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Master Thesis

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Should you trust me?

A quantitative study of how trust influence learning in international joint ventures

Navn: Stian Dragnes, Jeanette Fredriksen

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**Should you trust me?**

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**Supervisor:**

Linda Rademaker

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## Abstract

The scope of this master thesis is to understand how inter-partner trust influence technological learning in international joint ventures. Due to an increase in digitalization and intensified global competition, we have broadened our understanding of international joint ventures and the potential within alliance relationships. We have studied the learning of one partner from the other through the international joint venture. More specifically, we have examined the critical success factor, trust, and how different proxies for trust influence technological learning in the form of patent citations for firms in international joint ventures. Eight proxies for trust has been designed and analyzed in an Ordinary Least Squares regression model. Most of the data used in our thesis are collected from the Securities Data Corporation, with additional information from the U.S. Patent and Trademark Office, LexisNexis Corporate Affiliations, OECD, Factiva, and other webpages. The study shows that four out of eight proxies for trust had a significant relation to technological learning in international joint ventures. The results demonstrated that country familiarity, experience, and a prior relationship with the same international joint venture partner have a positive influence on firms' technological learning. Further, it appears that a high level of trust at a country level seems to decrease technological learning. In total, it does seem that inter-partner trust both positively and negatively influences technological learning in international joint ventures.

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# 1. Introduction

For many years, scholars have been concerned about how firms can create value in alliances. Today, the question is more relevant than ever because the ability to learn, manage and integrate from strategic alliances is vital in today's interconnected and globalized economy (Kohtamäki, Rabetino, & Möller, 2018). Reasons to form and sustain an alliance is the firm's opportunity to gain access to other firms embedded knowledge, as well as new skills and capabilities (Hamel, 1991; Kogut & Singh, 1988). In earlier years, low success rates have been observed for alliances, and only half of the firms joining such relationships yield a positive market return from their partnering activities (Chan, Kensinger, Keown, & Martin, 1997; Porter, 1987). Even though strategic alliances tend to have low success rates, we can see that more recently, alliances have been an increasingly favored measure for improving a company's competitive advantage (Ybarra & Turk, 2009). Therefore, we believe that factors contributing to alliance success are essential subjects for our research.

Scholars, such as Luthans, Rubach, and Marsnik (1995), indicated that in order to survive in a dynamic and complex environment, it is crucial for organizations future success to do more than adapting. It is also essential to have the ability to learn and create knowledge. Therefore, several scholars have explored under which conditions firms can create value in alliances and under what circumstances they reduce general performance. Different researchers have found numerous factors that can produce value creation, such as sharing of knowledge (Levinthal, 1997; Levitt & March, 1988), experience (Dyer & Singh, 1998; Kale, Dyer, & Singh, 2002) and trust (Swärd, 2016). Furthermore, Ybarra and Turk, (2009) proposed that trust between the alliance partners is one crucial factor for success. Even though many factors have been shown to influence learning, and while some have argued that trust is highly important, few studies have examined how trust influence learning for firms in strategic alliances. Therefore, we will mainly focus on this factor, trust.

*“Trust remains an under-theorized, under-researched, and therefore, poorly understood phenomenon” - (Child, 2001, p. 274)*

This might be because trust is a factor that is difficult to measure and can vary in applicability to different context because it has many dimensions (Rousseau, Sitkin,

Burt, & Camerer, 1998). The perception of trust is subjective and varies from individual to individual. This is just an additional reason for why one should further investigate how trust can affect learning in strategic alliances.

The topic of this thesis is highly relevant as more companies, in all sizes are forced into strategic alliances (Gulati, 1998; Human & Provan, 1997). Strategic alliances have the potential to create value for firms under favorable conditions (Pollitte, Miller, & Yaprak, 2015; Tao, Liu, Gao, & Xia, 2017). They allow companies to generate more revenue, penetrate additional markets, create new products, preempt competitors, create value, and reduce costs (Chan et al., 1997; Contractor & Lorange, 1988; Oxley & Wada, 2009). Furthermore, research has shown that an effective and governed alliance can create more value for the firm than if they went it alone (Ybarra & Turk, 2009). Due to an increase in digitalization and intensified global competition, we wish to broaden our understanding of international joint ventures and the potential within alliance relationships.

As learning is an essential element for firms to stay competitive in the increasingly complex and dynamic environment, it is fundamental to recognize the factors to how firms learn in alliances (Luthans et al., 1995). Since several scholars have studied learning at the international joint venture level (e.g., Lane, Salk, & Lyles, 2001; Zahra & George, 2002), we want to study the learning of one partner from the other through the international joint venture. In other words, we want to study at the partner level, rather than the international joint venture level. The ability to learn and create knowledge, as well as the relationship between learning and innovation has not received sufficient attention in alliance literature (Easterby-Smith, Lyles, & Tsang, 2008; Van Wijk, Jansen, & Lyles, 2008). Therefore, we will investigate firms' patent citations after the alliance formation, and we believe this will be a good indicator of a firm's capability to learn from the international joint venture. More specifically, we will examine the critical success factor, trust, and how different proxies for trust might influence technological learning for firms in international joint ventures.

Based on the aforementioned arguments our research question is:

**How does inter-partner trust influence technological learning in international joint ventures?**

As a point of clarification, trust is defined as mutual confidence that none of the partners in the international joint venture to any degree will exploit the other partner's vulnerabilities. Learning is defined as a process of gaining new insight or knowledge. The research will mainly contribute in two ways: First, how to measure trust and second, how trust influence learning in international joint ventures. We are here referring to technological learning as our dependent variable and use patent citations to measure it.

We are contributing to the body of literature by answering the research question with a quantitative method of measuring trust and only with the use of secondary data. Further, we are complementing the literature with more research on trust and learning in international joint ventures, and how inter-partner trust might influence technological learning for the parties joining such alliances.

The thesis begins with a review of the literature. First, it explores an overall perspective of alliances, before it moves on to explaining a strong incentive for forming an alliance, namely learning through alliances. Thereafter, it will focus on one factor that can produce value creation in alliances, more specifically, trust. Based on the literature, eight hypotheses have been made to guide the study. Then our research model will be presented, followed by an analysis of data and discussion of findings and their implications for practice. Lastly, limitations and future research will be given pursued by our conclusion.



## 2. Literature review

### 2.1 Alliances

An alliance is an arrangement between two or more firms, established as a relationship built upon cooperation but without any joint ownership involved (Dickson & Weaver, 1997). The term “alliance” can be described, compared to other types of inter-organizational relationships, as an informal, less complex, and short-term partnership between firms (Barringer & Harrison, 2000). Alliances may be explained as flexible cooperation allowing firms to complement each other with assets to explore new marketing, organizational, and technological strategies (Baum, Cowan, & Jonard, 2010; Mody, 1993). Strategic alliances can have a variety of organizational arrangements, such as joint ventures, research, and development partnerships, licensing agreements, technical exchanges, and distribution and supply agreements (Inkpen, 1998). Over the last decades, strategic alliances have experienced an increase in research. This has led to valuable insights on firm’s behaviour in alliances and the performance outcomes of such partnership (Gulati, 1998). Intensifying globalization, which requires businesses to penetrate different markets, is the most likely reason for the remarkable growth of alliances in recent years (Argandoña, 1999). Another reason for the high growth in alliance formation is a technological breakthrough. This is because it is almost impossible to be first out with new technology in every field, and the reason is that progress is both rapid and incessant. On the contrary, the partners of an alliance can develop products equally, and at the same time reducing costs and risks together with maximizing their ability to take care of competitors (Argandoña, 1999).

There has been observed low success rates for alliances, and only half of the firms joining such relationships take a positive market return from their partnering activities (Chan et al., 1997; Porter, 1987). Also, in earlier years, low success rate has been observed for alliances, and the high failure rate indicated that most alliances do not succeed in creating the desired values anticipated when they entered into an alliance (Das & Kumar, 2011; Kumar, 2014). Therefore, several scholars have explored under which conditions firms can create value in alliances and what conditions that reduce market returns. Different researchers have found numerous factors that can produce value creation, such as sharing of knowledge (Levinthal, 1997; Levitt & March, 1988), experience (Dyer & Singh, 1998; Kale et

al., 2002), trust (Svärd, 2016), gaining access and speed to foreign markets (Doz & Hamel, 2001), sharing of resources (Doz & Hamel, 2001; Lavie, 2006), and networks (Mitsubishi & Greve, 2009).

Despite the high failure rate, Barringer and Harrison (2000), argued that firms tend to have more than just one reason for alliance formation, such as risk sharing, cost minimization, and learning. Furthermore, Simonin (1997), described the rationale for alliance formation as firm's opportunity to gain a competitive position through greater knowledge. Moreover, the value of inter-organizational relationships, such as alliances, is access to resources without having to obtain the resources themselves, and then create a higher performance (Doz & Hamel, 2001; Lavie, 2006). Also, alliances facilitate a flow of knowledge through partners (Kogut & Singh, 1988). This, in turn, gives the firms capacity to be more specialized in activities that are crucial for being more effective and to increase their competitiveness (Baum, Calabrese, & Silverman, 2000). Because the objectives of an alliance may vary remarkably, the motives of each member in an alliance often vary in a considerable measure (Renart, 1998). Even though alliances can give access to beneficial knowledge and resources, some firms may not be willing to share the essential, since it can increase the risk of losing advantages (Gulati, Lavie, & Singh, 2009). And, for a firm to have an opportunity to survive and to be a step ahead of the others, is it necessary to learn and be able to create new knowledge (Luthans et al., 1995).

## 2.2 Learning Through Alliances

The literature highlights that alliances create unique learning opportunities for partner firms in bringing together firms with different knowledge bases and skills (Inkpen, 1998). Learning or the resolution of uncertainty is a strong motive for forming and sustaining alliances (Mody, 1993). Scholars also propose that learning may be an explicit goal of alliances (Kogut & Singh, 1988; Westney, 1988). Therefore, learning should be considered as an essential alliance objective.

Learning normally involves retention, creation, and transfer of knowledge (Gulati et al., 2009). The ability to learn, manage, and integrate from strategic alliances is vital in today's interconnected and globalized economy (Kohtamäki et al., 2018). Scholars, such as Luthans et al., (1995), indicated that in order to survive in a

dynamic and complex environment, it is crucial for organizations future success to do more than adapt. It is also essential to have the ability to learn and create knowledge.

