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## Utilizing Networks for achieving sustainable startup performance: Empirical investigation based on German startup companies

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To assess the vulnerability of startups from a networked perspective this research investigates inter-organizational relationships between startups and their collaboration partner. A conceptual framework is developed based on a literature review. An online survey is designed to analyze whether asymmetric interdependence relationships have an effect on startups' innovation firm performance. Side-effects are analyzed by moderator analysis of relationship strength and broker access utilization. This shall explore to which extent startups under asymmetric interdependence relationships can benefit from strong or weak business relationships, and whether startups can utilize their collaboration partners' broker access function to improve innovation firm performance. Preliminary data analysis is conducted by a principal component analysis (PCA) to validate the survey items. Exploratory testing based on hierarchical regression analysis does not account for a significant effect of startups' perceptions of asymmetric interdependence on innovation firm performance and corresponding moderation effects. The results indicate that asymmetric interdependence has a negative effect on exploration and a positive effect on exploitation innovation firm performance, but not significant. Besides, the findings depict that collaboration relationships to powerful partners and broker access utilization have a positive direct effect on exploration and exploitation innovation firm performance and additional side-effects are detected. Managerial implications, limitations and avenues for future research are suggested.

**Keywords:** startup, interdependence asymmetry, power asymmetry, innovation firm performance, collaboration relationship, relationship strength, broker access utilization

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## 1. INTRODUCTION

Compared to established corporations and partners some startup companies are able to achieve great innovation performance in their network. According to Weiblen and Chesbrough (2015) “it will be startups, not established corporations, who come up with the next big thing to create uncontested market space and disrupt entire industries” (p. 67). Nevertheless, the majority of young firms have higher failure rates than established firms (Baum, Calabrese & Silverman, 2000). For instance, empirical results of a five year longitudinal analysis reveal that about 78% of new ventures failed (Song, Podoyrnitsyna, Bij & Halman, 2008). In 2014 about 24.000 companies suffered from bankruptcy in Germany (BmWi, 2015) and only 2.1% of German startup entrepreneurs consider their company to be an established market player (DSM, 2015). On the one hand startups seem to obtain a vital role bringing new products and ideas into market, while on the other hand it gets obvious that the majority of startups face difficulties in setting up their business and only some are able to establish a foothold in the market. In this realm this master thesis explores the role inter-organizational relationships play for sustaining a startups’ innovation firm performance. Particularly, inter-organizational relationships to powerful partners are controversially discussed in the literature. On the one hand such a relationship enables a startup to access required organizational resources, distribution channels and manufacturing and marketing expertise (Alvarez & Barney, 2001; Katila, Rosenberger & Eisenhardt, 2008); can enhance a smaller firms’ chances of survival (Kalaignanam, Shanker and Varadarajan, 2007) and can enable a startup to become an embedded network actor (Ahuja, Polidoro & Mitchell, 2009). On the other hand, by the same token new entrepreneurial firms face high risks of misappropriation by their larger, older and more established partner (Katila et al., 2008), are limited in developing new relationships (Weiblen & Chesbrough, 2015) and performance benefits are likely to arise at the expense of the small firm (Villanueva, Van de Ven & Sapienza, 2012). For instance, empirical results reveal that large partners benefit from financial gains while small firms do not achieve significant returns (Kalaignanam et al., 2007; Yang, Zheng & Zhao, 2014). Alvarez and Barney (2001) argue that small firms suffer from inter-organizational relationships while large firms benefit from access to entrepreneurial firms new technology. Basically, this questions whether relationships between startups and their large partner can be collaborative at all or whether large partners are inclined to exploit the innovative performance of small firms.

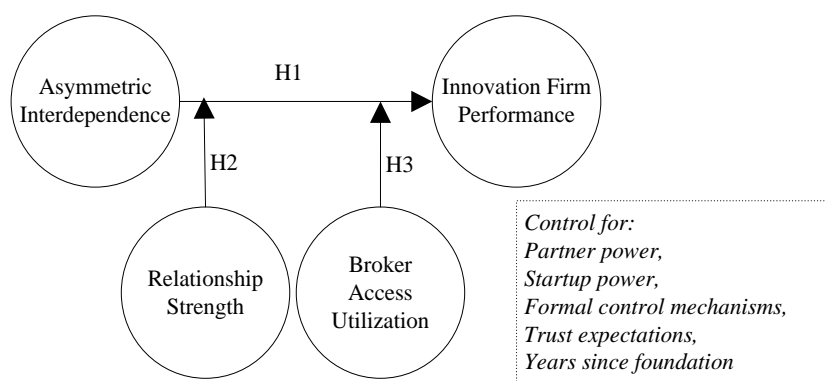
By definition, startups are new, young and emergent ventures (Song et al., 2008) with typically fewer operational resources (Katila et al., 2008) that are not dominating in its field or industry (Street & Cameron, 2007). In comparison, large corporations are typically older, more established and publicly traded with excess of operational resources and significant financial resources (Katila et al., 2008) that value and cannot imitate a startups’ inventive capability (Alvarez & Barney, 2001). Hence, large partners do have a stake in collaborating with startups and it seems to be beneficial for startup companies to connect with large organizations in order to acquire required resources. Empirical results of this thesis support that the majority of startups (87%) indicate that their most important collaboration partner is larger in terms of employees, in terms of partners’ expected revenue (82%) and in terms of partners’ expected sales (84%). Further illustration can be found in [Table5](#) in the appendix. However, besides this complementary nature these collaborative relationships are not necessarily beneficial for startup companies.

Several researchers investigate that startups face problems in collaborating with larger partners. Alvarez and Barney (2001) and Katila et al., (2008) state that small entrepreneurial firms commonly face difficulties in protecting themselves being bound to large firms. Yang et al., (2014) illustrates that small firms are often not able to govern complex and uncertain activities of large partners. Furthermore, a weaker structural position of startups could lead to asymmetry in negotiation power (Ahuja et al., 2009) enabling large partners to use superior bargaining power to suppress growth tendencies on the part of the small firm (Vandaie & Zaheer, 2014). Large firms pursue to generate private benefits not visible to their partner (Dyer, Singh & Kale ,2008) and differences in the extent to which large and entrepreneurial firms benefit through collaboration exist (Alvarez & Barney, 2001). For example, large partners introducing startup programs primarily pursue to improve their financial returns, R&D input and business development (Weiblen & Chesbrough, 2015), which might come at the expense of the startup company. In addition, even though some startup entrepreneurs have the objective to sell their business, cases in which firms are dependent on another provide strong support that large corporations fully acquire particularly promising startups (Nienhüser, 2008, Hillman, Withers & Collins, 2009; Weiblen & Chesbrough, 2015). Therefore, startups tend to be in a weaker position opposed to their collaboration partner and startups are often not able to deal with unequal relationships.

Due to the disparity between startups and large partners in a relationship it can be argued that startups are the more dependent party, which would have consequences for firm performance. Typically, smaller organizations perceive themselves to be vulnerable (Vangen & Huxham, 2003) and vulnerability exists when there is a perceived dependence on someone (Clark, Scholder & Boles, 2010). Von Raesfeld and Roos (2008) state that smaller companies are likely to be more dependent on other companies in their network and Scheer, Miao and Palmatier (2015) argue that startups’ degree of dependence is greater compared to the degree of partner dependence. If one party is more dependent compared to the other this illustrates that asymmetric inter-dependence occurs (Kumar, Scheer and Steenkamp, 1995a). While dependence is an individually subjected

attribute, interdependence is referred to the dyadic relationship between parties. Supposing that startups are the more dependent party and the collaboration partner the less dependent party this leads to an asymmetric interdependence relationship. These asymmetric relationships can easily become dysfunctional having a negative impact on firm performance (Kumar et al., 1995a; Kemp & Ghauri, 2001), because interdependence asymmetry is equal to power asymmetry (Kumar et al., 1995a) implying that partners are more powerful in the dyadic relationship. In addition, this might explain the weaker position of startups in collaboration relationships. In order to investigate this, this research concentrates on startups' perception of asymmetric interdependence in the relationship to their collaboration partner. To be more precise, in line with Kumar et al., (1995a) and Scheer et al., (2015) startups perceptions of asymmetric interdependence shall consider to which extent startups perceive their own dependence to be greater compared to their partners' dependence. To investigate whether startups' inter-organizational relationships to collaboration partners can have a negative impact on startups' innovation firm performance, this master thesis shall answer the following research question: **What is the effect of perceived asymmetric interdependence on startups' innovation firm performance?**

The relationship between perceived asymmetric interdependence and startup's innovation performance is depicted in Figure 1 which represents the conceptual framework that is analyzed. In terms of asymmetric interdependence startups perceptions of asymmetric interdependence towards their collaboration partner are analyzed, which shall determine to what extent startups perceive asymmetric interdependence in the relationship to their collaboration partner (Kumar 1995a). Prior empirical research investigates the effect of perceptions of interdependence asymmetry on firm performance (Kemp & Ghauri, 2001). Contributions to academia and practice shall be offered by investigating the moderating impact of relationship strength and brokered access utilization on the relationship between perceived asymmetric interdependence and innovation firm performance.



**Figure 1 Conceptual moderation model**

Basically, whether asymmetric interdependence leads to changes in innovation firm performance illustrates the need for actively managing interdependence relationships when looking at startups' network environment. If asymmetric interdependence results in weaker innovation firm performance this reveals a possible reason why startups fail in early business development and more explicitly investigates why startups face difficulties in protecting themselves in business relationships. In this realm, interdependence illustrates a possible reason why startups are restricted by external business relationships. The results of this paper offer valuable insights into the relationship between startups and their collaboration partner. In addition, the analysis of a single relationship can reveal overall patterns for managing startups relationships in the network. Findings can sharpen entrepreneurs' awareness of the potential downsides of networking with collaboration partners and reveal how startups can be prepared to better cope with asymmetric relationships. Testing moderator effects on the relationship between perceived asymmetric interdependence and innovation firm performance can reveal under which conditions the impact of asymmetric interdependence on innovation firm performance varies. Exploratory findings shall exemplify under which contextual factors startups are likely to cope with asymmetric interdependence and achieve the greatest degree of innovation firm performance.

Firstly, this research explores the effect of perceived interdependence asymmetry on innovation firm performance under different degrees of relationship strength. Relationship strength is determined by the length of the relationship, frequency of interaction and intensity concerning the relationship to startups' most important collaboration partner, supported by several researchers (Capaldo, 2007; Slotte-Kock & Coviello, 2010; Lowik, Rossum, Kraaijenbrink & Groen, 2012; Newbert, Tornikoski & Ougley, 2013). Empirical findings of Lowik et

al., (2012) reveal that small firms maintain about 41 percent of strong tie relationships of which are 50 percent to suppliers, 40 percent to customers and 10 percent to knowledge institutes. Who startups determine as their most important collaboration partner remains unclear. The outcome of this research shall explicitly determine who startups consider to be their most important collaboration partner and indicate the degree of interdependence for this specific relationship as well as the impact on innovation firm performance. An extensive literature review did not find prior research investigating the moderating impact of relationship strength on the relationship between perceived asymmetric interdependence and innovation performance. However, arguments for the relevance of relationship strength as a contextual factor can be provided. Empirical findings prove that whether relationships are service- or product-based has a moderation effect on interdependence relationships and own firm performance (Scheer et al., 2015) and on the effect of relationship quality and other performance outcomes (Palmatier et al., 2006). The major distinguishing feature between those types of relationships is the degree of ongoing interaction between firms (Palmatier et al., 2006; Scheer et al., 2015). For the reason that relationship strength takes comparable relational characteristics into account there is strong support for a moderating impact on the relationship between perceived asymmetric interdependence and innovation firm performance. This not only provides practical, but also academic relevance, because it adds an additional contextual factor to interdependence relationships. Therefore, enables to draw conclusions on which degree of relationship strength is preferable for startups in collaboration relationships with large partners.

