassenaar, C.L. & Pearce, C.L. (2012). The nature of shared leadership, in Day, D.V. and Antonakis, J. (Eds), *The Nature of Leadership 2nd ed.*, 363-389

Wenger, E. & Snyder, W. (2000). Communities of Practice: The Organizational Frontier. *Harvard Business Review*, 78, 139–145

West, M. A., & Farr, J. L. (1989). Innovation at work: Psychological perspective. *Social Behavior*, 4, 15–30.

Yammarino, F. J., Salas, E., Serban, A., Shirreffs, K., & Shuffler, M. L. (2012). Collectivistic leadership approaches: Putting the "we" in leadership science and practice. *Industrial and Organizational Psychology: Perspectives on Science and Practice, 5*, 382–402

Yin, R.K. (1984). Case Study Research: Design and Methods. Thousand Oaks, CA: Sage.

Yin, R.K. (2003). Case Study Research: Design and Methods. (3rd ed). Thousand Oaks, CA: Sage.

Yukl, G. A. (2010). *Leadership in organizations* (7th ed.). Upper Saddle River, New Jersey.

Zahra, S.A. & Covin, J.G. (1994). The financial implications of fit between competitive strategy and innovation types and sources. *The Journal of High Technology Management Research*, 5(2), 183-211

Zahra, S.A. & George, G. (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27, 185–203

Zipf, G.K. (1949). Human Behavior and the Principle of Least Effort. *Cambridge: Addison-Wesley.*