*"The reasons for the failure of some organizations and the success of others are varied and complex. However, there is little doubt that in a global economy characterized by "anybody, anywhere, anytime, and anyhow," that to succeed, and even to survive in the long run, organizations must be able to learn. They can no longer just react to change they must anticipate change".*

(Luthans et al., 1995, p. 25)

Learning is defined as a process by which repetition and experimentation enable tasks to be performed better and quicker, and new production opportunities to be identified (Teece, 1990). Furthermore, Morrison and Mezentseff (1997), refer to learning as a process of gaining new knowledge or insight. They also express that organizational memory, as well as individual memory, are both fundamental for learning. As we can see from the literature, learning is categorized into three levels: Individual, Group, and Organization (Crossan & Inkpen, 1994). Furthermore, learning develops through more than just the imitation and emulation of individuals, it can occur because of joint contributions to understand a complex problem. Coordinated search procedures and universal codes of communication are required for learning to take place (Teece, 1990).

Furthermore, the literature emphasizes that if alliance partner firms are competitors or potential competitors, a firm may have a limited incentive to share its knowledge. In fact, a firm may have little incentive to form alliances, let alone to share the knowledge that might lead to the establishment of a competitor (Inkpen, 1998). The dimension of trust that the other party will refrain from exploiting your vulnerabilities is particularly important to international alliances learning. This is because the level of confidence will define the likelihood of parties openly sharing valuable knowledge and information (Inkpen & Beamish, 1997). Moreover, increasing trust between partners in the alliance can mitigate partner protectiveness. When it comes to learning, trust should contribute to the open exchange of information between the partners involved in the alliance because trust will not give them the impression to protect themselves from the other's opportunistic behavior.

The literature refers to learning alliances as a relationship founded with the aim to cooperate, not to compete (Morrison & Mezentseff, 1997). These relationships are developed by creating a learning environment and by obtaining a systematic perspective. This will, in turn, improve the strategic fit between the companies in the long run (Morrison & Mezentseff, 1997). Furthermore, Hamel (1991), describes learning alliances as an involvement where the main objective of the parties involved is to learn from each other. The ability to obtain skills and knowledge through alliances may be fundamental for a firm to survive (Crossan & Inkpen, 1994). Moreover, developing a strategic alliance could be a faster and more efficient technique for acquiring specific knowledge and to learn the essential (Osland & Yaprak, 1995). Overall, Osland and Yaprak (1995), states that learning enables the partner's motivation in reaching the goals of the alliance relationship.

Strategic alliances are essential platforms for learning as it fosters knowledge transfer of a more complex, tacit, less codified, and more difficult character (Inkpen & Tsang, 2007). Partners in an alliance are more likely to learn and innovate if they have complementary strengths, existing governance mechanisms, and that they are somewhat technically distant (Ahuja, Lampert, & Tandon, 2008).

Even if organizations often communicate their alliance learning potential in glowing terms, learning is perceived as a complicated, frustrating, and often misunderstood process (Crossan & Inkpen, 1994). An understanding of what it means for an organization to learn is essential for an organization to learn through alliances (Crossan & Inkpen, 1994). Firms must be willing to acknowledge that learning is an essential strategic task, and understand that if they are unable to learn, they will become industry laggards (Crossan & Inkpen, 1994). To gain as much knowledge as possible, it is essential for firms to not view alliances as passive opportunities to benefit from its counterparty's skills, either act passive to the result of those skills (Hamel, Doz, & Prahalad, 1989). Moreover, firms should consider alliances as opportunities to learn and adopt these skills. Besides, it would be optimal if a firm learns the most from its alliance partners while the alliance is in progress (Hamel et al., 1989).

By working closely with its partners, the learning firm may be able to internalize partner skills that are found useful for the firm. The result of a successful learning experience is an improved knowledge base and an enhanced competitive advantage (Crossan & Inkpen, 1994). Notably, the success of alliance learning relies upon knowledge sharing (Yang, Fang, Fang, & Chou, 2014). Thus, giving too much attention to knowledge protection decreases interaction and transparency, and then damages joint learning (Muthusamy & White, 2005). Therefore, facilitate knowledge exchange while at the same time assure knowledge protection is a critical issue for firms (Kale, Singh, & Perlmutter, 2000; Norman, 2002). It is important that firms do not neglect knowledge protection, because interorganizational learning allows partner firms to effortlessly imitate and steal key knowledge and skills of the focal firm (Norman, 2004). Briefly, firms must take both knowledge exchange and knowledge protection into account and design appropriate governance mechanisms to address different problems and to enhance the effects of learning (Yang et al., 2014). In sum, the goal of strategic alliances is to acquire knowledge of the partners involved without sharing too much of their own (Dyer & Nobeoka, 2000; Lyles, 1988; Mody, 1993).

Furthermore, a firm's poor understanding of strategic dynamics results in a disappointing alliance performance (Khanna, Gulati, & Nohria, 1998), and that too much new knowledge, as well as too little, prevents effective learning (Hayward, 2002). Moreover, opportunities will remain unexploited without an understanding of effective governance of learning processes and alliance knowledge (Inkpen, 1998). Scholars agree to the fact that the ability to re-evaluate and learn is a key to success (Doz, 1996; Inkpen & Crossan, 1995; Mowery, Oxley, & Silverman, 1996).

In all, the literature indicates that for firms to learn from their alliance, it is required that the firm have an intention to learn and also the ability to learn. With the aim of learning from the alliance, the firms might focus on how to learn. This allows them to put more attention towards the positive outcome of an alliance and may contribute to motivate the partners to share their knowledge, given that the partners trust each other. As mentioned earlier in the literature review, trust is a factor that can produce value creation, and is therefore highly important for learning to take place (Swift & Hwang, 2013; Swärd, 2016).

## 2.3 Trust

Numerous definitions of trust have been proposed in the literature. The definitions tend to agree that trust is about one person or group's willingness to relate to another in the belief that the actions of the other are going to be beneficial rather than harmful, although this cannot be guaranteed. More specifically, Sabel (1993) defined trust as mutual confidence that none of the party in the alliance to any exchange will exploit the other parties' vulnerabilities. Lane, et al., (2001), expressed trust as the confidence that another party, not under your control, will refrain from misusing your vulnerabilities. Furthermore, Mayer, Davis, and Schoorman (1995, p. 712) defined trust as:

*"The willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party."*

Trust is a phenomenon that exists on a personal, organizational, interorganizational, and international level. Therefore, trust often plays an important or even dominant role in successful alliances, and managers often quote lack of trust as the main reason for failed alliances (Parkhe, 1998; Ring & Van de Ven, 1992; Sydow, 1998). Social capital, such as trust are particularly interesting because they are moral resources that operate in a fundamentally different manner than physical capital (Hirschman, 1984). Trust can also vary in applicability to different context because trust has many dimensions (Rousseau et al., 1998). Furthermore, Bryne, Brendt, and Port (1993), stated that trust is often touted as an absolute must for an alliance to be successful. Without trust, the exchange of information may be low in comprehensiveness, timeliness, and accuracy because the partners are unwilling to yield risks associated with distributing more valuable information (Inkpen, 1998). Moreover, Nielsen and Nielsen (2009) believe that trust is a particularly essential aspect of relational quality in alliances because it facilitates social interaction, reduces uncertainty, and reduces transaction costs, and increase transparency.

When a new alliance is formed, the partners may have initial uncertainties about working together. From the literature, there are two types of uncertainty in alliances, the first regarding unknown future events, whereas the second regarding partner's response to those future events (Parkhe, 1998). It is in situations with both

uncertainties that trust emerges as a central organizing principle in alliances (Parkhe, 1998). Trust reduces uncertain and complex realities far more economically and quickly than bargaining, prediction, or authority (Powell, 1990), and at the same time trust improves performance (Baughn, Denekamp, Stevens, & Osborn, 1997).

Previous relations between alliance partners can create an initial base of partner trust (Gulati, 1995a). Firms will have basic understandings about each other's capabilities and skills if they have worked together in the past, therefore, it should provide an incentive for further learning. Moreover, firms experience from the past influences their behavior and trust towards others. Experience can therefore influence the degree of trust in an alliance. Because of earlier experiences, firms have established knowledge of how a partnership or other activities from the past was. Therefore, firms would increase the potential value creation as the firms know from experience which alternatives that works (Gulati et al., 2009). Swärd (2016, p. 1841) points out that "trust emerges because of a shadow of the past where partners have positive experiences". However, if the environment is in rapid change, the right way today, might not be the right way tomorrow. Still, firms tend to enter into alliances depending on the partnering history of the firm (Gulati et al., 2009).

Firms that entering into new relationships tend to share small parts of information, since this only requires a minimal amount of trust (Ring & Van De Ven, 1994; Swärd, 2016). Several studies have found that over time, the exchanges of sharing knowledge increases and becomes riskier (Das & Teng, 1998; Luhman, 1979; Swärd, 2016). It has also been indications that firms tend to make risky and unwise trusting actions in the early stages (Berg, Dickhaut, & McCabe, 1995; Swärd, 2016). In addition, some managers tend to behave hazardously, and this can lead to essential information being held back from the partners involved in the alliance (Gulati, 1998). For this reason, with a long-term relationship, the risk of partners behave hazardously will decrease because of trust (Das & Teng, 2001). It has also been found that the longer the strategic alliance relationship lasts are positively related to the development of trust (Parkhe, 1993). Moreover, this indicates that the balance of trust differs from firms, which might be because of the different

experience from the past. Sharing of resources can be risky for the firm, but it can also be necessary.

Building trust might involve sharing and showing trustworthiness towards the partner to realize confidence from the other firms (Swärd, 2016; Weber, Malhotra, & Murnighan, 2004). Some studies have shown that especially strategic alliances with partners cross-border tend to limit their sharing of knowledge (Hamel, 1991; Mowery et al., 1996), and that trust is even more important when interorganizational relationships are between organizations from different countries (Child & Faulkner, 1998; Inkpen & Beamish, 1997; Krishnan, Martin, & Noorderhaven, 2006; Madhok, 2006). That is because organizations that come from different countries are more likely to be dissimilar, based on differences in culture, institutions and business practices of their home countries, than if they come from the same country (Hofstede, 2001). Moreover, Parkhe (1998) expressed that building trust may be more difficult when cultures are highly dissimilar since shared assumptions and homogeneous expectations about the alliance cannot exist as easily. Mowery et al. (1996) showed that strategic alliances with partners from the same country, tend to share much more. Because of this, alliance partners background can influence trust between the parties involved. Research also shows that the trust level within the firms' home country can have an impact on cooperative performance (Cusumano & Takeishi, 1991).