Secondly, whether startups intentionally utilize broker access provided by their collaboration partner to develop and get access to alternative partners and whether this helps startups to cope with potential negative effects of asymmetric interdependence shall be explored. Li, Poppo and Zhou, (2010) and Lowik et al., (2012) refer to brokered access which is the degree to which a focal partner enables access to a broader network. For the realm of this research broker access can be defined as the degree to which startups intentionally utilizes their collaboration partner to get access to a broader local network of partners. It is assumed that if startups are capable of utilizing their collaboration partner as a broker this supports maintaining innovation firm performance under perceived asymmetric interdependence. It is expected that utilization of a partners' broker access function moderates the relationship between startups' perceived interdependence and innovation firm performance. For instance, collaboration partners might enable startups to develop alternative partners and startups who intentionally utilize this function can develop and get access to alternative partners and knowledge which could change the negative impact of perceived interdependence asymmetry on innovation firm performance. On the one hand this would add to the academic field in terms of revealing an additional contextual factor in interdependence relationships. On the other hand contributions to practice are offered, because startups might need to actively focus on utilizing broker access and intentionally seek to utilize their collaboration partner to increase their exposure to alternative partners, resources, and knowledge. Whether this focus enables startups to cope with interdependency provides recommendations for entrepreneurs and startup managers in terms of business development. Intentionally seeking to increase their exposure to additional partners via their most important collaboration partner, startups might outweigh the negative impact of perceived interdependence on innovation firm performance.

In sum, the outcome of this research shall explore whether startups innovation performance is threatened by interdependence relationships being tied to a large partner. Furthermore, revealing under which contextual conditions startups can maintain their innovation firm performance even under asymmetric interdependency to network partners shall be explored in the moderator analysis. Implications for management can be provided by drawing overall effects of contextual factors that shall guide startups' to better focus their relationship management and network development practices.

## **2. THEORETICAL FRAMEWORK**

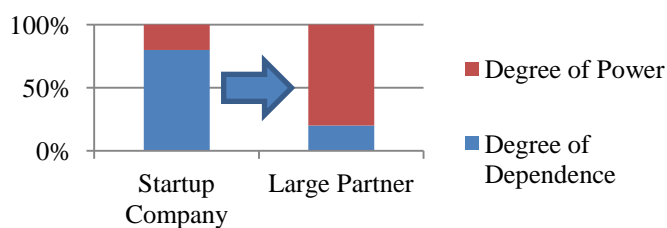
### **2.1. Impact of asymmetric interdependence on startups' innovation firm performance**

Hakansson and Ford (2002) illustrate that network relationships concern three kind of paradoxes which means that while accessing a network companies face limitations and opportunities at the same time, because they do not operate in isolation; are able to influence others, but at the same time are opposed to being influenced by others; and might control others while being controlled by others. To the same extent inter-organizational relationships between startups and their collaboration partner can offer opportunities and limitations at the same time. However, the reviewed literature and fundamental theories illustrate that unequal relationship between startups and large firms generally imply that startups' are rather concerned with the limitations of network relationships.

Resource dependency theory (RDT) can explain the weaker position of start-ups being opposed to unequal network relationships. According to Hillman et al., (2009) each inter-organizational relationship causes resource dependence situations. Based on the seminal work of Salancik and Pfeffer (1978) organizations must transact

with elements of their environment in order to obtain resources necessary for survival. Referring to collaboration relationships between startups and their collaboration partners the larger firm has significant financial and operational resources which new firms often need to access (Katila et al., 2008). This explains a dilemma for startup firms, because resources needed by new organizations are often controlled by large, powerful parties (Villanueva et al., 2012). Small firms need to get access to those resources of large firms, while being bound to a big player in the industry limits the startups freedom to collaborate or exit to competitors of that large corporation (Weiblen & Chesbrough, 2015). Based on resource dependency theory, this research argues that startups are inclined to engage with large established corporations, but corporations control valuable resources leading to dependence on the part of the startup company.

Nienhüser (2008) adapted a comprehensive view of RDT illustrating, that organizations controlling resources can distribute and control power outside their organization. For instance, each collaboration partner provides resources that the other partner does not have which leads to asymmetries in the relationship and influences firm performance (Kemp & Ghauri, 2001). It can be argued that large corporations control more resources which illustrates that large firms can use their power, because startups need to access those resources. In line, Salancik and Pfeffer (1978) argue that power is achieved by managing environmental contingencies. Referring to Nienhüser (2008) the fewer the number of resources controlled by one organization, the higher will be the concentration of power in the environment, and the complexity of connections which leads to conflicts and interdependencies. Hence, startups tending to be resource-poor are confronted with interdependency to large organizations that control relevant resources. This illustrates a need for startups managing environmental contingencies. Especially, unequal distribution of dependence illustrates a problem for startups which is explained by interdependence asymmetry. Basically, interdependence asymmetry reveals a difference between actors' dependence in a dyadic exchange relationship (Gulati & Sytch, 2007), which leads to greater power for the less dependent actor (Astley & Sachdeva, 1984; Kumar et al., 1995a). Based on the theory of Kumar et al., (1995a) Figure2 illustrates how a startups' asymmetric interdependence leads to asymmetric power distribution and benefits the large partner:



**Figure2 Interdependence/Power asymmetry**

Assuming that unequal resource dependence relationships exist, the startup company is likely to be more dependent compared to the large partner resulting in interdependence asymmetry. In relation to this, the large partner would obtain greater power which would result in power asymmetry. Power asymmetry arises through differences in resource-dependence, competencies, financial strength or size of equity holdings between partners (Wang & Hsu, 2014) and illustrates the degree to which one firm holds substantially more or substantially less power than another in a dyadic relationship (Wang, 2011). Furthermore, performance benefits for the power-advantaged actors will come at the expense of the power disadvantaged actor (Villanueva et al., 2012) if the powerful actor uses their power to their advantage (Nienhüser, 2008). Empirical findings reveal that asymmetric partnerships between small and large firms are common, but the smaller firm is often not able to improve their performance, because partners are more experienced (Kalaigianam et al., 2007). In addition, a meta-analytic review by Palmatier et al., (2006) reveals that dependence has a large direct effect on performance. Wang and Hsu (2014) argue that power asymmetry can impede exploratory and exploitative innovation firm performance.<sup>1</sup> Explorative innovation can be defined as a startups focus of introducing new products and opening up new markets, in comparison exploitative innovation pertains to startups focusing on improving existing products and market propositions, in order to meet the needs of existing customers (Fang, Fang, Chou, Yang & Tsai, 2011). It is argued that startups being the power disadvantaged actor face performance threats under unequal inter-organizational relationships to large partners. It is proposed that the greater the asymmetrical interdependence of startups the weaker will be their innovation firm performance. Supporting evidence can be provided by transaction-cost theory. In line with resource-dependency theory, transaction-cost theory determines that due to

<sup>1</sup> This paper distinguishes a startups' explorative and exploitative innovation firm performance in general and accounted for the individual relationship to startups' most important collaboration partner. The following categories are used: explorative relation-specific innovation performance; exploitative relationship-specific innovation performance; overall explorative innovation performance; overall exploitative innovation performance.

uncertainty and dependence on critical resources controlled by one partner, conflicts arise that need to be managed (Nienhüser, 2008). For example, due to knowledge exchanges between partners small firms face appropriation concerns and the possibility of opportunistic behavior by the large company (Sawers, Pretorius & Oerlemans, 2008). Basically, large actors are inclined to exert their bargaining power in order to intervene in the managerial decision process of the small firm, which prevents the startup realizing new projects and business opportunities (Vandaie & Zaheer, 2014). In sum, small firms have innovative ideas and products, but they miss the resources and expertise to fully capitalize on them, which is the reason why they constantly utilize alliances or partnerships putting themselves into a dependent position with weaker performance outcomes (Miles, Preece & Baetz, 1999). Asymmetrical relationships between weak and strong partners with unequal distribution of power have a negative impact on learning in partnerships (Wang, 2011) and unintended knowledge flows from the small to the large firm determine a low level of success in innovative partnerships between small and large firms (Sawers et al., 2008). Empirical findings of Miles et al., (1999) reveal that those firms, who felt that they most needed alliance relationships, or were dependent on their partner, are in fact the least successful firms. Hence, through interdependence asymmetry the collaborating relationship between startups and collaboration partners becomes dysfunctional and innovative performance of the startup will be threatened. It can be assumed that, the greater interdependence asymmetry within the inter-organizational relationship to collaboration partners, the weaker will be startups' innovation firm performance. Formally stated:

**Hypothesis 1** Asymmetric interdependence has a negative impact on startups' innovation firm performance.

## **2.2. Moderating impact of relationship strength**

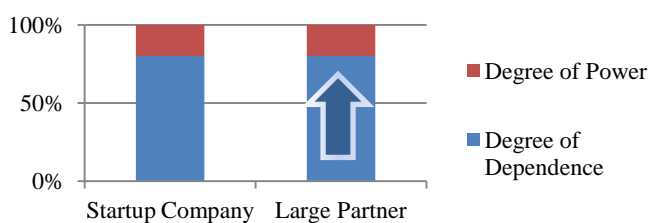
Social network approaches emphasize tie existence or tie strength and recognize that ties can be both of social and economic nature (Slotte-Kock & Coviello, 2010). Business network research regards the network as being comprised of different types of relationships and recognizes that they may be positive or negative allowing both cooperation and competition (Slotte-Kock & Coviello, 2010). Capaldo (2007) distinguishes inter-personal from inter-organizational relationships having different degrees of relationship strength. This research considers a business network perspective and focuses on the strength of inter-organizational (economic) ties between startup companies and their collaboration partner. Relationship strength is determined by intensity, length and depth, which can have positive and negative implications, depending on how firms establish, build, maintain or change relationships (Slotte-Kock & Coviello, 2010). In line with other researches it is argued that the higher the relationship length, intensity, and depth, the higher the strength of the relationship (Capaldo, 2007; Lowik et al., 2012; Newbert et al., 2013). Strong ties are beneficial for several reasons. Capaldo (2007) reveals that strong ties enable mutual knowledge sharing which has positive implications for innovation firm performance. According to Fang et al., (2011) strong relationships are beneficial because through joint activities organizations can effectively acquire knowledge from partners to develop new insights for innovation. Wang and Hsu (2014) argue that developing strong learning relationships both partners can engage in ongoing innovation through interaction with each other. Hence, a stronger inter-organizational relationship provides an atmosphere which cultivates a startups' innovation firm performance. Therefore this research argues that the stronger a relationship between startups and their collaboration partner the weaker will be the negative impact of asymmetric interdependence on innovation firm performance. For this reason the impact of relationship strength shall be further explored by considering startups' perceptions of relationship strength towards their most important collaboration partner.

Taking a network perspective a small firm can significantly benefit by investing the exploration of strong ties instead of increasing their weak tie network (Lowik et al., 2012). For instance, Ahuja (2000) indicates that dense ties in networks limit opportunistic behavior of partners that do not want to lose their reputation while open networks might stimulate the possibility of opportunistic actions. Hence, if relationship strength between startups and large corporations becomes stronger in terms of intensity, length and depth the possible negative effect of perceived asymmetric interdependence on firm performance is likely to become weaker. There are several reasons why relationship strength is developmental for reducing the possible negative impact of asymmetric interdependence on innovation firm performance. Empirical findings of Watson (2007) reveal that intensive networks with more strong ties are more important in terms of firm survival which is especially important for young firms. For example, young firms might seek advice from professionals on a regular basis which is critical for firm survival in early years of a new venture (Watson, 2007). In line, Weiblen and Chesbrough (2015) refer to project-based approaches that help small firms to limit the risk of dependency and do not influence the future course of a startup. Furthermore, strong ties can offer steady flows of new ideas, technological innovations and operational support (Capaldo, 2007). Hence, this paper assumes that the stronger the degree of relationship strength the weaker will be the negative impact of perceived asymmetric interdependence on innovation firm performance.

Transaction cost theory provides supporting arguments. It has been stated that due to shared resources partner dependence increases and the tendency to behave opportunistically decreases (Nienhüser, 2008). In line, Capaldo (2007) argues that strong inter-organizational relationships entail greater resource commitments, while weak relationships are characterized by low levels of interaction. Under strong relationships managers are willing to



pool their assets, knowledge and know-how which would not be exploited opportunistically (Capaldo, 2007). Thus, the longer, the more intensive and the more in depth relationships are, the greater the inclination of large partners to make resource commitments and the less they are inclined to engage in opportunistic behavior. Due to shared resources strong relationships are likely to entail greater mutual interdependence which provides an atmosphere that supports innovation performance. Palmatier et al., (2006) argues that startups could pursue generating strong relationships that would be most effective for strengthening specific aspects of a relationship. For instance, a realistic goal for a weaker firm is to increase their partners' dependence, which would have a positive impact on relationship quality (Kumar et al., 1995a). Through strong relationships to collaboration partners a startup might actually be able to cope with the negative effect of asymmetric interdependence on innovation firm performance. For instance, while achieving symmetric relationships is elusive and rarely achieved, increasing partners' dependence is a more realistic objective (Kumar et al., 1995a). The interdependence- and power situation that is targeted under these terms would pursue reducing asymmetry which can be achieved by increasing large partners' dependence. In line, Nienhüser (2008) states that startups can increase the importance of their controlled resources for their large partner and thus make their partner more dependent, which would have the effect of reducing negative effects of asymmetric interdependence. In relation to Kumar's et al., (1995) theory [Figure3](#) more clearly illustrates the power/interdependence distribution.



**Figure3 Interdependence/ Power symmetry**

Accordingly it can be assumed that the stronger a relationship in terms of intensity, length and depth, the more the relationship changes towards mutual dependence of partners and symmetric interdependence and hence the lower the bargaining power of the large partner. Obviously, stronger dyadic relationships and projects to network partners can help small organizations in coping with interdependence issues, to maintain innovation firm performance. Thus, strong relationships are likely to have a positive effect on the negative relationship between asymmetric interdependence and innovation firm performance. For this reason, it can be assumed that the negative impact of perceived interdependence asymmetry becomes weaker the stronger the network relationship. *Ceteris paribus* the stronger the network relationship the weaker will be the negative impact of interdependence asymmetry on innovation firm performance. Formally stated:

**Hypothesis 2** The relationship between asymmetric interdependence and innovation firm performance is moderated by relationship strength: the greater the degree of relationship strength, the weaker the negative effect of asymmetric interdependence on innovation firm performance. (Moderation)

### 2.3. Moderating impact of utilizing brokered access

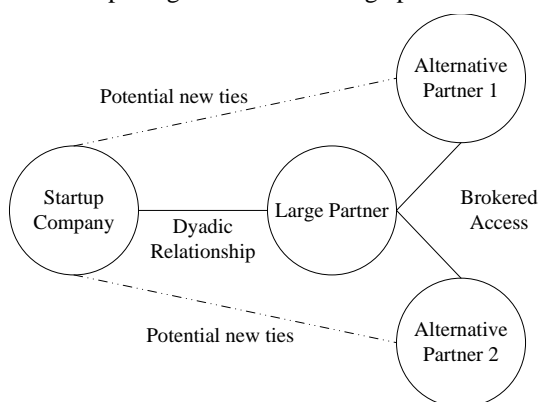
Network theory provides contradicting findings to the relationship strength argument stating that, the more densely firms are interconnected the more the inflow of diverse and fresh insights will be limited (Ahuja, 2000). On the one hand strong relationships seem to be beneficial, but on the other hand solely concentrating on strong ties can limit the inflow of varied information and knowledge. In this realm, Lowik et al., (2012) argues that firms can become overembedded because, after a certain extent tie strength leads to diminishing knowledge acquisition benefits and partners are becoming too similar (Lowik et al., 2012). For instance, if companies concentrate on a narrow set of strong ties, the inflow of new information, knowledge and resources would be limited. Nevertheless, Von Raesfeld, and Roos argue that a firm who aims to be efficient and flexible in its network, needs to have both strong ties and at the same time have a broad view of its network. Hence, in addition to strong relationships, a company would need to have a broad view of their network to acquire diverse information, knowledge and resources for innovation. To capitalize on these benefits startups need to constantly balance their exposure to new actors while maintaining a strong relationship. This thesis proposes that in order to achieve this balance startups need to constantly utilize their collaboration partners' broker access function for increasing their exposure to alternative partners.

Ahuja (2000) illustrates that partners with many other partners provide indirect ties that can enhance a focal firm's informational reach within the network. Shan, Walker and Kogut (1994) argue that strongly embedded firms in a network benefit from receiving more resources and information enabling them to increase their number of relationships. In addition, Lowik et al., (2012) notes that besides strong ties weak ties are equally important for innovation. For example, a larger number of weak ties can eliminate the hazards of being locked-in

or being restricted by strong relationships and can facilitate innovation (Capaldo, 2007). Jack (2005) argues that strong ties provide a mechanism to activate and invoke weak ties. Lowik (2012) argues that firms can develop capabilities that enable them to reduce the negative effects of strong ties' overembeddedness. For instance, through strong tie relationships firms can develop the capability of "intentionally establishing relationships with organizations to get access to their large networks" (Lowik et al., 2012). This capability concerns the use of strong ties to get access to networks of their partners by using the partner firm as a gateway to new contacts and to tap new knowledge sources for innovation (Lowik et al., 2012). In line, Mitrega, Forkmann, Ramos & Henneberg, (2012) argue that systematically searching for new relational partners or replacing existing relationships with new ones can enrich startups' overall relationship portfolio and contributes to innovation performance. Thus, focusing on strong ties seems to be beneficial for the activation of weak ties and could improve innovation firm performance. Hence, if startups intentionally establish multiple relations through their relationship to a large partner this would have a positive impact on the original relationship between perceived interdependence asymmetry and innovation firm performance for two reasons: firstly the development of alternative partners makes the startup less dependent on their existing partner and secondly the development of new partners enables a startup to acquire new knowledge for innovation.

This thesis builds up on this capability perspective by analyzing whether startups constantly intend and pursue to utilize their collaboration partner for developing new relationships. The strategic pursuit to get in contact with others via their collaboration partner is assumed to offer an enabling function for startups to get access to additional partners and to become an embedded actor of the large partners' network by developing alternative partners. It is argued that startups intentionally seeking to expand relationships via their collaboration partner are likely to offset negative effects of perceived asymmetric interdependence on innovation firm performance. Hence, startups intentionally utilizing their partner to increase their exposure to alternative partners are better at coping with the negative effect of perceived asymmetric interdependence on innovation firm performance.

Basically, business relationships enable organizations to gain valuable contacts in the business network of their partner (Ashnai et al., 2015). Startups have the option to increase their exposure to new ties by developing ties via their existing strong ties (Tiwana, 2008). For example, Yli-Renko, Autio & Sapienza, (2001) analyzes the degree to which key customer relationships provide young technology-based firms with a network of additional customer contacts. Transferring this principle to the relationship with key partners, startups are exposed to alternative partners as well. However, they need to intentionally utilize their partners as a broker for alternative partners in order to benefit from such a function. Basically, this would change the role of the key partner from a direct knowledge source to a broker function for knowledge (Lowik et al., 2012). Hence, in order to benefit from broker access a startup has to be able to utilize the broker access function provided by their partner. In this view, startups might have the ability of utilizing their large partner as an intermediary which facilitates knowledge transfer (Li et al., 2010). Thereby, startups could indeed remain innovative while at the same time decrease the negative effects of asymmetric interdependence if they are able to utilize the broker function provided by their large collaboration partner. In line, Hallen, Katila and Rosenberger, (2014) argue that through developing alternative partners startups perceive less dependence to their large partner which would indirectly enable them to maintain their innovation performance. Hence, it is assumed that the more startups intentionally develop alternative partners through their large partner, the weaker will be the negative impact of perceived interdependence on innovation firm performance. Figure 4 more precisely illustrates a network perspective of how startups might utilize their large partner as an intermediary to access alternative partners.



**Figure 4 Utilizing large partners intermediary function**

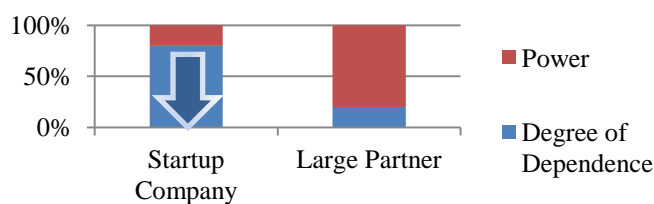
Basically, the large partner would be able to exploit their structural position as opposed to the startup company. The reason is that the broker (large partner) spanning structural holes between the startup company and alternative partners has the ability to transfer resources and ideas generated in the dyadic relationship with the startup company to other industries or partners (Hargadon & Sutton, 1997). Under such situations the startup

company would be highly dependent on their large partner. It has been argued that under dependency startups generally face difficulties in developing new relationships to new partners or exit to competitors (Weiblen & Chesbrough, 2010). A possible reason is that under dependence to large partners startups are concerned with lock-in effects, which prevent them from forming new tie relationships and they face challenges in the ability to develop and utilize business relationships (McGrath & O’Toole, 2013). Basically, lock-in effects prevent startups from realizing new projects (Vandaie & Zaheer, 2014). Zaheer, Gulati & Nohria (2000) reveal that lock-in and lock-out effects occur when ties formed with one actor place constraints on ties with other actors. If firms are locked-in to a narrow circle of ties, innovation input is dependent on a small number of external sources for creativity, which jeopardizes the firm’s ability to generate or respond to changes (Capaldo, 2007). For this reason it is relatively difficult for startups to develop alternative partners, but if they are able to utilize brokered access of their partners and overcome lock-in effects the negative effect of asymmetric interdependence on innovation performance could be reduced.

In line with transaction based theory the utilization of broker access for developing alternative partners offers substantial benefits. On the one hand the startup would be able to identify partners whose interests are more genuinely interdependent compared to their large partner (Hallen et al., 2014). On the other hand a startup would be able to improve their attractiveness towards other existing and potential partners, which creates fertile ground for further network development (Capaldo, 2007). In addition, access to third parties can act as social defenses representing a threat of disciplining opportunistic behavior of powerful partners, which enables the young and otherwise low powerful firm to utilize the power of third parties (Hallen et al., 2014). Furthermore, increases in network size eliminate the hazards of small-numbers bargaining power, because “a larger number of partners reduced indeed the vulnerability of the firm to its external sources of innovation failing, drying up, or exiting the network, thereby enhancing the company’s bargaining power in each dyad” (Capaldo, 2007, p. 604). Hence, startups utilizing broker access provided by their partner are potentially better off coping with power imbalances, opportunistic behavior and asymmetric interdependence.

Resource dependence theory finds supporting arguments, because startups can create alternative resources enabling firms to manage their interdependence (Nienhüser, 2008). Firms might utilize brokered access for developing and utilizing inter-organizational relationships to gain access to various resources held by other actors (Bae & Insead, 2004; Walter, Auer & Ritter, 2006; McGrath & O’Toole, 2013). For instance, the more startups seek to access additional resources in the large partners’ network enables them to develop alternative options. Thereby, startups are able to decrease the negative impact of perceived asymmetric interdependence on innovation firm performance, because they are less reliant on their existing large partner as they have access to new alternative partners.

Summarizing, utilizing brokered access enables startups to cope within asymmetric interdependence situations and thus maintain innovation firm performance. In line with the theory of Kumar et al., (1995a) a startup in these terms could reduce their own dependence by increasing alternatives available or by decreasing the value of its relationship with the large partner. Figure5 further illustrates the interdependence/power situation that can be achieved through intentionally utilizing brokered access of large partners.



**Figure5 Interdependence/ Power distribution**

It is argued that the more startups are capable to utilize brokered access provided by their large partner the original negative relationship between asymmetric interdependence and innovation performance becomes weaker. Focusing on existing network relationships for developing new ties can be seen as relevant means coping with asymmetric interdependence situations. Furthermore, by tapping into the developed competencies of additional new firms, startups can enhance their own knowledgebase and thereby improve their innovation performance (Ahuja, 2000). Hence, spreading ties to new actors by accessing ties in the network of large partners can possibly help a startup to mitigate the negative impact of perceived interdependence on innovation firm performance. Formally stated:

**Hypothesis 3:** The relationship between asymmetric interdependence and innovation firm performance is moderated by the utilization of broker access: the greater the degree of broker access utilization, the weaker the negative effect of asymmetric interdependence on innovation firm performance. (Moderation)

### 3. METHOD

#### 3.1. Research approach & data collection method

The conceptual framework is the outcome of a literature review. Causal relationships are developed reviewing fundamental theories such as resource-dependence theory, network theory and transaction cost theory. Contributing to the current marketing and entrepreneurship literature this thesis refers to additional constructs identified in industrial marketing and purchasing (IMP) literature as those provide insights on business interactions for different types of relationships in business-to-business contexts. An integrative approach of the reviewed theories leads to the current research framework which connects established constructs of prior qualitative and quantitative research with new constructs. According to Edmondson and Mc Manus (2007) such a framework supports exploratory testing of the identified relationships.