Scholars have also observed inter-partner competition and how it impacts learning in strategic alliances (Cohen & Levinthal, 1990; Inkpen, 1998; Krishnan et al., 2006). Notably, in horizontal alliances, firms tend to hold back more knowledge because the firms are in the same industry (Liu, Wang, & Wei, 2009). Trust is therefore an important aspect of inter-partner competition.

As Sward (2016) suggests, low trust increases the complexity of the contract and control, which leads to the reduction of sharing and only providing the alliance with necessary resources. Hence, increasing the cost of more detailed contracts and system to ensure fairness. In contrast, by having high trust the integrity, openness, fairness, and monitoring increases, consequently, firms would tend to share more with each other which increases the potential of learning from the alliance (Lavie, 2006; Swärd, 2016). Following, firms will be able to be more specialized in their



activities, increasing their competitiveness, and improve efficiency (Baum et al., 2000).

Das and Teng (2000) argue that trust based on several theories can explain the failure of an alliance, because, some firms may behave opportunistically or with the aim of allying to only assess essential information without cooperating (Gulati, 1998; Khanna et al., 1998). The behavior might lead to less effective alliances since the sharing of knowledge is imbalanced, providing only some with benefits and others with none. However, as many scholars have seen is that some firms tend not to share some of their information, to sustain their competitive advantage (e.g., Gulati et al., 2009; Lavie, 2006).

Scholars, such as Nahapiet and Ghoshal (1998), and Steensma, Tihanyi, Lyles, and Dhanaraj (2005), focused on how trust affects the firm's ability to obtain new knowledge and use it for innovative purposes. The correlation between learning and innovation has received little systematic attention in the alliance literature (Easterby-Smith et al., 2008; Van Wijk et al., 2008). Previous studies have focused on a relationship between a firm's strategic alliance and various performance indicators or research output, such as the level of product innovativeness (Kotabe & Scott Swan, 1995), milestone stages reached (Lerner, Shane, & Tsai, 2003), products under development (Deeds & Hill, 1996), and patenting propensity (Shan, Walker, & Kogut, 1994). In the process of innovation, few studies have focused on the intermediate role of learning (Yli-Renko, Autio, & Sapienza, 2001). Also, as mentioned in the section about learning in alliances, interorganizational learning facilitates innovation by increasing the willingness to develop new products and explore new ideas (Yli-Renko et al., 2001). Furthermore, the literature emphasizes that a high degree of trust should improve knowledge transfer and learning because it reduces the need for formal monitoring. Thus, it allows the firms to invest more effort into sharing of information and knowledge. The scope of relational learning broadens when relationships are based on mutual trust, as this gives incentives to try new methods and take risks in sharing unrelated knowledge (Nielsen & Nielsen, 2009).

There is still no clear consensus among scholars when defining trust, however, the extant literature seems to agree that trust has a positive, albeit indirect and limited impact on alliance performance (Krishnan et al., 2006; Nielsen, 2007). In all, trust is an essential variable for the alliance to succeed since the sharing of resources and knowledge makes firms able to improve. Additionally, without trust, the cost of specified contracts will increase and limit the ability to cooperate unreservedly. Thus, the trust will encourage to transfer knowledge across firms without high cost and uncertainty. However, trust comes with a price as the risk of being betrayed. Therefore, with ties to the companies in the alliance, the risk of opportunistic behavior reduces, as explained above. Furthermore, with experiences from the past, firms might be able to identify who to trust or not. Therefore, experiences can reduce firm's uncertainty when choosing the best fit for an alliance. In addition, cultural distance and alliance duration can also have a significant impact on the trust level between the parties in the interorganizational relationship. The literature also shows that faster technological change, increasing global competition, and rising costs and risks of developing new products have made it difficult for companies to do everything themselves. Therefore, accompany an alliance could be necessary to survive in today's rapidly changing environment. Overall, the literature suggests that higher level of trust is generally associated with increased efficiency, satisfaction, or performance for one or more of the parties involved in the alliance (Zaheer, McEvily, & Perrone, 1998).

### 3. Hypotheses

We have developed eight hypotheses, to test different variables of trust, and whether trust in the alliance influence learning for the partners involved. We are here referring to learning as technological learning. According to many observers, learning in collaboration depends on high levels of trust between the partners (e.g., Buckley & Casson, 1988; Lundvall, 1988). There are different aspects of trust in the literature, and we want our eight proxies to contribute to the field of study. In addition to this, we investigate why these particular types of trust can influence the firm's technological learning. Moreover, these hypotheses are based on the theory from the literature review and are the foundation for the rest of the paper.

**Country Familiarity.** Scholars, such as Freeman (1991) believes that it is because of the importance of personal trust relationships that cultural factors such as educational background, shared ideologies, language, regional loyalties, and experiences will continue to play an essential role in collaboration. We believe that a higher degree of similarity would reflect a higher familiarity between the countries involved in the alliance. Because, fewer differences between the countries in the alliance, the easier it is to understand and communicate with each other. Furthermore, research has shown that as companies become more international, their first attempt to collaborate is often with countries that share significant similarities with the home country (Parkhe, 1998). This is based on the logic that similarity promotes better understanding, greater knowledge, and familiarity with the host country environment. Similarity can create homogeneous expectations and common assumptions in a partner or a partnership in international alliances, which again can generate characteristic-based trust, and facilitating cooperative success (Parkhe, 1998). To be more specific, scholars agree that cultural distance could be related to alliance performance (Luo, 2002; Pothukuchi, Damanpour, Choi, Chen, & Park, 2002). Based on the above assumption, we believe that country familiarity will increase partners trust towards each other in the international joint venture (IJV). We, therefore, use country familiarity as a proxy for trust. Further, that inter-partner trust will influence the partners technological learning. That is because scholars have found a positive relationship between trust and both learning and performance in international strategic alliances (Lane et al., 2001). Therefore, we

propose a hypothesis that examines how this component of trust influence firms technological learning in IJV.

**H1:** The higher country familiarity within the IJV, the greater the IJV partner's technological learning.

**Country Level Trust.** It is common that international alliances bring together managers with different beliefs, thinking, reasoning and structure of perceiving, also that the managers have very dissimilar cognitive blueprints for understanding the world (Maruyama, 1984). Differences like this can be fundamentally important for international alliance managers. Furthermore, the literature argues that persons from low-trust countries versus persons from high-trust countries are likely to focus on subtle but essential differences in criteria in evaluating partners and partnerships (Parkhe, 1998). In other words, that persons from low-trust countries tend to evaluate alliances more on person-specific trust, where socio-psychological factors play a more significant role (Parkhe, 1998). As an argument for our hypothesis, the literature refers to that higher trust level within a country can enhance cooperative performance (Cusumano & Takeishi, 1991). Based on theory for country level trust, we do believe that the countries trust level is being reflected in the partner's trust towards each other, and, therefore is a great proxy for trust and to measuring performance in IJV. As a clarification, we use country level trust as a component for trust and measure how it will influence technological learning for each partner in the IJV. We use this because higher trust level within a country can enhance cooperative performance.

**H2:** The higher country level trust for the IJV partner's, the greater the IJV partner's technological learning.

**Experience.** Research has shown that there is a relationship between future experience and value creation, and because of earlier experiences, firms have established knowledge of how a partnership or other activities from the past was (Gulati et al., 2009; Kale, Dyer, & Singh, 2001). Therefore, firms would increase the potential value creation as the firms know from experience which alternatives that works (Gulati et al., 2009). Furthermore, Swärd (2016, p. 1841) points out that "trust emerges because of a shadow of the past where partners have positive experiences". We have based our hypothesis on this literature and Gulati's (1995a)

research on trust, where he argues that all previous relations between different alliance partners can create an initial base of partner trust. Therefore, we use the experience as a proxy for trust and believe, that from experience, they know which partner to trust or not and will, therefore, increase their technological learning.

**H3:** The more experience partners have from previous IJV, the greater the IJV partner's technological learning.

**Inter-partner Competition.** Inter-partner competition can be described as vertical or horizontal alliances. Inter-partner competition occurs when a partner in the alliance tries to maximize its private interests at the expense of the other partner or the alliance (e.g. Baum et al., 2000; Park & Russo, 1996; Park & Ungson, 2001). The concerns about opportunistic exploitation might be especially large between potential competitors in strategic alliances, because, the partners may have a strong incentive to erode each other's resources (Khanna et al., 1998; Oxley & Sampson, 2004). The danger about partnering up with potential competitors is that they are well-known with the areas that their partners operate in, also that they have superior capacity to absorb and reuse exclusive knowledge (Cohen & Levinthal, 1990; Park & Russo, 1996). Moreover, the potential to misunderstand the motives of a partner in situations with inter-partner competition is significant, and this can exacerbate the partner's tendencies to protect its resources, such as knowledge, and foster an imperfect alliance relationship (Hamel, 1991; Kale et al., 2000). Trust is, therefore, an important, yet difficult aspect of inter-partner competition. On the contrary, vertical alliances have a low potential for inter-partner competition, and, therefore, the appropriation of resources is less likely to be of strategic concern (Krishnan et al., 2006). Based on identified literature, we will use inter-partner competition as a component of trust, as we see it impact the way partners trust each other according to the literature. Theory indicates that higher competition will lead to lower trust between firms in IJV and cause reduced technological learning for the partners.

**H4:** The lower inter-partner competition in the IJV, the greater the IJV partner's technological learning.

**Partner Power.** Krishnan et al. (2006), examined when trust matter to alliance performance and used local partner size as one of their variables. Deeds & Rothaermel (2003) did the same in their article about the relationship between age

and performance in R&D alliances. We assume that the difference in the number of employees for each company in the IJV could be an indication of partner power between the parties involved. Since, it has been shown that the number of employees could provide an indication of the company size and potentially have a more substantial capacity to control the alliance. Therefore, it seems suitable using partner power as a proxy for trust. We believe that a higher difference in the number of employees will lead to less trust between partners, which then will share a minimum of knowledge and, therefore, hinder partners technological learning.

**H5:** The lower degree of partner power in the IJV, the greater the IJV partner's technological learning.

**Duration.** Duration refers to the length of the current relationship. Parkhe (1993), found that the longer the strategic alliance relationship had lasted was positively related to the development of trust. Partners in a strategic alliance come to know whether the other partner can be trusted or not as time passes in a relationship. Furthermore, the reason why older partnerships continue is that experience breeds trust (Scanzoni, 1983). Also, the older the relationship is, the more likely it is that the partnership has passed through the period of conflicts. If an alliance overcome this period, the establishment is laid for personal trust, excellent working relationship, and mutual liking (Anderson & Weitz, 1989). Partners in long-lasting alliances will, even without a period of conflicts, have had enough time to develop mutual understanding and come to learn each other's idiosyncrasies over time (Parkhe, 1998). Therefore, the longer the parties have been together in the same alliance, the more they will trust each other (Ybarra & Turk, 2009). We, therefore, use duration as a proxy for trust. Based on this literature, we proposed a hypothesis that duration will influence the partners technological learning.