To gather empirical data an online survey is constructed using survey scales of prior research. Initially, a questionnaire is developed in English and translated into German, then back-translated into English by a third person to confirm that it was an equivalent translation. In order to collect data the Lime-Survey online tool via the access of the University of Twente is used. This online application enables to distribute the survey via E-mail to respondents. After 3 weeks a reminder for participation is distributed. To increase the response rate the reminder includes a coupon that in terms of participation each respondent gets the chance to win a free service of a sponsor company (worth 150€). Various online registers listing startup companies are used and searched-through to retrieve corporate websites of startups and corresponding e-mail addresses. In total, 6000 startup email addresses are collected, than uploaded to the Lime-Survey tool with individual tokens to prevent double entries and invitations for voluntary participation are distributed in automated e-mails via the program. The online registers used to retrieve startup e-mail addresses are listed in appendix [Table7](#).

#### 3.2. Research sample

The unit of analysis is based on business relationships between startup companies (focal company) and their collaboration partner (partner company). The units of observation are German startup companies' entrepreneurs, manager- and employee and the analysis considers their perceptions and expectations concerning the relationship to their most important collaboration partner. Primarily, this research explores the relationship to draw conclusions based on the startup company. The invitation e-mail clearly asks for startup companies' participation in the survey and companies existing longer than 8 years are excluded. After controlling for missing data the sample includes 45 responses leading to a response rate of 0,75%. On average 4 years since founding for the responding startup companies have passed ([Table2](#)). The sample consists of 29 (64%) founders and 12 (27%) employees at least in a leading managerial position, for instance executive assistance, and 4 (9%) answers are missing. Initially, respondents identified their most important collaboration partner and related all survey questions to this identified relationship for the remainder of the survey.<sup>2</sup> Most startup companies 20 (44%) consider a customer company to be their most important collaboration partner followed by suppliers 6 (13%) and distributors 4 (9%) and other startups 4 (9%). Among others, 5 (11%) startups indicate that their most important collaboration partner is a non-profit-organization, reseller or financial institute. In addition, the sampled companies are operating within the following major industry sectors: information (25%), communication technology (17%), service and retail trade (13%) and electronics (13%). For further illustration have a look at appendix [Table6](#).

#### 3.3. Measures

Basically, this research analyzes characteristics of the relationship between startups and their collaboration partner. However, the questionnaire survey does not test for both partners perceptions of the relationship. Instead empirical analysis is conducted on the perceptions and expectations of how startups perceive the relationship to their most important collaboration partner. For the reason that the outcome is oriented towards the role of startups being bound to collaboration partners this shall provide sufficient insights as opposed to research analyzing the perceptions for both interlinked organizations at a dyadic level (Zaheer, Gözübüyük & Milanovl, 2010). Hence, analyzing startups perceptions of the relationship shall determine overall patterns of the relationship and startups' firm performance. [Table1](#) illustrates the concepts, operational definitions and a description of the operational measures supported by the literature. The initial survey comprises a broad range of survey questions related to each construct attached in paragraph 11. SURVEY. The analytical procedure of section 3.4 indicates to narrow down the survey items by excluding questions identified in [Table8](#); while including the independent survey items identified in [Table9](#) and including the depend survey items identified in [Table10](#). A summary of all survey items used and analyzed, their identified constructs and operational measures are illustrated in [Table11](#).

The dominant independent variable of this research is perceived asymmetric interdependence. The current research design does not enable to investigate both parties' dependence perceptions of the dyad; instead the

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<sup>2</sup> Supported by similar approach of Mitrega et al., (2012) and Ashnai et al., (2015)

primary focus lies on startups. Hence, the perceived interdependence to a specific partner is investigated. Perceived relationship strength is treated as a moderator variable and investigates the moderating impact on the original relationship between perceived asymmetric interdependence and innovation firm performance. In addition, this research proposes the construct of utilizing brokered access as a moderator on the original relationship. For the reason that interdependence is strongly associated with power positions, this research further explores the role of power perceptions as a control variable. In addition, prior research constantly investigates that trust within relationships can have differential effects as well (Kumar, Scheer & Steenkamp, 1995b; Ahuja, 2000; Blomqvist and Seppänen, 2003; Vangen & Huxham, 2003; Capaldo, 2007; Ahuja et al., 2008, Hagedoorn, Roijakkers & Kranenburg, 2008). For this reason this paper controls for startups' trust expectations in partners and the presence of formal control mechanisms within the relationship. Further, years since foundation is entered as a control variable.

**Table1 Operationalization of concepts**

Concept	Definition	Operational Measures *	Literature
<b><u>Dependent Variables:</u></b>			
Overall Innovation Firm Performance	Startups' degree of overall explorative and exploitative innovation firm performance.	3 explorative items & 3 exploitative items (on 7-point Likert scale 1-strongly disagree to 7- strongly agree)	Fang et al., 2011
Relation-Specific Innovation Firm Performance	The degree of explorative and exploitative innovation firm performance, startups obtain trough the relationship with their collaboration partner.	4 explorative items & 4 exploitative items (on 7-point Likert scale 1-strongly disagree to 7-strongly agree)	Fang et al., 2011
<b><u>Independent Variable:</u></b>			
Asymmetric Interdependence	Startups' perceived degree of interdependence in a specific collaboration relationship.	8 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Gulati & Sytch, 2007 (ad.)
<b><u>Moderator Variables:</u></b>			
Relationship Strength	The strength of the business relationship between startups and their collaboration partner.	# Relationship time: Number of years of the relationship #Frequency of interaction: number of times business-related interaction in a month -Relationship Intensity: (1)Business Acquaintance (4) Busienss Friend (7) Personal Friend	Capaldo, 2007; Slotte- Kock & Coviello, 2010; Lowik et al., 2012; Newbert et al., 2013
Broker Access Utilization	Practices startups intentionally deploy to establish multiple relations within a single relationship to develop and get access to alternative partners.	4 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Yli-Renko et al., 2001; Ritter, Wilkinson & Johnston 2002; Lowik et al., 2012, Li et al., 2010
<b><u>Control Variables:</u></b>			
Startup Power	Startups' perception of own power compared to their collaboration partner.	3 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Tang & Tang, 2012; Tang et al., 2014
Partner Power	Startups perception of power exerted by collaboration partner.	3 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Tang & Tang, 2012; Tang et al., 2014
Trust Expectations	The degree to which startups expect their collaboration partner to act in a benevolent and trustworthy way concerning the relationship.	9 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Gulati & Sytch, 2007; Li et al., 2010
Presence of Formal Control Mechanisms	The degree to which formal control mechanisms are present in the relationship between startups and their collaboration partner.	3 items (on 7-point Likert scale 1- strongly disagree to 7-strongly agree)	Li et al., 2010; Yang et al., 2011; Cao & Lumineau, 2015
Years since Founding	The number of years that have passed since founding of the startup company.	#Number of Years	Song et al., 2008; Wang, 2011, Li et al., 2010

\* For further insights please have a look at section 11. SURVEY

### 3.4. Analytical procedure

#### 3.4.1. Preliminary analysis: Data screening

Preliminary analysis is conducted to ensure that survey questions relate to the suggested constructs. Field (2013) suggests to exclude questions that correlate too highly with others ( $r > 0,9$ ) and exclude questions that do not have sufficient correlations with others ( $r < 0,3$ ). To identify which questions are conflicting a bivariate correlation table for all survey items was constructed.

After analyzing the 33 independent survey items several questions reveal weak correlations within their question group ( $r < 0,3$ ). The determinant of an r-matrix together with the outcome of the anti-image correlation matrix indicate weak sampling adequacy, which might be caused by the relatively high number of items applied for a small sample size. For these reasons 16 questions of the independent survey items need to be excluded for further analysis, leading to a total of 17 independent items used in a principal component analysis. The questions of relationship strength do not indicate any significant correlation with their corresponding construct. Instead the item relationship intensity indicates correlations with other question groups, which is the reason why relationship intensity will be included for further analysis. The continuous variables frequency of interaction and relationship time do not correlate with each other which is the reason why they will be analyzed separately for relationship testing. Even though research suggest a multi-dimensional construct for the relationship strength construct (Capaldo 2007; Slotte- Kock & Coviello, 2010; Lowik et al., 2012; Newbert et al., 2013) for the current data the items do not correlate with each other which is the reason, why they are analyzed separately.

In addition, an r-matrix has been conducted for the 14 dependent survey items to investigate whether those relate to their corresponding constructs. Analyzing the r-matrix, the majority of items' correlation coefficients reveals moderate correlations ( $r > 0,3$ ) within their own question group. In addition, there are no questions that reveal conflicting correlations ( $r > 0,9$ ). Nevertheless, some question items reveal weak correlations ( $r < 0,3$ ) within their question group and together with the outcome of an anti-image correlation matrix the preliminary analysis of the dependent survey items indicates that 9 items need to be excluded for further analysis to improve the sampling adequacy. This leads to 5 dependent survey items remaining in the factor analysis.

An overview of which survey questions are excluded from the analysis is provided in [Table 8](#). The remaining survey items are further analyzed in two factor analyses: one for the independent and one for the dependent survey items.

#### 3.4.2. Principal component analysis

Next, a principal component analysis (PCA) is performed to validate the questionnaire. This data reduction technique shall identify groups or clusters of variables within the dataset. The primary advantage that can be achieved, applying this technique, is to concentrate further analysis on a reduced size of questions while retaining as much of the original information provided in the data (Field, 2013).

Firstly, a principal component analysis (PCA) with orthogonal rotation (varimax) is conducted for the remaining 17 independent survey items. The Kaiser-Meyer-Olkin measure is sufficiently large to verify the sampling adequacy for the analysis, ( $KMO = 0,504$ ) which is slightly above the threshold level 0,5 recommended by Kaiser (1974). The determinant of the R-matrix ( $|R| = 0,001$ ) indicates that there is potentially no multicollinearity. Bartlett's test of sphericity ( $\chi^2(136) 308,88, p < 0,001$ ), indicates that correlations between items are sufficiently large for the PCA. In total, six components with eigenvalues for each component over Kaiser's criterion of 1 in combination explain 73,5% of the variance. Due to the relatively small sample size, Stevens (2012) indicates that loadings greater 0,7 can be considered to be significant criterion level. However, a scree plot illustrates that one component lies slightly below this level and the point of inflexion provides support for extracting six components which is the reason why the minimum was decreased to factor loadings greater 0,59. Nevertheless, due to the relatively small sample size the results of the scree plot have to be considered with caution. However, supported by the sufficiently large KMO's value and due to the fact that this survey contains survey items identified in previous literature there is strong support for the six identified factors. [Table 9](#) shows the factor loadings after rotation. The outcome of the factor analysis for independent survey items that cluster on the same components suggest that component 1 represents formal control mechanisms, component 2 broker access utilization, component 3 perceived asymmetric interdependence, component 4 partner power, component 5 trust expectations and component 6 startup power. These components are used for further analysis and hypothesis testing. In line with Kline's (1999) recommendation all Cornbach's alphas reveal sufficiently large reliability of the constructs: Formal control mechanisms ( $\alpha = 0,772$ ); broker access utilization ( $\alpha = 0,787$ ); perceived asymmetric interdependence ( $\alpha = 0,750$ ); and partner power ( $\alpha = 0,774$ ). Except for trust expectations ( $\alpha = 0,647$ ) and startup power ( $\alpha = 0,646$ ) being slightly below the threshold level. However, due to the theoretical support for construct questions and the fact that the inter-correlations of items were sufficiently large the constructs are accepted for further analysis.

Obviously relationship intensity which determines a subjective measure for relationship strength appears to be correlated with trust expectations. Basically, the item determines emotional intensity of the relationship. It seems

that whether respondents perceive the relationship to their collaboration partner to be intensive, has an effect on trust expectations in partners. For this reason the item was added to the component of trust expectations.

Secondly, a principal component analysis is conducted with orthogonal rotation (varimax) for the 5 dependent survey items. Based on the relatively small sample size ( $n=45$ ) loadings greater 0,7 can be considered to be a significant criterion level (Stevens, 2012). The Kaiser-Meyer-Olkin (KMO) measure verifies the sampling adequacy for the analysis ( $KMO=0,69$ ) which falls slightly above the threshold level of 0,6. The determinant of the r-matrix is sufficiently large to determine that there is potentially no multicollinearity ( $|R|= 0,048$ ). Bartlett's test of sphericity ( $\chi^2(10)=125,987, p<0,001$ ) indicates that correlations between items were sufficiently large for the PCA. In line with Kaiser's recommendation all components with eigenvalues greater 1 are acceptable for the extraction of components. Two components had eigenvalues of Kaiser's criterion over 1 that together explained 86,24% of variance. A scree plot indicates that two factors can be extracted from the factor analysis. The point of inflexion supports extracting two factors. Nevertheless, a larger sample size is generally required. Due to the fact that the KMO is sufficiently large and given that the items of explorative relation-specific innovation firm performance correlate with the first component and the items of exploitative relation-specific innovation firm performance with the second component, these two components are retained in the final analysis. Explorative and exploitative innovation firm performance factors have been previously applied by Fang et al., (2011) which further supports the extraction of two dependent components for further analysis. Table 10 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents explorative relation-specific innovation firm performance, and component 2 represents exploitative relation-specific innovation firm performance. Both Cronbach's alphas have high reliabilities: Explorative relation-specific innovation firm performance  $\alpha= 0,922$ ; exploitative relation-specific innovation firm performance  $\alpha=0,816$ . Hence, these components are used for further hypothesis testing.

In sum, after the preliminary analysis six independent components can be extracted: Startup power, partner power, trust expectations, formal control mechanisms, perceived asymmetric interdependence and broker access utilization. Furthermore, after a second PCA two dependent factors can be extracted: Explorative relation-specific innovation firm performance and exploitative relation-specific innovation firm performance. These identified concepts of the PCA together with survey questions and their operational measures are summarized in Table 11.

## 4. RESULTS

### 4.1. Descriptive statistics

Based on the identified components variables are constructed and used for hypothesis testing. Table 2 provides an overview of all means, standard deviations and bivariate correlations of the variables. Based on Cohen (1992) a small correlation exists if  $r$  lies between 0,1 and 0,3; a medium effect for  $r$  between 0,3 and 0,5; and a large effect exists for  $r > 0,5$ . The outcome shows significant correlations of perceived asymmetric interdependence on exploitative innovation firm performance ( $r=0,359, p<0,05$ ). It seems that even though startups perceive asymmetric interdependence they might benefit in terms of exploitative innovation firm performance.

The interaction effect of broker access utilization significantly correlates with explorative innovation firm performance ( $r=0,484, p<0,01$ ) and exploitative innovation firm performance ( $r=0,337, p<0,05$ ). In addition, a correlation for the interaction effect of perceived asymmetric interdependence and frequency of interaction on exploitative innovation firm performance can be detected ( $r=0,380, p<0,05$ ). Additional independent variables and control variables are correlated with each other which might indicate multi-collinearity and will be further analyzed while testing the hypotheses.

Besides, the first impression reveals that a positive correlation between perceived asymmetric interdependence and partner power exists ( $r= 0,309, p<0,05$ ). Obviously this supports the theory of Kumar (1995) that asymmetric interdependence increases with partner power. In comparison, the power of the startup company would decline with asymmetry, but the data does not indicate a significant correlation between perceived asymmetric interdependence and startup power. For this reason, startups' perception of own power and their perception of partners' power will be analyzed separately as control variables. Nevertheless, Scheer et al., (2015) recommends differentiating between a focal party's true relative dependence and the partner's relative dependence, which can be calculated by the differences. However, the current data does not indicate corresponding correlations, which is the reason why startup power is analyzed separately from partner power.

Obviously, a significant positive correlation between startup power and the presence of formal control mechanisms is evident ( $r=0,369, p<0,05$ ). It seems that startups are able to improve their power position under the presence of formal control mechanisms in the relationship with their collaboration partner. Furthermore, a positive correlation between formal control mechanisms and trust expectations is statistically significant ( $r=0,263, p<0,1$ ). Potentially, the more formal control mechanisms are present, the more startups tend to perceive their partner to be trustworthy.

Furthermore, startups' years since foundation reveals correlations with explorative innovation firm performance ( $r=-0,288$ ,  $p<0,1$ ), formal control mechanism ( $r=-0,326$ ,  $p<0,05$ ), and trust expectations ( $r=-0,412$ ,  $p<0,01$ ). It seems that the longer startups are established, the weaker the presence of formal control mechanisms and the weaker trust expectations in their partner, the weaker will be their explorative innovation firm performance.

In addition, a correlation between relationship time and partner power exists ( $r=0,287$ ,  $p<0,1$ ). It might be the case that startups maintain collaboration relationships with more powerful partners on a long-term basis. Although, it is commonly recommended to use relationship time and frequency of interaction as a multi-dimensional construct (Slotte-Kock & Coviello, 2010) both items reveal distinctive correlations with other variables. For instance, frequency of interaction correlates with variables like exploitative innovation firm performance ( $r=0,326$ ,  $p<0,05$ ) and perceived asymmetric interdependence ( $r=0,315$ ,  $p<0,05$ ). It seems that the more frequently startups interact in the collaboration relationship with their partner, the more they are able to utilize exploitative innovation firm performance and the greater their perceived asymmetric interdependence. Furthermore, frequency of interaction is correlated with years since founding ( $r=0,560$ ,  $p<0,01$ ) which might indicate that the longer startups exist, the more they tend to interact with their collaboration partners. Due to the different correlations of the two items the multi-dimensional construct of relationship strength will further be analyzed separately by frequency of interaction and relationship time. A summary of all bivariate correlations, means and standard deviations can be found in descriptive statistics [Table2](#).

## 4.2. Hypothesis testing 1-3

Field (2013) suggests that at least 10-15 participants per variable are required for conducting a hierarchical multiple linear regression analysis. To validate a large enough sample size for the current data and including all predictors a medium effect size can be supported (Cohes'  $R= 0,2$ ). The regression analysis is performed including the control variables, predictor variables, and the interaction effects with the moderator variables for each outcome variable explorative and exploitative innovation firm performance. Basically, this enables to determine the added individual contribution of each predictor on each outcome variable. [Table3](#) and [Table4](#) summarize the analysis for testing the hypotheses 1-3. [Hypothesis 1](#) predicts a negative impact of perceived asymmetric interdependence on startups' innovation firm performance. To test the direct effect of perceived asymmetric interdependence on innovation firm performance with the corresponding moderator effects of [Hypothesis 2](#) (relationship strength) and [Hypothesis 3](#) (broker access utilization) hierarchical multiple regression analysis is performed on each outcome variable: explorative and exploitative innovation firm performance.

Basically, Model 1 in [Table3](#) and model 4 in [Table4](#) refer to the control variables' impact on explorative and exploitative innovation firm performance, Model 2 in [Table3](#) and model 5 in [Table4](#) refer to the predictors perceived asymmetric interdependence, relationship time, frequency of interaction and broker access utilization as a direct effect on the outcome variables. Model 3 in [Table3](#) and model 6 in [Table4](#) include the interaction effects of the moderator variables relationship time, frequency of interaction and broker access utilization accounted for perceived asymmetric interdependence and tests for the effect on each outcome variable.

Firstly, a correlation matrix for the independent items' impact on explorative innovation firm performance does not indicate conflicting correlations ( $r>0,9$ ) which gives support for potentially no multi-collinearity between the predictors. Secondly, having a short look at the correlation matrix for the outcome variable exploitative innovation firm performance all r-values are below 0,9 which already indicates that there is potentially no multi-collinearity. Short formal reports for the hypothesized relationships including each model's fit are provided:

Model 1 reveals that the inclusion of the control variables accounts for a significant change of variation in explorative innovation firm performance ( $R^2=0,232$ ;  $F=2,0252$ ,  $p=0,96$ ). In addition, model 4 indicates that the inclusion of the control variables does not account for a statistically significant change of variation in exploitative innovation firm performance ( $R^2=0,146$ ;  $F=1,158$ ,  $p=0,350$ ). In Model 2 the inclusion of the predictor variables perceived asymmetric interdependence, relationship time, frequency of interaction and broker access utilization has improved the ability to predict explorative innovation firm performance ( $\Delta R^2=0,279$ ;  $\Delta F=4,276$ ,  $p<0,05$ ). Furthermore, Model 5 reveals a significant change in the predictive power of the model by the inclusion of the predictor variables which have explained a large amount of variation in exploitative innovation firm performance ( $\Delta R^2=0,319$ ,  $\Delta F=4,479$ ,  $p<0,05$ ). Model 3 does not account for a significant change of variability in explorative innovation firm performance added by the inclusion of the moderation variables accounted for perceived asymmetric interdependence ( $\Delta R^2=0,066$ ;  $\Delta F=1,403$ ,  $p=0,264$ ). In addition, Model 6 does not reveal a significant change in predicting the outcome variable exploitative innovation firm performance by the inclusion of the moderation variables accounted for perceived asymmetric interdependence ( $\Delta R^2=0,027$ ,  $\Delta F=0,476$ ,  $p=0,702$ ).



**Table2 Descriptive statistics**

Means, standard deviations and bivariate correlation of the variables (n=45)

	Mean	S.d.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Explorative Innovation Firm Performance	4,85	1,66	1													
2 Exploitative Innovation Firm Performance	4,32	1,46	0,170	1												
3 Perceived Asymmetric Interdependence	3,77	1,39	0,060	0,359**	1											
4 Partner Power	4,41	1,75	0,294**	0,283*	0,309**	1										
5 Startup Power Formal Control	4,31	1,50	0,063	0,093	0,113	-0,224	1									
6 Mechanisms	4,89	1,24	0,021	0,089	0,195	0,080	0,369**	1								
7 Trust Expectations	3,38	1,07	0,035	0,238	0,151	-0,064	0,114	0,263*	1							
8 Years Since Founding	3,95	2,62	-0,288*	-0,044	0,027	-0,047	-0,205	-0,326**	-0,412***	1						
9 Relationship Time Frequency of	3,20	2,94	-0,097	-0,010	-0,070	0,287*	-0,048	0,089	0,101	0,092	1					
10 Interaction Broker Access	20,07	29,62	0,028	0,326**	0,315**	0,350**	0,048	0,065	-0,023	0,560***	0,240	1				
11 Utilization Perceived Asymmetric Interdependence x	4,75	1,55	0,484***	0,337**	0,088	0,145	-0,164	0,004	0,024	-0,042	-0,054	-0,065	1			
12 Relationship Time Perceived Asymmetric Interdependence x	11,79	10,62	0,017	0,189	0,343**	0,456***	-0,048	0,201	0,238	0,011	0,878***	0,382***	0,049	1		
13 Frequency of Interaction Perceived Asymmetric Interdependence x	88,38	152,92	0,062	0,380**	0,500***	0,349**	0,094	0,171	0,020	0,426***	0,162	0,933***	-0,066	0,393***	1	
14 Utilization Broker Access	18,09	9,68	0,337**	0,421***	0,747***	0,353**	-0,141	0,091	0,114	0,014	-0,041	0,147	0,684***	0,313**	0,257*	1

Notes: \*\*\*p<0,01; \*\*p<0,05; \*p<0,1

**Table3 Hierarchical regression analysis: Explorative innovation firm performance**

Determinants of explorative innovation firm performance (n=45)