**H6:** The longer the duration of the IJV, the greater the IJV partner's technological learning.

**Technology Transfer.** According to the literature, learning is one of the primary motivations and benefits for strategic alliances. Therefore, trust is also highly important. Several strategic alliances are formed for technology transfer and exchange, or for the joint development of technology (Cullen, Johnson, & Sakano, 2000). Technology transfer is significantly inhibited if partners do not trust each

other and are not committed to the alliance. If this is the case, the exchange of information and scientific knowledge that is necessary in the development of new technologies may never take place (Cullen et al., 2000). Moreover, the cost of establishing sufficient control mechanisms for safeguarding crucial assets and resources, such as technical knowledge can be unreasonable if one does not trust one's partner (Parkhe, 1993). Based on this literature, we assume that strategic alliances which shares technology will increase their technological learning grounded on the assumption that technology transfer reflects trust between partners.

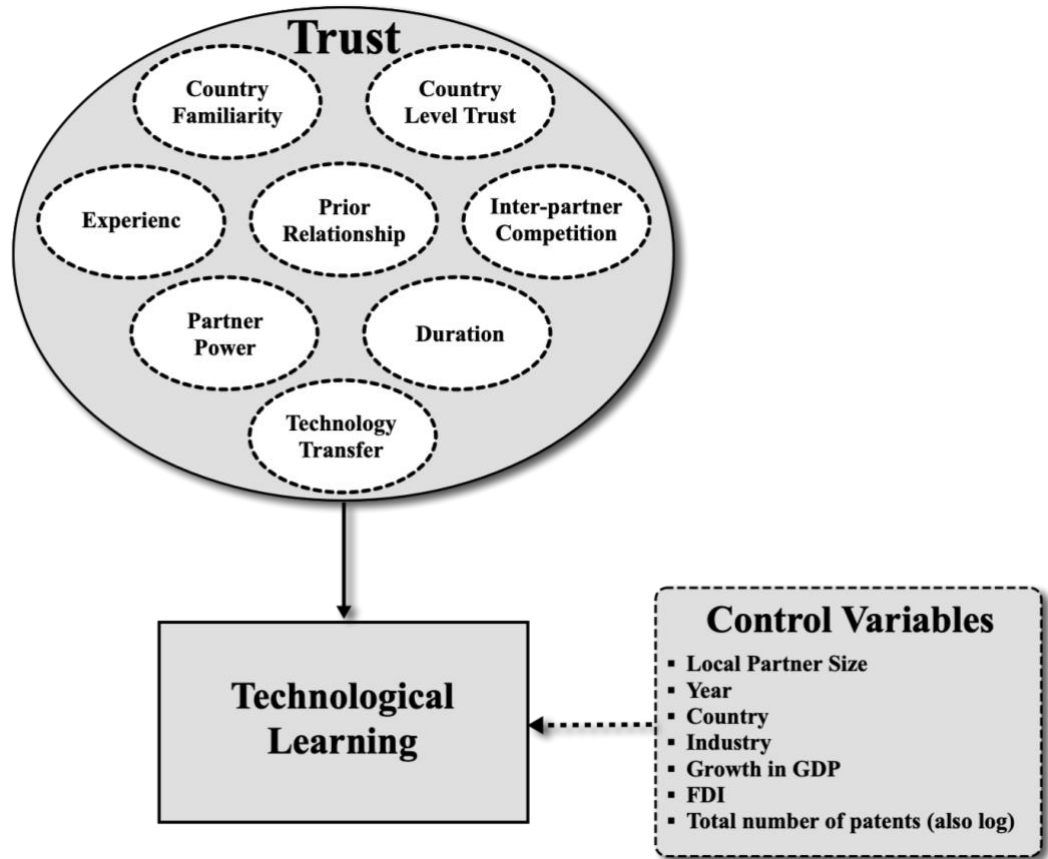
**H7:** With technology transfer in the IJV, the greater the IJV partner's technological learning.

**Prior Relationship.** The prior relationship between the firms in an alliance influence the willingness to collaborate (Gulati, 1995b; D. A. Levinthal & Fichman, 1988). That is, because, repeatedly interaction between the partners impact the trust and knowledge of each other's reliability and lack of propensity to behave opportunistically (Rempel, Holmes, & Zanna, 1985). Furthermore, prior affiliation impacts a firm's propensity to cooperate with a particular partner (Saxton, 1997). Moreover, Saxton (1997) suggested that former relationships between firms should affect alliance success. That is, because, affiliation allows firms to know a partner better, and to make firms understand the resources or capabilities it is retrieving and the partner's expected behavior. In addition, prior relationship with the same partner should build trust and a mutual understanding of how they work together. Since Gulati (1995a) used prior relationships as a proxy for trust, we will do the same. Also, we believe that prior relationship with the same partner influence learning as they know the partner better, and therefore enables them to retrieve the wanted knowledge. Based on this, we have formulated a hypothesis that suggests that prior relationships with the same IJV partner will influence the technological learning for the companies in the IJV.

**H8:** A positive prior relationship with the same IJV partner, the greater the IJV partner's technological learning.

## 4. Research Model

The model below (Figure 1) demonstrate our study. We propose that our eight variables are proxies for trust, and subsequent influence IJV partners technological learning in the form of patent citations.



**Figure 1. Trusts' Influence on Technological Learning**



## 5. Methodology

### 5.1 Data

The data were mainly collected through the Mergers, Acquisitions, and Alliances' database of the Securities Data Corporation (SDC) for joint ventures operating cross borders. An IJV is a widespread cooperative agreement intended to jointly develop, manufacture, or distribute products (Gulati, 1998). Although alliances have been an accepted method of enhancing performance and acquiring new knowledge, there might be several differences between the partners, such as their pattern of demand for trust, which can mitigate the benefits of alliances. Based on this, it seems applicable to analyze our proxies for trust in alliances and identify their effect on learning in IJV's. We expect to be able to provide a rich and suitable contribution to the already existing body of literature.

### 5.2 Data Collection

Most of the data used in our thesis were collected from SDC, with additional information gathered from the U.S. Patent and Trademark Office (USPTO), LexisNexis Corporate Affiliations, OECD, Factiva, and other webpages. The first criteria for the selected IJVs were that their relationship was announced in the time period 1996 to 2015. We selected that time span because SDC only offered a complete dataset on IJV's from 1988. Additionally, we wanted a time gap with the possibility to count for companies experience before 1996. The second criteria were to only have international relationships, hence: alliances that are cooperating in cross-border relations. Based on the two search requirements, we ended up with 2 052 raw IJV's in total. However, since this paper aims to measure the effects on a company level was it necessary to collect all the information needed for all companies. Sequentially, after collecting additional information from USPTO and LexisNexis, the final number was 252 IJV's in the time period 1996 to 2012. Meaning, we had collected all the essential information for 533 companies, yet it could be too little because of this thesis global perspective. Consequently, a lower level of observations might lead to lower reliability and potentially limit the generalizing of our findings.

### 5.2.1 Dependent Variable: Technological Learning

Patent data has been widely used in organizational research to measure company's knowledge space (Rosenkopf & Nerkar, 2001; Sørensen & Stuart, 2000), and normally used to calculate technological learning. We have, therefore used patents as our measurement for companies' learning. The data was collected from USPTO, and all 475 technological classes in the period 1995 to 2015 (Benner & Waldfoegel, 2008). Based on the information from USPTO, we used a similar concept as Rosenkopf and Nerkar (2001) with this formula:

$$L_{i,n} = \sum_{n=1}^3 p_{i,n}$$

Hall, Jaffe, and Trajtenberg (2000) showed that data from USPTO had a citation lag near 5 years during the variation from 3 to 12 years. Because of the limited data in our dataset, we did only look at the effect for 3 years, which might lead to lower reliability for our analysis. The  $p_{i,n}$  stands for the total number of patents in period  $n$  for company  $i$ , and  $L_{i,n}$  is the total number of patent citations for the company  $i$  that was made over three years after period  $n$  (Brockman, Khurana, & Zhong, 2018; Rosenkopf & Nerkar, 2001).

The sum of patents from the time period after entering into the alliance is uncertain. Increase in patents can stem from the alliance or other factors, additionally to the citation lag. Moreover, the use of patents might have some inaccuracy in measuring the collaboration and trustworthiness between the partners within the alliance: (i) it does not consider non-innovative technology alliances. Hence, alliances with, for example, cross-licensing will lead to an error (Grindley & Teece, 1997). (ii) It may capture noise or patents not linked towards the alliance. (iii) It is primarily a measure of output, so it might undervalue the partner's inputs that are not turned into patents or patents requiring a high level of inputs. Despite potential errors, we have, because of the time limitation, continue using the variable, and assumed that patent citations reflect upon inner-company learning and is therefore affected by the IJV.

### 5.2.2 Independent Variables

#### *Country Familiarity*

Country familiarity could be a proxy for trust within the IJV and potentially influence learning. Several scholars, such as Lowe, Gibson, and Kirkman (2001), and Shenkar (2001), have used Kogut and Singh's (1988) formula for measuring cultural familiarity, yet it was based on Hofstede's four cultural dimensions. Because the newest report was Hofstede's six dimensions, we have therefore changed the calculation from the four dimensions to the six dimensions for hypothesis 1:

$$CD_i = \frac{\sum_{i=1}^6 \frac{(I_{i,j} - I_{i,k})^2}{V_i}}{6}$$

$I_{i,j}$  stands for the index for the  $i^{\text{th}}$  cultural dimension and  $j^{\text{th}}$  country,  $V_i$  is the variance of the index of the  $i^{\text{th}}$  dimension,  $k$  indicates the other partner in the alliance, and  $CD_j$  is the cultural difference of the  $j^{\text{th}}$  country from the partner  $k$ . As Kogut and Singh (1988) mentioned; the scaling method imposes weight based on index variance. Any resultant measurement error cannot be expected to correlate theoretically with the other independent variables and should reduce the significance of the statistical relationship. Overall, it was anticipated that the greater country familiarity for the IJV, the greater technological learning.

#### *Country Level Trust*

National culture might have considerable influence on the companies' level of trust, and therefore, a country's trustworthiness might affect company culture and its internal level of trust (Graham, 2000; Maruyama, 1984). Consequently, for hypothesis 2, the level of trust for the countries has been collected from the database "Our World in Data". The database has been used by e.g., Oxford University and Stanford, yet seemingly not been used in any research. The database contains country level trust, and it has calculations for several countries from 1993. Based on existing theory, it was predicted that the greater country level trust, the greater the learning will be accomplished for the company.

### *Experience*

For hypothesis 3, alliance experience is generally used as a proxy for a firm's alliance capability (Levitt & March, 1988; Zahra & George, 2002). We have used the same method as Kale et al. (2002): measure the experience by counting each firm's number of alliances over a 25-year period from 1988 to 2013 (Kale et al., 2002). The source for collecting a raw count of each companies' alliances was SDC, which maintains a relatively complete list of firms' IJV's since 1985.

However, Kale et al. (2002) found that SDC holds certain errors by (i) Missing some alliances because some companies might not inform about all their engagements, either tactical or strategic reasons and (ii) some companies did not show any progress after the announcement due to disagreements or inertia. The errors were controlled for by using Factiva. Based on the control it was not identified an overload variance, indicating our data might be sufficient, and low possibility of errors. Despite potential errors it has, because of limited time and capacity, not been controlled further for potential errors. Based on existing theory, companies would with greater experience have greater technological learning from the IJV.

### *Inter-partner Competition*

Past empirical research has shown that partners operating in the same industry should be classified as alliances being potential competitors (Liu et al., 2009). Because competition could be on different levels, it would be less reliable to use a simple dummy for the inter-partner competition. Instead, hypothesis 4 was measured by using Krishnan et al. (2006) accurate identification method of inter-partner, scoring the competition present in the alliances by using the four-digit SIC code.

The score was implied with a binary measure into three categories indicating the degree of competitive overlap. If the alliances operate in the same four-digit SIC code, they got the score 2, as both of the partners was mainly active in one area. Partners in this alliance are horizontally related, and the alliance's activities are central for their businesses, following the concerns about breeding a potential competitor are likely to be very high. If the two first digit of the SIC code was the same, they got a score of 1. Implying that the partners could work in similar

industries, yet lower than in the situation coded 2 because the overlap is less central to their businesses. Finally, if the partners were not in the same industry, they were scored 0. This category is clear cases of vertical relationship in the alliance, so they are less likely to be potential competitors. Based on existing theory, it seems that higher inter-partner competition mitigates technological learning in IJV.

#### *Partner Power*

For hypothesis 5, the relative partner power between companies aims to represent the power among the partners within the alliance. Das and Teng (1998) refer to several scholars that shows that the ownership control affects the power within the alliance. Unfortunately, there was a limited amount of information on the ownership percentage for the IJV in SDC, annual reports, and Factiva. With only 85 observations available, we were required to restate our variable to increase the number of observations.

Based on a complete list of information on the number of employees, we converted our variable over to the differences in company size. Larger firms are usually more powerful compared to smaller firms and might have some advantages in acquiring headquarters' support for their business actions and innovation activities (Kale et al., 2002; Tsai, 2001). Firm size is normally measured in revenues, assets, or market share. However, as the only requirement for our selected alliances was that it was cross border, several of the companies did have a negative revenue stream at the time of the alliance. Total assets do not reflect firm size based on knowledge, and market share data is elusive since many firms may not have products on the market. Thus, the firm's size was measured by using the number of employees. The data was collected first from SDC, subsequent supplied from LexisNexis for companies missing that information in SDC. Unfortunately, for this variable, we were unsuccessful in finding well-known literature to support our measuring method. Despite seemingly no support from existing literature, the formula was built as followed:

$$P_l = \log \left( \frac{Em_{l,n}}{Em_{k,n}} \right)_{JV}$$

In the formula,  $Em_{l,n}$  stands for the specific company's number of employees for company  $l$  in period  $n$  and  $Em_{k,n}$  is the number of employees in the partnering company in the joint venture. Following it has been taken the logarithm to downscale the scores and decreasing the standard deviation. For a score below zero represent the small company in the alliance, and vice versa, scores that are distant from zero implies high power. Based on the theory, it would be possible to assume that the partner power, will influence learning in the IJV.

#### *Duration*

The value from duration represents the variable for hypothesis 6, and data was collected from SDC. The information from SDC provided the planned number of years the alliance tended to collaborate. As several scholars have shown, duration appears to be an essential factor for the alliance (e.g. Parkhe, 1993; Simonin, 1999). However, it does appear that scholars have both used the planned number of years of cooperating, in addition to the actual duration of the alliance (e.g. Simonin, 1999; Ybarra & Turk, 2009). Unfortunately, due to limited capacity, we were not able to control for alliances' actual duration. Therefore, only the planned duration was taken into consideration. From existing research, it could be expected that the longer duration, the greater technological learning will be accomplished for the firms.

#### *Technology Transfer*

For hypothesis 7, it was used as a flag from SDC; "Technology Transfer flag" is categorized as "Yes" if the alliance implies the transmission of technology to the alliance or from one partner to another. It could be expected that companies with technology transfer would companies have higher technological learning from the IJV.

#### *Prior Relationship*

It has seemingly not been established a well-known quantitative research methodology for measuring trust, hence limiting the reliability of a direct measurement of the variable trust. However, based on existing theory, one could use partners previous relationships as a proxy for trust in hypothesis 8. The data for the prior relationship was collected from SDC and Factiva. Originally the plan was to only look at the duration relationship; unfortunately, we were incapable of

collecting enough observation only for the duration relationship. To increase the reliability, three variables were classified as being prior relationship combined; duration relationship, duration of entering the alliance, and past collaborations. If companies did not have any information before entering the alliance, it was then assumed that the companies had a non-existing prior relationship. The purpose of the formula was to provide a variable that reflected upon the partners' collaboration skills and trustworthiness under and after the negotiation. Without any research supporting our formula, we might experience lower reliability.

$$PR_i = \log\left(\frac{R_{l,k}}{A_{JV}}\right) * E_{JV}$$

$R_{l,k}$  is the number of days from the first official project to the announcement of the alliance and  $E_{JV}$  bases on an overall amount of times the alliance has collaborated. Both  $R_{l,k}$  and  $E_{JV}$  were used since several scholars have found that prior knowledge toward each other increases their trust (Coulter & Coulter, 2002; Parkhe, 1998).  $A_{JV}$  tells the number of days it took from announcement to the alliance was active, this has the aim to reflect on the complexity of the deal. Because, alliances with a more complex contract might have needed more time before entering the alliance and the complexity gives a signal of limited trust (Chen, 2000; Woolthuis, Hillebrand, & Nooteboom, 2005).

Explanation of the scoring system: When the score is negative, the companies started with an initial negative relationship, and this suggests that the learning outcome will be lower. If the score is close to zero, the alliance consists of partners with no prior collaboration. When the score is positive, the companies started with an initial positive relationship, and we imagine that the more positive prior relationships between partners, the greater technological learning partners will accomplish.

### *5.2.3 Control Variables*

We identified and included several variables to control for possible confounding factors and reduce the risk of endogeneity. We controlled for local firm size, different macro factors, level of patent citations, nationality, industry, and the year of entering the alliance.

The local partner size was included since the size can affect the company's innovation and performance. Larger firms tend to have more resources to enhance their innovation and performance (Mowery et al., 1996; Tsai, 2001). Similar to our relative partner power, the firm's size was controlled by using the number of employees as a proxy for size. Furthermore, we controlled for the size of the local partner by taking the log of the number of employees (Deeds & Rothaermel, 2003; Krishnan et al., 2006; Tsai, 2001).

Regarding the macroeconomic factors that could affect companies technological learning, we included GDP growth and Foreign Direct Investments (FDI) change related to GDP. The reason for controlling for macro-economic factors was because developed countries may provide higher investments into the research and development, and therefore have more patent citations. Consequently, learning might not be related to the IJV, rather the macroeconomics for the country. With information from OECD and used the formula to measure, have we measured GDP growth:

$$GDP_G = \frac{GDP_Q - GDP_{Q-1}}{GDP_{Q-1}}$$

Additionally, FDI was controlled for additional investments that could have potential influenced the patent citations for the companies. Regarding our macro variables, it might arise a bias: because companies which were contributing multi-nationally has only been represented by their home nation's statistics and not specifically towards the subdivisions located country.

It has also been controlled for companies that have a higher number of patents because it might influence the measured technology learning for each company. Since, with a higher number of patents, the probability of having patent citations in the specific year would be much higher. Hence, for a firm with a higher number of patent citations, the measuring of the learning might be less reliable, since the patents might originate from other sources.



The country dummy was made to control for national effects on the regression model. Since the data for learning was collected from USPTO, national level could affect the patent citations for the observed companies and potentially favor companies with greater connections towards the United States.

Dummies for alliances in industries indicate industries that could systematically perform better than those in other industries owing to differences in industry structure (Steensma et al., 2005). To control for industry differences, we used dummy variables for the major industries in our sample, based on two-digit SIC codes.

Lastly, we took into consideration the year of the alliance. Several studies have shown that the environment has more turbulence and therefore pushed the requirements of learning (Barreto, 2010). Since learning is an essential factor for surviving in a turbulent environment, an increase in learning over the years could relate to pressure from the competitors and not directly from the trust level within the alliance. Hence, imply that the tension might limit the trust towards their partners and instead increase the behavior of self-interest.

### 5.3 Regression Model

Compared to other scholars, we have seen that a frequently used regression model is the ordinary least squares regression model (OLS) and this indicates reliability towards the regression model. Further, OLS was selected because of its simplicity and with the purpose to fit with our dependent variable. However, to create an ideal and valid regression model, we yield for the seven assumptions. After testing the regression model in Stata/IC 15.0, it did appear to be an accurate correlation concerning our dependent variable towards our independent variables. We did also used Stata/IC 15.0's regression with robust standard errors to counter the effect of heteroscedasticity. Based on our variables we have formulated the following OLS:

$$\begin{aligned}
 L_{i,n} = & \alpha_i + \beta_1 CD_i + \beta_2 \text{Country level trust} + \beta_3 \text{Experience}_i \\
 & + \beta_4 \text{Inter partner} + \beta_5 P_i + \beta_6 \text{Duration} \\
 & + \beta_7 \text{Tech transfer} + \beta_8 PR_i + \varepsilon_i
 \end{aligned}$$

Importantly, as e.g., Bjørnskov (2007) and Antonakis, Bendahan, Jacquart and Lalive (2010) stresses that almost all papers that used a simple OLS regression implies that potential endogeneity issues have been unanswered. To avoid endogeneity, it has been included several control variables, which potentially limits the endogenous affection from a national, firm, or individual level. However, since all the data was collected from second-hand sources and without any direct contact with the companies, it has not been possible to optimally control the endogeneity regarding our measurements.