	1				2				3			
	B	s.e.	$\beta$	p	B	s.e.	$\beta$	p	B	s.e.	$\beta$	p
Constant	3,012**	1,460		0,046	0,800	1,474		0,591	4,033	2,901		0,174
Partner Power	0,324**	0,149	0,343	0,036	0,369**	0,155	0,390	0,022	0,325*	0,163	0,343	0,054
Startup Power	0,182	0,186	0,166	0,334	0,283	0,170	0,257	0,105	0,374*	0,194	0,340	0,062
Trust Expectations	0,034	0,276	0,019	0,902	0,083	0,253	0,047	0,746	-0,035	0,292	-0,020	0,905
Formal Control Mechanisms	-0,097	0,229	-0,072	0,673	-0,102	0,205	-0,076	0,620	-0,190	0,215	-0,141	0,383
Years since Founding	-0,029*	0,016	-0,306	0,083	-0,039*	0,020	-0,416	0,055	-0,025	0,022	-0,269	0,264
Perceived Asymmetric Interdependence					-0,161	0,186	-0,135	0,393	-0,880	0,705	-0,741	0,221
Relationship Time					-0,103	0,084	-0,182	0,227	-0,423	0,349	-0,750	0,235
Frequency of Interaction					0,001	0,009	0,000	0,999	-0,026	0,027	-0,458	0,344
Broker Access Utilization					0,500***	0,149	0,469	0,002	0,244	0,480	0,229	0,615
Perceived Asymmetric Interdependence x Relationship Time									0,104	0,110	0,666	0,351
Perceived Asymmetric Interdependence x Frequency of Interaction									0,005	0,006	0,507	0,356
Perceived Asymmetric Interdependence x Broker Access Utilization									0,064	0,125	0,374	0,614

Notes: \*\*\*p<0,01; \*\*p<0,05; \*p<0,1; Model 1: R<sup>2</sup>=0,232, Model 2:  $\Delta R^2$ =0,279, Model 3:  $\Delta R^2$ =0,066**Table4 Hierarchical regression analysis: Exploitative innovation firm performance**

Determinants of exploitative innovation firm performance (n=45)

	4				5				6			
	B	s.e.	$\beta$	p	B	s.e.	$\beta$	p	B	s.e.	$\beta$	p
Constant	1,428	1,247		0,259	0,031	1,296		0,981	-0,625	2,615		0,813
Partner Power	0,280**	0,128	0,335	0,034	0,148	0,136	0,177	0,284	0,170	0,147	0,203	0,255
Startup Power	0,153	0,159	0,157	0,344	0,145	0,149	0,149	0,337	0,113	0,175	0,116	0,523
Trust Expectations	0,401*	0,236	0,257	0,098	0,401*	0,223	0,257	0,080	0,443	0,263	0,284	0,102
Formal Control Mechanisms	-0,075	0,195	-0,063	0,702	-0,099	0,180	-0,083	0,586	-0,132	0,194	-0,111	0,501
Years since Founding	0,008	0,015	0,104	0,576	-0,23	0,018	-0,278	0,215	-0,029	0,021	-0,354	0,182
Perceived Asymmetric Interdependence					0,136	0,163	0,130	0,409	0,311	0,636	0,296	0,628
Relationship Time					-0,055	0,074	-0,110	0,462	0,037	0,315	0,074	0,907
Frequency of Interaction					0,014*	0,008	0,282	0,074	-0,002	0,024	-0,045	0,926
Broker Access Utilization					0,316**	0,131	0,335	0,021	0,480	0,433	0,508	0,276
Perceived Asymmetric Interdependence x Relationship Time									-0,026	0,099	-0,187	0,796
Perceived Asymmetric Interdependence x Frequency of Interaction									0,004	0,005	0,372	0,505
Perceived Asymmetric Interdependence x Broker Access Utilization									-0,039	0,113	-0,256	0,734

Notes: \*\*\*p<0,01; \*\*p<0,05; \*p<0,1; Model4: R<sup>2</sup>=0,146, Model 5:  $\Delta R^2$ =0,319, Model 6:  $\Delta R^2$ =0,027

The results depict the following direct effects for control variables on explorative and exploitative innovation firm performance. With regard to model 1 in [Table 3](#) side-effects on explorative innovation firm performance are depicted for partner power that has a positive effect and is significant ( $\beta=0,343$ ,  $p=0,036$ ) and years since founding has a negative effect and is significant ( $\beta=-0,306$ ,  $p=0,083$ ). Furthermore, model 4 in [Table 4](#) depicts side effects on exploitative innovation firm performance: Partner power has a positive effect and is significant ( $\beta=0,335$ ,  $p=0,034$ ) and trust expectations have a positive effect which is significant ( $\beta=0,257$ ,  $p=0,098$ ). Overall, partner power has a positive impact on innovation firm performance, while years since foundation has a negative effect on exploration and trust expectations have a positive effect on exploitation which will be further elaborated in the discussion.

[Hypothesis 1](#) predicts that perceived asymmetric interdependence has a negative effect on startups' innovation firm performance. For perceived asymmetric interdependence the direction of the effect on explorative innovation firm performance is negative and not significant ( $\beta=-0,135$ ,  $p=0,393$ ). In addition, the direction of the effect on exploitative innovation firm performance is opposite to the expectation, positive and not significant ( $\beta=0,130$ ,  $p=0,409$ ). The results show a large positive effect of broker access utilization on both explorative ( $\beta=0,469$ ,  $p=0,002$ ) and exploitative innovation firm performance ( $\beta=0,335$ ,  $p=0,021$ ) which are significant. Furthermore, a large positive effect of frequency of interaction ( $\beta=0,282$ ,  $p=0,074$ ) on exploitative innovation firm performance is significant. Hence, for the current findings we cannot with complete evidence conclude that perceived asymmetric interdependence has a negative effect on explorative and exploitative innovation firm performance. Therefore, considering the current data we do not have enough evidence to accept [Hypothesis 1](#).

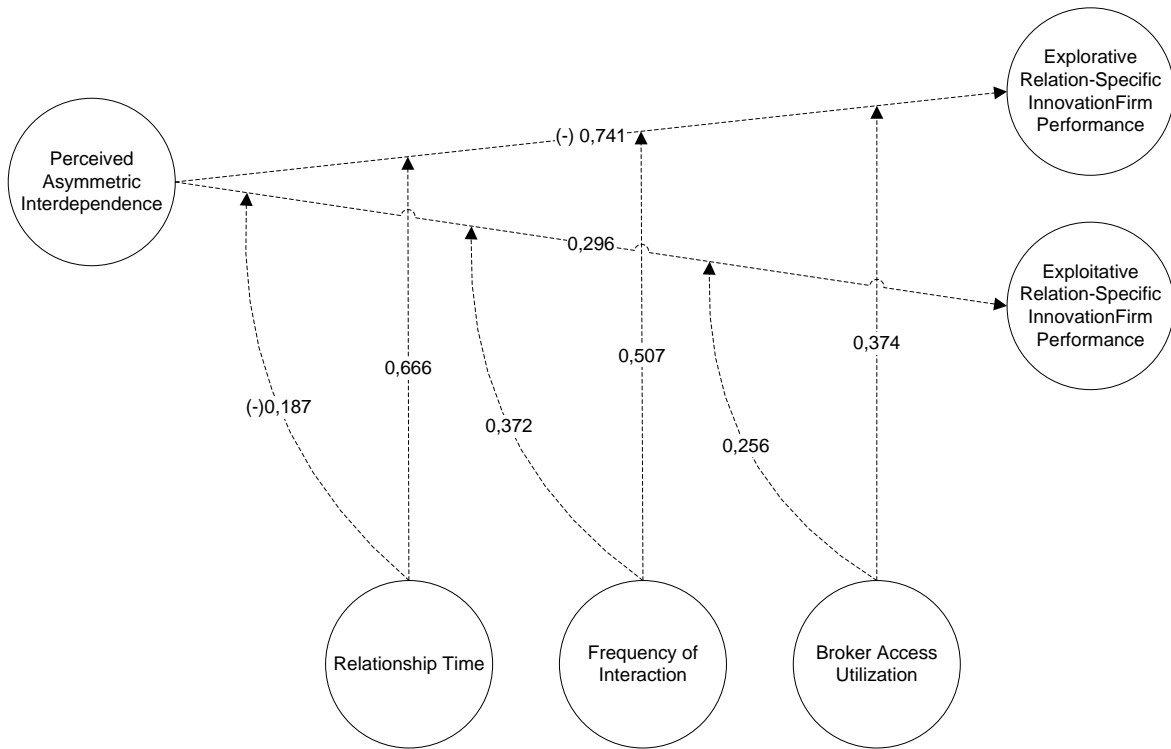
Basically, with regard to the moderation model after the introduction of the moderation effects, the original negative effect of perceived asymmetric interdependence decreases for explorative innovation firm performance in that it becomes more negative ( $\beta=-0,741$ ,  $p=0,221$ ) and the positive effect on exploitative innovation firm performance increases in that it becomes more positive ( $\beta=0,296$ ,  $p=0,628$ ), but both effects are not significant.

[Hypothesis 2](#) predicts that the relationship between perceived asymmetric interdependence and innovation firm performance is moderated by relationship strength. Even though previous research analyzes relationship strength as a multidimensional construct (Capaldo, 2007, Lowik et al., 2012, Newbert et al., 2013) the preliminary data analysis together with the outcome of the PCA does indicate that relationship strength needs to be analyzed by two distinctive components: Relationship time and frequency of interaction. Hence, for the current data these components are analyzed separately as moderator variables. The outcome of the analysis indicates a positive effect of relationship time accounted for perceived asymmetric interdependence on explorative ( $\beta=0,666$ ,  $p=0,351$ ) and a negative effect on exploitative innovation firm performance ( $\beta=-0,187$ ,  $p=0,796$ ), but both moderation effects are not significant. In addition, the current data depicts that frequency of interaction accounted for perceived asymmetric interdependence has a positive effect on explorative innovation firm performance ( $\beta=0,507$ ,  $p=0,356$ ) and a positive effect on exploitative innovation firm performance ( $\beta=0,372$ ,  $p=0,505$ ), but both moderation effects are not significant. Hence neither for relationship time nor frequency of interaction we do not have enough evidence to accept [Hypothesis 2](#).

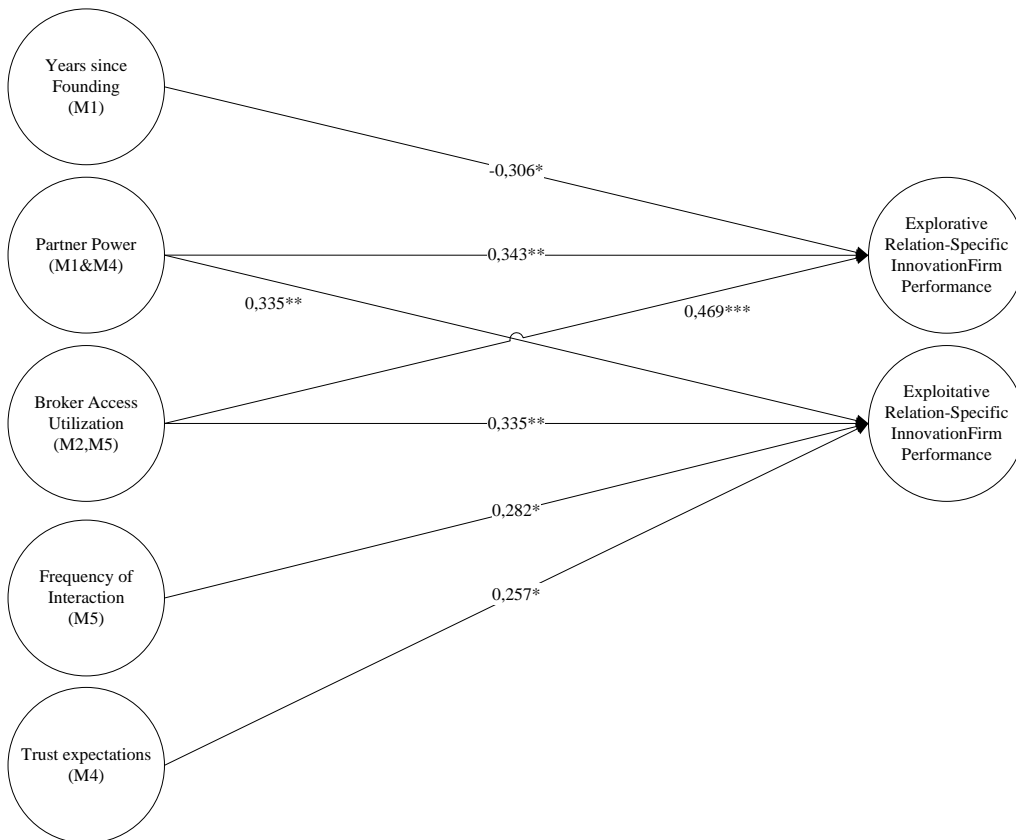
[Hypothesis 3](#) predicts that the relationship between perceived asymmetric interdependence and innovation firm performance is moderated by broker access utilization. The results show that the effect of broker access utilization accounted for perceived asymmetric interdependence is positive for explorative innovation firm performance ( $\beta= 0,374$ ,  $p=0,614$ ) and negative for exploitative innovation firm performance ( $\beta=-0,256$ ,  $p=0,734$ ), but both effects are not significant. For this reason, we do not have enough evidence to accept [Hypothesis 3](#).