## 6. Results

Before moving on to the discussion of the hypotheses, it is useful to explain a few descriptive statistics associated with the data. Appendix 1 and 2 contains the frequency statistic of the country, year, and distribution of industries from our dataset. As shown in Appendix 1, there is a significant number of companies from United States (38,7%) and Japan (12,5%), and mainly the companies in our dataset are from manufacturing industries (appendix 2).

### 6.1 The Descriptive Statistics and Correlation

Table 6.1 contains a description of all the variables and a correlation matrix, showing a low correlation between the different variables. The number of observations differs between the variables, which reduce the total number of observations in the full regression. Mainly it was a low correlation between trust and the other variables. However, learning had some strongly correlated variables, such as the experience (0.64), partner power (0.28) and trust (0.22), yet still far from 1.0.

**Table 6.1 Correlations and descriptive statistics**

Variable	N	Mean	Std. Dev.	Min	Max	1.	2.	3.	4.	5.	5.a	6.	7.	8.	9.	10.	11.	12.	13.	13.a	14.	15.	16.	
1. Learning	533	473.56	1328.27	1	9951																			
2. Country Familiarity	533	1.98	1.61	.02	10.78	.18																		
3. Country Level Trust	531	34.85	8.36	5.50	70.87	.08	.07																	
4. Experience	533	24.42	55.17	1	389	.64	.15	.07																
5. Inter-partner	533	.47	.70	0	2	-.12	-.02	-.04	-.09															
5.a Inter-partner Dummy	534	.36	.48	0	1	-.10	-.05	-.05	-.09	.91														
6. Partner Power	521	-.17	3.81	-9.24	9.24	.28	-.03	.01	.24	.01	.00													
7. Ownership	85	46.88	11.17	20	80	.01	-.19	.11	-.07	.00	-.06	.25												
8. Duration	533	7.14	8.79	1	100	.03	.09	-.03	.14	.04	.04	.02	.13											
9. Technology Transfer	533	.12	.32	0	1	-.02	.02	.00	-.01	.00	.02	.02	.08	.06										
10. Prior Renationship	533	215.27	1838.18	-4	10.00	.21	.08	.03	.26	-.06	-.06	.01	.06	.12	-.01									
11. Local Partner Size	527	3.92	1.18	.903	5.84	.36	.09	.06	.35	-.11	-.11	.69	.04	.13	-.15	.04								
12. GDP Growth	533	2.83	5.19	-5.47	12.72	-.06	-.09	-.03	-.09	-.01	.05	-.12	.15	.02	.11	-.03	-.09							
13. Patents	533	5 260	14867	5	101 382	.92	.16	.07	.63	-.14	-.13	.30	.06	.04	-.01	.15	.37	-.02						
13.a Log Patents	533	5.41	2.80	1.61	11.53	.61	.13	.12	.42	-.11	-.08	.44	-.09	.05	-.05	.13	.55	.06	.62					
14. Country	532	22.52	10.24	1	32	.01	-.02	-.01	-.02	.04	.06	-.01	.08	.00	.03	.03	-.02	-.02	.04	.11				
15. Industry	533	39.69	17.44	10	87	-.01	-.05	.03	-.01	-.30	-.33	-.16	-.14	-.13	-.00	-.01	-.08	-.23	-.03	-.10	.05			
16. Year	533	2001	4.85	1995	2013	.06	.06	.10	.04	.02	-.01	.01	-.16	.07	-.18	.13	.07	-.24	-.03	.02	-.08	-.04		
17. FDI	530	2.44	3.17	-3.62	36.70	-.07	-.16	-.12	-.11	.01	.05	.04	.19	-.03	-.05	-.04	-.01	.15	-.07	-.10	-.05	-.04	.10	

### 6.2 Regression Results

We used OLS to test if the proxies for trust significantly predicted technological learning. The results of the regression indicated that the predictors explained 90% of the variance ( $R^2=0.90$ ,  $F(107, 410) = 28.78$ ) and shown in table 6.2, model 10. The R-squared are unusually high and could be explained by the patent variable,

which has a high correlation towards the independent variable (0.92) (table 6.1). In appendix 3, the patent variable was changed to be the logarithm of patents, as a robustness check.

It was found that for hypothesis 1, the country familiarity showed in model 10 and 2 to be significantly and positively predicts learning (model 10:  $\beta = 41.03$ ,  $p < .05$ ; model 2:  $\beta = 43.69$ ,  $p < .01$ ), and are supporting the hypothesis, which suggests that higher similarities on a national level have a positive relation towards technological learning. Following for hypothesis 2, the trust level of each company's country was significant in model 3, yet negative ( $\beta = -26.13$ ,  $p < .05$ ) hence not supporting the anticipated results. This suggests that higher country level trust influences the learning negatively. Furthermore, in model 10, hypothesis 2 was not significantly supported, but maintain the negative coefficient sign. It is implying that there might be some ambiguity in our results. For hypothesis 3, company's experience was significantly and positively related to learning in both model 4 and 10, suggesting support to our hypothesis (model 10:  $\beta = 2.10$ ,  $p < .01$ ; model 4:  $\beta = 2.52$ ,  $p < .001$ ). Implicating that experience has a positive relation to technological learning. Hypothesis 8 shows that a positive prior relationship indicator was significantly and positively connected towards learning, in both model 9 and 10 (model 10:  $\beta = 0.03$ ,  $p < .05$ ; model 9:  $\beta = 0.04$ ,  $p < .001$ ), thus hypothesis 8 was supported. It is implying that there was a positive relation between partners prior relationship and technological learning.

The p-value for the other variables was below the requirement for a statistically significant level and indicated a non-existing relation between technological learning and the trust variables. Hypothesis 4 was not supported, the inter-partner competition had the predicted sign; which was negatively associated with a high level of inter-partner competition; still, it was not significant. Hypothesis 5 predicted a higher partner power, reduced the learning, hence the proposed sign, yet not significant, so not supported. Hypothesis 6 predicted that longer durations would lead to higher technological learning and was not supported in the findings with a negative sign. Hypothesis 7 was not supported, the technology transfer has the expected sign; that is, positively connected to the learning, yet it was not significant.

**Table 6.2 Results of Regression Analysis**

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Country Familiarity (H1)		43.69** (16.55)								41.03* (16.54)
Country Level Trust (H2)			-26.13* (12.24)							-19.59 (12.21)
Experience (H3)				2.52*** (0.52)						2.10** (0.54)
Inter-partner Competition (H4)					-4.54 (37.42)					-0.65 (36.84)
Partner Power (H5)						-6.26 (8.99)				-2.17 (8.95)
Duration (H6)							-0.03 (2.72)			-2.37 (2.71)
Technology Transfer (H7)								46.33 (75.43)		45.70 (76.97)
Prior Relationship (H8)									0.04*** (0.01)	0.03* (0.01)
Local Partner Size	-18.59 (26.59)	-16.86 (26.41)	-15.36 (26.56)	-34.61 (26.12)	-18.63 (26.62)	-3.61 (34.83)	-18.58 (26.66)	-16.99 (26.73)	-14.60 (26.23)	-17.02 (34.98)
GDP Growth	-15.20 (18.74)	-9.51 (18.74)	-14.44 (18.71)	-14.26 (18.27)	-15.30 (18.78)	-15.80 (18.90)	-15.21 (18.82)	-15.61 (18.77)	-17.60 (18.49)	-12.38 (18.48)
Total nr. of Patents	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)	0.08*** (0.00)
Country dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Industry dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Year	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
FDI	-3.88 (12.46)	-3.38 (12.38)	-3.72 (12.43)	1.95 (12.20)	-3.74 (12.53)	-3.43 (12.58)	-3.88 (12.48)	-3.88 (12.47)	-3.66 (12.28)	2.01 (12.25)
Constant	-108.59 (388.45)	-254.02 (389.64)	1012.98 (652.54)	-73.81 (378.59)	-107.91 (388.94)	-175.63 (404.07)	-108.47 (389.09)	-139.38 (391.95)	-107.24 (382.90)	584.40 (655.77)
n	526	526	524	526	520	526	526	526	526	518
df_r	422.00	421.00	420.00	421.00	421.00	416.00	421.00	421.00	421.00	408.00
r2	0.89	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.90	0.90

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

For the control variables, it was shown a high significance between technological learning and the total number of patents ( $\beta = 0.08$ ,  $p < .001$ ). Therefore, showing that a higher number of patents have relevance on the learning measurement.

### 6.3 Robustness Checks

We have also executed several robustness checks on our results. For instance, we ran our regression model by taking the logarithm of the number of patents instead of using the total number of patents (Appendix 3). Our results changed the significant level and coefficient sign for several of our hypotheses. The experience regarding hypothesis 3, maintain a high significance and positive connection towards learning (model 10a:  $\beta = 11.27$ ,  $p < .01$ ; model 4a:  $\beta = 11.23$ ,  $p < .001$ ). Additionally, the duration variable for hypothesis 6, changed to have a high significant level in model 10a, yet a negative correlation (model 10a:  $\beta = -10.55$ ,  $p < .05$ ), and is not supporting our predicted direction. The prior relationship in hypothesis 8 was still supported in model 9a, however not in model 10a. Except for the changes in the significant level, hypothesis 2's coefficient sign change from negative to positive and for hypothesis 5 from negative to positive. Based on the robustness tests, the regression appears to be dependent on the patent citations and less for the other variables.

We did also test hypothesis 5 using the additional variable ownership (85 observations) and tested it with both patent control variables (Appendix 4). Ownership does not have any significance, but it has a positive correlation towards learning, therefore not as anticipated. Most of the hypotheses are not supported, except for hypothesis 3 in model 13a. However, it is essential to mention the low number of observations, which might limit the results from this robustness check.

## 7. Discussion

Overall, the findings from this study support, to some extent, the idea that companies trust towards the IJV could influence their technological learning. Despite the support from the regression model, existing literature has shown that our variables also can mirror other reasons. In this section, we will discuss the findings for all our hypothesis and other potential reasons for our results.

### 7.1 Implications

Four out of eight hypotheses were significantly supported in the regression model. Therefore, we will start discussing the hypotheses that were supported. Hypothesis 8 indicates that a positive prior relationship increases technological learning. However, the information that has been used to measure partner prior relationships could be explored in other ways. First, the duration relationship could possibly be a variable of companies increase in capabilities of absorbing information from their partner. Therefore, potentially not a measurement for trust. Second, the number of times companies have cooperated within an alliance might have a similar explanation as to the first: only higher familiarity and not necessarily trust. Third, the information regarding the time from announcing an alliance to signing was also taken into account. As mentioned in the methodology, Kale et al. (2002) pointed out that there might be some bias in the data from SDC and therefore reducing the reliability concerning the findings. However, potential explanations for the time it took to get an agreement on entering the IJV could be regarding the law, procedures, or policy, which might not be conserving lack of trust for their partners. Bizarrely, the time it took to agree could be a sign of trust, since the partners published their plan of entering into an alliance before entering, compared to other alliances that did not inform before entering. Based on our assumptions, this implies that companies should try to maintain their relationship to increase their relation and further increase technological learning from the IJV.

Hypothesis 1 was supported and implied that with a higher maintained country familiarity technological learning will increase. Rather than being a reflection of country familiarity, it could be a measurement of the geographical distance between countries (Contractor & Choi, 2016; Ghemawat, 2007; Tong, Reuer, & Peng, 2008), language barriers or countries' similarity regarding laws (Ghemawat, 2007).

The similarity could make it easier to transfer knowledge between partners in alliances and does not automatically mean alliances with lower country familiarities has a lower level of trust. Independent of assumptions, it would be beneficial for companies with the aim to learn, to enter an IJV with high country familiarity.

Regarding the country level of trust for each partner, we got an unanticipated result of a negative sign for the coefficient. Which could be interpreted that higher country level trust leads to a lower level of learning. The findings could also mean that companies from high trust level countries, might be more patient and focus on building a relationship towards their partners (Parkhe, 1998). On the opposite side, there could be companies from low trust level countries, that might have a higher self-interest, and only concentrating on absorbing knowledge from their partners. The findings imply that companies from countries with a higher level of cultural trust, might be blind and overlook self-interested partners.

Companies experience seems to be another important finding, whereas hypothesis 3 was supported. It suggests that companies with more experience tend to trust their partners, and this increases their technological learning. However, as scholars have shown the experience could be a reflection of companies' absorptive capabilities (Koput, SmithDoerr, Powell, & Koput, 1996), since the companies might have greater routines, higher adaptability or higher willingness to learn. Despite potential explanations discounting for trust, it could also be that companies with higher experience are trusted more by their partners because of greater reputation (Parmigiani & Rivera-Santos, 2011), resulting in a higher knowledge transfer from the partners.

The variable for inter-partner competition from hypothesis 4, shows that companies within potential higher competition might have lower technological learning outcome, which could indicate a lower trust level. However, instead of relating it towards trust, could the results explain that if the alliances have higher inter-partner competition, partners could potentially have more overlapping knowledge (Mitsuhashi & Greve, 2009; Mowery, Oxley, & Silverman, 1998). Hence, reducing the likelihood of increased technological learning. Another explanation could be that alliances with higher inter-partner competition have other purposes for the



alliance, such as an increase in capacity, speed and gaining access to markets (Barringer & Harrison, 2000; Doz, 1998; Mody, 1993).

In hypothesis 5, the variable we looked at was relative partner power and ownership control; the coefficient sign was as anticipated negative for partner power, yet not for the ownership. This indicates that an increase in power might reduce the trust and consequently the learning. However, the measurement for partner power indicates that companies scoring particularly high were collaborating with a significantly smaller company. Hence, the partner power might measure companies existing resources, whereas larger companies tend to have more knowledge and therefore learn less from a smaller partner. As Greve (2008) describes, smaller firms tend to specialize, while larger firms tend to be generalists. Therefore, larger firms might collaborate with smaller firms to differentiate themselves and learn unique capabilities. For the ownership control, it does appear to be those with higher ownership that achieve the highest technology learning. A possible explanation for the unexpected results might be that companies with higher ownership have the most interest in achieving technological learning. However, it could be an idea that companies with a higher ownership percentage might have invested more into the alliance and are more trustworthy in the alliance.

The duration variable represents hypothesis 6, and seemingly from our regression, it has a negative correlation with technological learning, which was unanticipated. This might indicate that if the duration exceeds its planned time span, trust might be reduced, and this will, in turn, reduce the learning outcome of the alliance. However, companies with a long-planned duration might have more complex knowledge transfer, which might take time before it is shown in the measurement for learning outcome (Lunnan & Haugland, 2008). Consequently, trust may still be high for companies with longer duration, but the learning outcome might have some years of lag in the patent citations.

Lastly, hypothesis 7 was for the technology transfer, and in the regression technology transfer had positive coefficient towards technological learning. The regression results indicate that technology transfer will potentially lead to higher trust towards their collaborators and increase the learning outcome. However, it

might be that companies planned or were required to share knowledge within the alliance, despite their trustworthiness concerning their partner.

So, how does inter-partner trust influence technology learning in international joint ventures? Overall, it does seem to be a correlation between some circumstances of trust and technological learning. With a positive prior relationship, experience from prior alliances and higher country familiarity, companies might increase their potential learning from the alliance. However, should you trust your partner? As it was shown, companies from countries with a high level of trust had lower technological learning, which could indicate that too much trust reduces the potential learning from the IJV. A possible explanation could be that companies with a high cultural trust level overlook IJV partners that are showing hazardous behavior, because companies from the home country always behave honestly. Therefore, it is probable that companies have, to some extent, a need to be self-interested in order to survive and avoid a high degree of knowledge spillovers and failed attempts in learning.

## 7.2 Contributions

With little prior research on how trust influence learning in IJVs, our paper has shown that there might be possible to measure such complex variables.

The main contribution, in terms of analytical findings, this paper has shown that prior relationship does appear to influence technological learning. This supports Gulati's (1995a) assumption that prior relation affects the learning for the companies in an alliance. Furthermore, we did also find support in our data that country familiarity influence firm's technological learning, and that companies with similar culture in IJV are potentially easier to trust (e.g. Luo, 2002; Pothukuchi et al., 2002). It has also been shown that experience allows the company to achieve higher learning, yet it could be discussed whether the experience is a good proxy for trust (Gulati, 1995a; Swärd, 2016) or only a measurement of company's absorptive capacities (Koput et al., 1996). The unpredicted finding from our analysis was country level trusts' negative effect on learning, indicating that company with a more trusting culture potentially might have too low requirements towards their partners, providing their partners with more knowledge than they received back. Overall it does seem to be beneficial to collaborate and build a good

relationship with companies with a similar culture and acquire experience. However, it could be essential to be critical of whom to trust.

Regarding the selected methodology, we have shown that it is possible to use an unconventional measurement of trust. As most of the prior research has used qualitative measures, have we used quantitative second-hand data, and it might be possible to use a similar method in the future. It has also been shown that it is plausible to measure alliance specific advantages on a firm level, by combining information on national and partner level.

## 8. Limitations and Future Research

Research on trust and how it affects technological learning in international joint ventures are relatively difficult to measure, and future research is important to get an even more in-depth understanding of the concept. Based on our research, we have found some limitations and potential recommendations for future research.

### 8.1 Limitations

This study has several limitations that need to be taken into consideration when interpreting the results. First, the difficulties regarding trust and how to measure it accurately. Although there is a lot of literature and research in the field of strategic alliances, measuring trust is a common challenge that recurs. This study is mainly limited by the lack of empirical attention from IJV scholars regarding issues of similarities and differences in collaborative trust (Currall & Inkpen, 2002). The definition of trust varies to some extent, and individuals may also have their own perception and interpretation of trust. Therefore, trust is a challenging variable to analyze and measure. Furthermore, since trust is person-specific, previous studies are often based on interviews, observations or cases. Additionally, a limitation might be the fact that we quantitatively measure trust.

Second, we see that this study is mainly limited by the lack of observations in the dataset after differentiating the data on characteristics such as patents from USPTO, employee number from LexisNexis and prior relationship from Factiva. By examining our hypotheses with a larger data sample, one might obtain stronger and more reliable results. It could also create the possibility of using previously supported methods, such as looking at five years after entering the alliance for patents, instead of only three.

Thirdly, all our strategic alliances are acquired from the same database SDC. The database provided us with limited information on each strategic alliance. We therefore had to retrieve information from other databases and websites to gather the information needed. This might have made our data less generalizable and limiting the ability to control for the partners intention for entering the IJV. It was also difficult to gather the information, which we assume is because some of the

IJV goes back to 1996, and the information could therefore, some places, be inadequate.

Fourthly, the name of the alliance and the company could vary depending on the secondary data sources, which again made it challenging and time-consuming. In all, the fact that we only had access to public information made many of our variables limited and made us unable to control for endogeneity, and that could potentially increase the homogeneity. Because we potentially only found information on companies with higher social interest and more transparent future plans. Also, companies that had changed their names from the primary data might have been overlooked and therefore reduced the number of observations.

Fifth, as we have based our study on eight proxies for trust, we assume to experience omitted variable bias to some degree. Due to the cross-sectional nature of our data, it is not clear to us whether our eight proxies fully cover the term “trust”, or if there are other factors lying outside our proxies actually influencing the variables in which our hypotheses depend on.

Lastly, as mentioned, we looked at strategic alliances during the period of time from 1996 to 2015, and a lot might have changed in those twenty years. The world has become more globalized, and this may have led to a change in trust towards the partners involved in the IJV. Moreover, we believe this has affected our results and need to be taken into consideration. One possibility could be that it was more familiar or more natural to take patents in the past than in recent times, and that this might have impacted the results of this research.

## 8.2 Future Research

This thesis harbors several limitations and inspires numerous ideas for future research. We have only investigated alliances obtained from one database, SDC, and recommend future research to use strategic alliances from other databases to compare the results and see if it provides the same outcomes. We would also recommend combining a quantitative and qualitative study in future research. By including interviews there will be complementing results, and also increase the credibility of the findings, as well as control for endogenous variables. As previously mentioned, SDC lacked important information concerning, for example,

the alliance's announcement dates, ownership, and entry-costs. Due to time limits and lack of available information, several variables ended up as proxies for the original variables, which limits the reliability and validity of our research. For future research, we recommend measuring prior relationship by considering the length from announcing their collaboration until they sign the contract. An alternative could be to look at the number of pages the contract agreement contained or potentially the number of advisors working on negotiating an IJV arrangement. Both could potentially support the idea of prior relationship (Coulter & Coulter, 2002; Parkhe, 1998) and compensation of lacking trust by increasing the control (Chen, 2000; Woolthuis et al., 2005). Also, considering the number of observations, it would be recommended for future research to investigate with a higher number of alliances. This might increase the validity of the research and potentially increase the significant levels for the different variables. Lastly, it would have been interesting to look at what the optimal level of trust companies should have towards their partners are. Could it be possible to identify an optimal level of trust, find a tool to identify our partner's behavior, or do we only need to accept the uncertainties of sharing knowledge?