Summarizing, the results of the statistical analysis cannot provide evidence to support the proposed moderation model. Instead the results indicate the effects illustrated in [Figure 6](#) which are not significant. Nevertheless, the results indicate side-effects which are significant depicted in [Figure 7](#).

**Figure6 Moderation effects**



**Figure7 Side-effects: Significant relationships**



Notes: \*\*\*p<0,01; \*\*p<0,05; \*p<0,1; M1=Model 1, M2= Model 2, M4= Model 4, M5= Model 5

## 5. DISCUSSION

The results of this paper cannot fully support a negative impact of perceived asymmetric interdependence on relation-specific explorative or exploitative innovation firm performance. Instead there is at least a non-significant negative effect of perceived asymmetric interdependence on explorative innovation firm performance and a non-significant positive effect on exploitative innovation firm performance. However, the results do not support the proposed moderation model. Nevertheless, the findings indicate that collaboration relationships with powerful partners and broker access utilization are beneficial in terms of explorative and exploitative innovation firm performance. With regard to [Hypothesis 1](#) these contradicting findings need to be explained.

In terms of exploitative innovation firm performance it seems that startup companies do actually not suffer under asymmetric interdependence relationships. In comparison, there is the chance that asymmetric interdependence occurs at the expense of explorative innovation firm performance. Zaheer et al., (2000) and Vandaie and Zaheer, (2014) illustrate that lock-in effects arise through dependence and can have negative effects on innovation, which might explain the negative effect of asymmetric interdependence on explorative innovation firm performance. Furthermore, this might explain why asymmetric interdependence can still have a positive effect on exploitative innovation firm performance, as startups locked-in to asymmetric interdependence relationships rather pursue to improve on existing products and services, instead of entering new markets and developing new propositions. Nevertheless, empirical evidence of this research is not sufficiently large to further confirm the effect of interdependence asymmetry on innovation firm performance.

To all appearances actively engaging in collaboration relationships with powerful partners enables startups to increase their explorative and exploitative innovation firm performance. Even though there is a chance that startups perceive asymmetric interdependence in the relationship to powerful partners startups take the risk to obtain the associated benefits. This generally supports that interdependence does not necessarily have a negative effect on innovation firm performance. Apparently, inter-organizational relationships to powerful partners have positive implications for explorative and exploitative innovation firm performance. Obviously, collaboration with a powerful partner has a positive effect on developing new market propositions and at the same time enables startups to improve on existing products and services. This suggests that startups benefit considerably through collaboration with large partners. Drawing on interdependence theory a powerful partner can imply that the startup is less powerful in the relationship (Kumar et al., 1995) and several researchers propose that smaller firms are not able to achieve performance benefits through collaboration with a power-advantaged actor (Villanueva et al., 2012), or with a more experienced partner (Kalaiganam et al., 2007), under asymmetrical relationships having a negative effect on learning through partnerships and innovation (Wang, 2011; Wang & Hsu, 2014). However, the findings of this research cannot fully support a negative effect of perceived asymmetric interdependence on innovation firm performance. Opposed to interdependence theory the findings indicate that startups can even benefit in collaboration relationships with powerful partners. A possible explanation for the contradicting findings might be provided with reference to Kumar et al., (1995a) or Nienhüser et al., (2008) stating that a large partner does not necessarily need to use their powerful position to their advantage, which would explain why interdependence asymmetry does not negatively influence innovation firm performance. In addition, it is stated that asymmetric interdependence is only harmful if the less dependent partner extracts a disproportionate share of the distributable outcomes from the relationship, which is not harmful in the case that the powerful partner serves in the interest of both parties rather than in self-serving fashion (Kumar et al., 1995b, Scheer et al., 2015). Hence, in the case that collaboration partners do not exploit the relationship to the startup company asymmetric interdependence becomes less harmful for the startup company. Considering the current findings, this might explain why asymmetric interdependence and the partner's power are not necessarily negatively associated with innovation firm performance. Due to the fact that broker access utilization has a positive effect on explorative and exploitative innovation firm performance it might even be that developing ties to third parties indeed enables startups to establish social defenses that can discipline opportunistic behavior of powerful partner (Hallen et al., 2014). Additionally, this mechanism could explain, why powerful partners are not inclined to use their bargaining power at the expense of the startup company.

Regarding the proposed moderation effect of broker access utilization the findings do not indicate that broker access utilization enables startups to better cope within asymmetric interdependence relationships, because interdependence asymmetry does not significantly influence the startups' innovation firm performance. What is more, through broker access utilization we find a direct positive effect on explorative and exploitative innovation firm performance. There is strong support that startups intentionally pursue to utilize their collaboration partner to get into contact with alternative partners, having overall positive implications on explorative and exploitative innovation firm performance. Hence, an external view for network development enables startups to improve their explorative and exploitative innovation firm performance through the relationship with their collaboration partner. It can be assumed that if startups intentionally pursue to utilize the broker access function provided by their collaboration partner they are able to improve explorative and exploitative innovation firm performance. This supports that even though network relationships lead to interdependencies (Salancic & Pfeffer, 1978), they

can provide beneficial performance outcomes. This underlines the argument of Von Raesfeld and Roos (2008) that firms aiming to be efficient and flexible in their network need to have strong ties and at the same time have a broad view of their network, to develop new partners. Moreover, since network relationships imply dependencies to other organization in the network (Slotte-Kock & Coviello, 2010) startups can cope with dependencies by intentionally pursuing to utilize broker access, which would lead to an overall improvement of innovation firm performance. In terms of exploitative innovation firm performance startups can improve their internal production processes, decrease internal production costs and improve existing products and services through intentionally seeking and developing new partners via their collaboration partner. In addition to this, the findings indicate that broker access utilization is also beneficial in terms of improving explorative innovation firm performance. In the pursuit of network development, the more startups constantly seek to develop new partners via their collaboration partner the more startups are able to enter new markets, develop new products and offer new market propositions. This view for network development indeed enables startups to develop a sustainable performance of their business, by balancing exploration and exploitation innovation.

Nevertheless, this research cannot support a moderation effect for the components of relationship strength concerning the relationship between asymmetric interdependence and explorative or exploitative innovation firm performance. It seems that regardless of relationship time or frequency of interaction the impact of perceived asymmetric interdependence on innovation firm performance does not change significantly. Hence, whether weak or strong relationships differently influence the impact of asymmetric interdependence relationships on innovation firm performance cannot be supported. Instead, frequency of interaction does have a positive direct effect on exploitative innovation firm performance. This means that the more frequently startups engage with their collaboration partner, the greater exploitative innovation firm performance can be achieved through the relationship. It might be argued that startups tend to make more adjustments or improvements to their existing products and market propositions in order to meet the demands of their existing customers (Fang et al., 2011), and the more often startups interact with their collaboration partners. Potentially, startups' tend to benefit more under strong interaction relationships with their collaboration partner, because greater interaction leads to greater exploitative innovation firm performance. This finds support by Wang and Hsu (2014) stating that strong learning relationships can lead to innovation through constant interaction. In addition, a possible reason why interaction frequency improves startups' exploitative innovation firm performance can be explained referring to Yang et al., (2011) stating that firms generate confidence within relationships by existing institutional structures and previous interactions. Hence, the more frequently startups interact with their collaboration partner, the more startups are able to benefit from exploitative innovation firm performance. It might actually be the case that startups experience through interaction explains the positive effect of interaction frequency on exploitative innovation firm performance.

Furthermore, this research finds a significant effect of years since foundation on explorative innovation firm performance. The longer startup companies exist the less they tend to engage in explorative innovation practices. Hence, with increasing company age startups constantly lose their explorative focus in terms of entering new technology fields, extending product ranges or opening new markets (Fang et al., 2011; Wang & Hsu, 2014; Ashnai et al., 2015). This might indicate that explorative innovation firm performance becomes weaker in later stages of the startup life-cycle. It seems that once startup companies developed their network with increasing age the lesser startups are inclined to engage in explorative practices. In addition, the findings indicate a positive effect of whether startups perceive their partner to be trustworthy on exploitative innovation firm performance. The more startups perceive their partner to be trustworthy with benevolent behavior the greater startups are able to improve existing production processes, costs and service quality. Hence, based on trust expectations in partners, startups are more likely to adjust internal production processes and improve existing products and services. This makes the partners' trustworthiness an important factor for the inter-organizational relationship and supports prior research stating that trust is something perceived to be valuable in the relationship to a collaboration partner (Zaheer, McEvil & Perrone, 1998; Zaheer & Harris, 2005).

## **6. STRENGTH, LIMITATIONS & FUTURE RESEARCH**

A major strength of this research is the development of an online survey including reviewed question items with great reliability outcomes for construct questions, which are applicable by future research. The survey should be applied to the same context of German startup companies to validate the current findings and can be transferred and repeated in different contexts for instance, various national contexts, concentration on a specific industry sector or small- and medium-sized enterprises as well as established firms to further compare the findings. For instance, it could be that startups in different national contexts are indeed negatively influenced by asymmetric interdependence, because Germany can be considered to be a stable business context which offers greater stability for small enterprises (Hatak, Fink & Frank 2015). There might be the chance that under unstable national contexts and greater levels of corruption, interdependence indeed negatively influences innovation firm performance, because startups would not be protected by constitutional mechanisms. This could help to clarify the positive effect of interdependence asymmetry on exploitation innovation firm performance. However, the diverging effects of interdependence asymmetry having a positive effect on exploitation and a negative effect on

exploration firm performance needs to be clarified. Hence, it is recommended to initially validate the current findings of this research. In the case that future research indeed finds a diverging effect in the population it might even be the case that lock-in effects associated with asymmetric interdependence relationships have a negative effect on exploration innovation firm performance. Hence, it is recommended to take a control for lock-in effects into account.

Furthermore, strength of this paper is that the current findings which are based on a single relationship to a dominant collaboration partner can be applied for startups overall network development. This way the paper is able to provide an example of how startup companies perceive interdependence within a relationship and through which mechanisms startups are able to achieve the greatest innovation benefits. Broker access utilization might be considered as a mechanism for startups to develop their network more efficiently and effectively. Nevertheless, there seems to be a threshold-level to which startups can benefit and exceeding this level suffer from network development practices, because prior research states that startups are not able to manage a great number of strong relationships (Von Raesfeld & Roos, 2008; Lowik et al., 2012; Vandaie & Zaheer, 2014). In this realm, future research could more precisely focus on limits startups face in developing their network.

Although, this research is not without limitations, because it is recommended extending the current data based on German startup companies. Future research is needed to validate the preliminary results based on German startup companies. Furthermore, future research could analyze why trust for the current study is an explanatory factor of exploitative innovation, but not for explorative innovation firm performance. In addition, there are potentially additional factors besides trust expectations that are valuable in inter-organizational relationships between startups and collaboration partners. Palmatier et al., (2006) investigates relational factors that might be more valuable for a relationship compared to trust, like: similarities between parties or the alignment of benefits achieved through collaboration. In addition, future research might take shared goal expectations as suggested by Li et al., (2010) into account. Hence, focusing on the exploration of alternative building blocks in inter-organizational relationships might reveal why trust was less influential for exploration firm performance. In addition, the presence of formal control mechanisms correlates with startups trust expectations and startups perception of own power. Possibly formal control mechanisms are a preferable mechanism for startups to cope within relationships and the bargaining power of unequal partners in order to maintain their own power position within the relationship. Investigating this can be the focus of future research.

Additionally, this research reveals that constantly increasing the exposure to alternative partners has overall positive implications on innovation firm performance. In this realm future research might explore the role of network embeddedness more precisely (Lowik et al., 2012, Newbert et al., 2013). Investigating whether startups' embeddedness or their degree of connectedness in the network can determine greater or weaker explorative or exploitative innovation performance might lead to relevant outcomes. In line, whether startups utilizing broker access through their collaboration partner are able to achieve greater embeddedness in the network seems to be an interesting subject to study. In addition, with regard to the length of relationships and the frequency of interaction future research might concentrate on startups' experiences in collaboration relationships. For instance, experience through interaction with partners might illustrate why some startups achieve greater benefits through collaboration with their dominant collaboration partner. This could potentially explain the positive effect of frequency of interaction on exploitative innovation firm performance.