## 9. Conclusion

The world is more globalized and complex than ever, and for companies to survive, it is crucial to do more than adapting. It is also essential to have the ability to learn and create knowledge (Luthans et al., 1995). Ybarra and Turk (2009) showed that alliances have been an increasingly favored measure for improving a company's competitive advantage. For firms to learn and acquire new knowledge in collaboration depends on high levels of trust between partners (Buckley & Casson, 1988; Lundvall, 1988). Our paper, therefore, try to shed light on to what degree inter-partner trust influences technological learning in international joint ventures. Based upon other scholars' methods; eight proxies for trust has been designed and analyzed in an Ordinary Least Squares regression model.

Four out of eight proxies for trust had a significant relation to technological learning in international joint ventures. The results demonstrated that country familiarity had a positive influence on the partners technological learning, supporting Luo (2002) and Pothukuchi et al. (2002). Furthermore, it was established that experience influence firms learning positively, which supported both Swärd (2016) and Koput et al. (1996) findings. Also, partners that had a well-established relationship experienced a positive influence on technological learning for the international joint venture, which supported Gulati (1995a) assumption. Lastly, it appears that a high level of trust at a country level seems to decrease learning outcome, and this is in fact not evident in the existing literature. However, it might indicate that too much trust isn't desirable either. In total, it does seem that inter-partner trust both positively and negatively influences technological learning in international joint ventures.

Our study is limited to only secondary data and does not optimally identify endogenous factors. The low number of observations prevent our result from being generalizable and would, consequently, be essential to control the findings for other conditions and increase the number of observations. Following, it would be interesting for future research to identify an optimal level of trust, because, we have identified that trust potentially affect technological learning both ways. Therefore, you should ask yourself: Should you trust me? – before sharing your knowledge.

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# 11. Appendix

## Appendix 1 – Distribution of firms per country and year

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2011	2012	2013	Total	Share
<b>Country</b>																				
Australia	0	0	1	1	1	2	0	1	0	0	1	0	0	0	0	1	0	0	8	1,5 %
Austria	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0,2 %
Belgium	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0,4 %
Bermuda	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0,4 %
Canada	3	5	2	8	2	5	4	5	1	0	1	1	0	0	0	1	0	2	40	7,5 %
China	0	0	0	0	0	0	1	1	1	0	0	1	0	1	1	0	0	0	6	1,1 %
Croatia	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0,2 %
Denmark	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	4	0,8 %
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0,2 %
France	1	3	2	2	3	3	2	1	0	0	0	1	0	1	0	0	0	0	19	3,6 %
Germany	3	1	4	3	2	5	0	2	6	2	1	2	1	1	0	1	0	3	37	7,0 %
Iceland	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	3	0,6 %
India	0	1	2	0	1	1	0	0	1	0	1	0	0	1	0	0	1	0	9	1,7 %
Ireland-Rep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0,2 %
Israel	0	0	0	1	0	0	0	0	0	2	1	0	1	0	0	0	0	2	7	1,3 %
Italy	2	1	1	2	1	0	1	1	0	1	1	0	1	1	0	0	0	1	14	2,6 %
Japan	8	4	8	3	6	6	6	6	5	1	2	2	3	1	0	1	4	2	68	12,8 %
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0,2 %
Malaysia	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	5	0,9 %
Netherlands	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	0	0	5	0,9 %
Norway	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0,8 %
Philippines	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0,2 %
Russian Fed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0,4 %
Singapore	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1,1 %
South Africa	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0,2 %
South Korea	3	0	0	1	1	0	1	0	2	2	1	0	1	0	0	0	0	0	12	2,3 %
Spain	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	3	0,6 %
Sweden	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1	4	0,8 %
Switzerland	3	1	1	3	1	1	1	0	0	0	0	2	1	0	0	0	0	0	14	2,6 %
Taiwan	1	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	1	6	1,1 %
United Kingdom	4	1	2	12	4	4	0	3	1	2	1	1	0	1	1	2	0	0	39	7,3 %
United States	19	14	15	34	23	25	16	10	12	3	7	4	2	7	2	5	3	5	206	38,7 %
<b>Total</b>	<b>50</b>	<b>35</b>	<b>40</b>	<b>80</b>	<b>50</b>	<b>56</b>	<b>34</b>	<b>32</b>	<b>31</b>	<b>14</b>	<b>20</b>	<b>14</b>	<b>10</b>	<b>15</b>	<b>4</b>	<b>16</b>	<b>9</b>	<b>22</b>	<b>532</b>	

## Appendix 2 – Distribution of firms per industry

<b>Range of SIC Codes</b>	<b>Frequency Industry</b>
<i>01-09</i>	<b>0</b> <i>Agriculture, Forestry and Fishing</i>
<i>10-14</i>	<b>35</b> <i>Mining</i>
<i>15-17</i>	<b>0</b> <i>Construction</i>
<i>18-19</i>	<b>0</b> <i>Not used</i>
<i>20-39</i>	<b>349</b> <i>Manufacturing</i>
<i>40-49</i>	<b>59</b> <i>Transportation, Communications, Electric, Gas and Sanitary service</i>
<i>50-51</i>	<b>4</b> <i>Wholesale Trade</i>
<i>52-59</i>	<b>5</b> <i>Retail Trade</i>
<i>60-67</i>	<b>13</b> <i>Finance, Insurance and Real Estate</i>
<i>70-89</i>	<b>67</b> <i>Services</i>
<i>91-97</i>	<b>0</b> <i>Public Administration</i>
<i>99-99</i>	<b>1</b> <i>Nonclassifiable</i>

## Appendix 3 –Logarithm of patents

	Model 1a	Model 2a	Model 3a	Model 4a	Model 5a	Model 6a	Model 7a	Model 8a	Model 9a	Model 10a
Country Familiarity (H1)		62.11 (35.82)								38.66 (30.67)
Country Level Trust (H2)			-7.45 (26.52)							10.77 (22.62)
Experience (H3)				11.23*** (0.81)						11.27** (0.84)
Inter-partner Competition (H4)					-72.40 (80.82)					-38.64 (68.61)
Partner Power (H5)						19.13 (19.31)				20.48 (16.57)
Duration (H6)							-5.71 (5.85)			-10.55* (5.00)
Technology Transfer (H7)								80.71 (162.81)		26.98 (142.95)
Prior Relationship (H8)									0.06* (0.03)	0.00 (0.02)
Local Partner Size	44.67 (62.44)	47.36 (62.31)	45.93 (62.79)	-67.06 (52.50)	46.17 (62.47)	0.29 (78.24)	47.73 (62.52)	46.70 (62.63)	51.44 (62.16)	-108.16 (67.23)
GDP Growth	-16.03 (40.38)	-7.94 (40.56)	-15.72 (40.51)	-11.80 (33.55)	-17.61 (40.43)	-14.53 (40.65)	-18.92 (40.49)	-16.75 (40.45)	-19.41 (40.19)	-12.53 (34.24)
Log of patents	255.99*** (25.08)	254.85*** (25.03)	255.69*** (25.17)	192.85*** (21.33)	252.91*** (25.32)	255.42*** (25.40)	255.13*** (25.10)	256.77*** (25.15)	253.08*** (24.98)	187.42** (21.93)
Country dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Industry dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Year	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
FDI	14.27 (26.95)	14.89 (26.88)	14.34 (27.03)	36.16 (22.44)	16.24 (27.04)	12.13 (27.16)	14.19 (26.95)	14.33 (26.97)	14.34 (26.80)	35.86 (22.71)
Constant	-894.93 (836.08)	-1099.16 (842.37)	-575.02 (1413.41)	-496.32 (695.14)	-880.28 (836.43)	-691.54 (869.37)	-867.60 (836.59)	-949.04 (843.91)	-887.75 (831.49)	-815.39 (1217.39)
n	526	526	524	526	520	526	526	526	526	518
df_r	422.00	421.00	420.00	421.00	421.00	416.00	421.00	421.00	421.00	408.00
r2	0.51	0.52	0.51	0.66	0.51	0.51	0.51	0.51	0.52	0.67

\* p&lt;0.05, \*\* p&lt;0.01,\*\*\* p&lt;0.001

## Appendix 4 - Results of Regression Analysis included ownership

	Model 11	Model 12	Model 13	Model 11a	Model 12a	Model 13a
Country Familiarity (H1)			104.42 (97.32)			5.26 (119.70)
Country Level Trust (H2)			18.84 (78.62)			86.90 (95.33)
Experience (H3)			4.00 (2.92)			9.86** (2.89)
Inter-partner Competition (H4)			276.56 (301.45)			-207.98 (342.65)
Partner Power (H5)		14.10 (71.07)	22.04 (82.42)		87.01 (105.78)	22.27 (105.74)
<b>Percent Ownership (H5)</b>	<b>0.13 (20.66)</b>	<b>-1.36 (22.36)</b>	<b>3.98 (25.21)</b>	<b>60.59 (33.05)</b>	<b>47.23 (37.02)</b>	<b>27.81 (34.56)</b>
Duration (H6)			6.13 (15.74)			5.37 (19.91)
Technology Transfer (H7)			46.54 (498.04)			194.84 (628.26)
Prior Relationship (H8)			0.02 (0.04)			0.01 (0.05)
Local Partner Size	-211.61 (198.49)	-261.34 (322.21)	-342.85 (380.27)	-489.57 (395.24)	-760.84 (516.75)	-388.23 (498.71)
GDP Growth	189.21 (110.85)	192.18 (114.03)	175.29 (150.21)	327.73 (165.13)	339.80 (166.85)	200.77 (188.99)
Total nr. of Patents	0.11*** (0.01)	0.11*** (0.01)	0.09** (0.02)			
Log of Patets				399.92*** (101.95)	370.17** (108.80)	190.81 (104.98)
Country dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Industry dummies	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
Year	(Included)	(Included)	(Included)	(Included)	(Included)	(Included)
FDI	-108.28 (159.32)	-102.96 (164.67)	22.83 (188.57)	-312.38 (237.62)	-269.49 (244.80)	-57.44 (237.03)
Constant	-221.21 (1812.67)	69.34 (2358.34)	-1229.36 (4187.57)	-1903.93 (2753.74)	-7.91 (3605.00)	-4657.58 (5174.20)
n	84	85	85	84	85	85
df_r	25.00	24.00	17.00	25.00	24.00	17.00
r2	0.93	0.93	0.95	0.84	0.85	0.92

\* p&lt;0.05, \*\* p&lt;0.01,\*\*\* p&lt;0.001