One of the major limitations of this research is that, due to the scope of this study, no dyadic measures were included. Instead all assumptions and propositions are made based on startups' expectations concerning the relationship. On the one hand it was possible to analyze startups' inter-organizational relationships based on expectations of a partner, but on the other hand in order to validate the results future research might take dyadic measures into account. Hence, analyzing not only startup perceptions, but also the perceptions of partners in the relationship is a valuable addition to this research. Furthermore, the survey does only consider a snapshot of the relationship at a specific point in time. In line with the recommendation of Slotte-Kock and Coviello (2010) future research could concentrate on the process of change within dyadic relationships. For instance, companies could consider specific relationships at different points in time, which could provide insights in overall development of the relationship and whether asymmetric interdependence changes over time. In addition, analyzing dyadic measures of asymmetric interdependence, research needs to take the intentions of the powerful party into account. It might be that powerful partners do not intend to exploit a startup company and instead fairly collaborate with equal distribution of benefits. This could explain why this research does find a negative effect of perceived asymmetric interdependence on startups' innovation performance.

In addition, with regard to the generalizability of findings the outcome of this research is limited to the current data. Overall causal relationships are observed and explained by the current data, but due to the low response rate, the relatively small sample size, and the weak accuracy of the predicted moderation model the predictive power of this research is limited. Nevertheless, some degree of accuracy for the identified side-effects together with the PCA validate the applied constructs in the survey and the reliability of findings.

## **7. CONTRIBUTION TO SCIENCE AND PRACTICE**

### **7.1. Practical Contribution**

Basically, understanding the effects of asymmetric interdependence relationships should help startups to better cope within asymmetric relationships. Based on the current findings, startups do possibly not suffer from asymmetric interdependence in terms of exploitative innovation firm performance, but might be limited in their ability to develop and enter new markets in terms of explorative innovation firm performance. However, in order to further generalize on this more data is needed.

What is more, based on the analysis of startups most important collaboration relationship to an inter-organizational partner this thesis is able to provide recommendations on how startup companies are able to improve their innovation performance through inter-organizational relationships. The findings indicate that asymmetric interdependence relationships with powerful partners are not necessarily harmful for startup companies. However, there are specific means to utilize interdependence relationships even more effectively and efficiently.

For instance, broker access utilization, partner power, frequency of interaction and trust expectations enable startup companies to achieve the greatest benefits for exploitative innovation firm performance. The exploratory findings indicate that focusing on collaboration partners with whom startups frequently interact; the intention of constantly developing new partners via their collaboration partner; inter-organizational relationships to powerful partners and trustworthy partners provide the greatest benefits in terms of improving internal production processes as well as existing products or services. However, these relational elements are primarily related to exploitative innovation firm performance and not to explorative innovation firm performance. In order to achieve the greatest balance of exploration and exploitation startups should primarily focus on utilizing the broker access function of their partner and concentrate on relationships to powerful partners as those have overall positive effects on both exploration and exploitation innovation firm performance. The strategic intent to develop alternative partners and collaboration with powerful partners seems to balance the degree of exploration and exploitation innovation firm performance. Besides the improvement of internal production processes, services and costs, at the same time, startups are able to enter new markets and develop new market propositions.

Based on the current findings, a three-step approach for balancing exploration and exploitation practices in inter-organizational relationships can be recommended. Firstly, considering startups portfolio of relationships and identifying which collaboration partner startups perceive to be the most powerful partner might be an initial starting point to determine which partner is most influential. Secondly, the frequency of interaction can be used to determine the most influential partner who obtains startups' greatest effort in maintain the relationship. Thirdly, the strategic intention of targeted utilization of the brokered access function provided by these identified partners enables the startup to make this relationship even more efficient and effective. Following these mechanisms startup companies can sustain or even improve innovation firm performance through targeted development of inter-organizational relationships.

Moreover, with increasing years since foundation startups are less inclined to pursue explorative innovation. Potentially, with increasing years since foundation startups lose their explorative focus which might exemplify that over time startups are becoming overembedded in their network (Lowik et al., 2012). In order to maintain explorative performance with increasing company age startups need to concentrate network development practices to unconnected ties. Essentially, this means that with company age the focus on entering new technology fields, extending product ranges, developing new offerings, and opening new markets (Fang et al., 2011) needs to become a primary objective to simultaneously pursue explorative and exploitative performance. This might illustrate that once startups developed their network they need to consider developing new partners besides those identified via their collaboration partner in order to maintain explorative innovation firm performance and to prevent overembeddedness.

### **7.2. Theoretical Contribution**

The outcome of this research contributes to the academic field investigating that the construct of broker access utilization becomes a relevant factor analyzing inter-organizational relationships. Depending on the extent to which startup companies constantly seek to increase their exposure to new alternative partners via their existing relationships startups can improve overall innovation firm performance. Basically, this contributes to the current industrial marketing and purchasing literature, because it reveals that small firms can improve their performance in business relationships through targeted utilization of brokered access provided by their partner. Furthermore, the findings indicate that specific types of collaboration partners, namely powerful partners have overall positive effects on startups innovation firm performance, which contributes to the discussion of negative and positive effects through asymmetric interdependence.

In addition, this research basically contributes to the findings of Lowik et al., (2012) and Mitrega et al., (2012) as systematically searching for new relational partners can enrich a startups' relationship portfolio which contributes to innovation firm performance. Furthermore, this research reveals that small firms can significantly



benefit from developing their network via their collaboration partner. This generally supports Von Raesfeld and Roos (2008) that for successful business development strong and varied ties and the partners' intermediary functions are equally important. In line with the findings of Von Raesfeld and Roos (2008) startups can concentrate on strong tie relationships and at the same time improve their network development practices through the strategic intention of utilizing broker access functions provided by partners which would positively influence innovation firm performance. This basically contributes to entrepreneurship and network research, because a mechanism through which startups can constantly develop their network is elaborated. Furthermore, in relation to resource dependency theory the findings indicate that startups might not necessarily be disadvantaged by resource dependence situations, as those enable them to improve exploitative innovation firm performance. Hence, opposed to the vulnerability of startups within inter-organizational relationships this research indicates that powerful partners possibly offer more benefits in terms of startups' innovation performance than expected.

In addition, the findings illustrate that startups can use their inter-organizational relationships more precisely to generate new ideas for technological innovation and operational support through balancing exploration and exploitation as suggested by Capaldo (2007) through focusing on powerful partners and broker access utilization.

## **8. CONCLUSION**

The main intention of this thesis was to analyze whether startups, commonly treated as the vulnerable party in inter-organizational collaboration relationships, are indeed negatively influenced by unequal relationships. Besides, different types of relationships and practices that startups constantly use and apply in inter-organizational collaboration relationships reveal, how targeted managerial actions can enable startups to cope with interdependence relationships and achieve sustainable innovation firm performance. In order to investigate this, startups' perceptions of asymmetric interdependence towards a specific relationship were analyzed and the impact on innovation firm performance. Opposed to the expectation, the current findings however do not indicate a significant negative effect of perceived asymmetric interdependence on innovation firm performance. Despite positive effects through collaboration with powerful partners and utilization of partners' broker access function on innovation firm performance are evident. Based on the sample of German startup companies, it seems that companies effectively maintain their existing business relationships and their flexibility to develop new businesses simultaneously (Von Raesfeld & Roos, 2008) and are not constrained by network paradoxes or interdependence relationships. It appears that startups can actually benefit through relationships with powerful partners.

Compared to the risks startups can face through asymmetric inter-organizational relationships, it seems that startups generally obtain more benefits through collaboration relationships. Basically, even though asymmetric interdependence relationships bring along resource-dependence situations (Salancik & Pfeffer, 1978), bargaining power of partners (Vandaie & Zaheer, 2014), risk of misappropriation (Katila et al., 2008) and limitations in developing new relationships (Weiblen & Chesbrough, 2015) the associated benefits through inter-organizational relationships are dominating. Even asymmetric interdependence relationships to powerful partners can be beneficial for startups, because those generally enable startups to get access to required resources or manufacturing and marketing expertise, to develop new distribution channels (Alvarez & Barney, 2001; Katila et al., 2008), and to develop their network position (Ahuja et al., 2009). In addition, the utilization of strong ties for increasing the number of external sources for innovation (Lowik et al., 2012) enables startups to balance exploration and exploitation. It is likely that, increasing the exposure to alternative partners and systematically searching for new relational partners enhances a startups' network portfolio and contributes to innovation firm performance (Mitrega et al., 2012). Thereby this research suggests that startups can follow a three step approach to achieve sustainable performance through inter-organizational relationships in networks. Firstly, the identification of startups' most powerful partners and secondly the identification of partners with whom startups most frequently interact can determine inter-organizational relationships that are most influential to startups innovation firm performance. Thirdly, the targeted selection of these inter-organizational relationships to strategically utilize the broker access function provided by these relationships can be pursued to achieve the greatest degree of exploration and exploitation innovation firm performance.

With regard to the research question, the current findings cannot support an effect of perceived asymmetric interdependence on innovation firm performance. It seems that startups' collaboration relationships are not by default asymmetric and asymmetric interdependence does not necessarily have a negative effect on innovation firm performance. Referring to the network paradoxes of Hakansson and Ford (2002) this research reveals that in terms of startups' relationships to their dominant collaboration partner asymmetric interdependence does not necessarily limit a startups freedom to collaborate or to exit to other partners. Instead, there is a hint that startups can utilize their external relationships for innovation, by further developing alternative partners through brokered access provided by each inter-organizational relationship. Hence, with a focus on utilizing external relationships startups are able to achieve sustainable performance. Perhaps, concentrating on key partners and the development of alternative partners via key collaboration partners enables a startup company to acquire knowledge, resources and information and offers the greatest benefits to remain autonomous by the exploration

of new markets. Even though, asymmetric interdependence in the relationship can make the startup company vulnerable, startups seem to be well established to cope with their weaker position and there are specific means to develop, maintain and increase innovation performance through inter-organizational relationships. The findings indicate that collaboration with powerful partners and the continuous development of alternative partners via partners' intermediary function is a vital mean for achieving sustainable startup performance in terms of balancing exploration and exploitation innovation firm performance.

Startups are not necessarily restricted by the limitations of network paradoxes instead startups tend to effectively cope with their asymmetric interdependence relationships to collaboration partners through distinct mechanisms. In line with Von Raesfeld and Roos (2008) this research reveals that startups are able to maintain their existing business relationships, while keeping their flexibility to develop new businesses at the same time. Intentionally utilizing powerful partners and frequently used inter-organizational relationships as brokers to get access to alternative partners could enable startups to strategically lock of dependence on other actors in order to cope with relational obstacles. Startups need to strategically develop these mechanisms in order to yield the greatest benefits of the relationship to their dominant collaboration partner in terms of balancing explorative and exploitative innovation firm performance. A paramount statement concerning dependence relationships is presented by Ritter, Wilkinson & Johnston (2002) who state that "firms are not able to decide whether to have relationships or not or whether to care about them; the only choice is whether to cope with them effectively and efficiently or not". Hence, it depends on the way how startups cope with unequal interdependence relationships and there are always means to further improve innovation firm performance within interdependence relationships.

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## 10. APPENDIX

**Table5 Comparison of size**

Comparison of Size (n=45)		
Number of Employees	Partner Employees > Startup Employees	87%
	Startup Employees > Partner Employees	11%
	Equal Size	2%
Perception of Partner Revenue	Partner Revenue > Startup Revenue	82%
	Startup Revenue > Partner Revenue	18%
Perception of Partner Sales	Partner Sales > Startup Sales	84%
	Startup Sales > Partner Sales	16%
Estimated Partner Sales Volume	0 - 5.000€	7%
	5.000 - 10.000€	4%
	10.000-50.000€	13%
	>50.000€	76%

**Table6 Descriptive statistics sample**

Sample Companies (n=45)		
Industry Sector	Utilities	2%
	Transportation & Public Utilities	2%
	Communication Technology	17%
	Electronic	2%
	Gas	2%
	Wholesale Trade	3%
	Finance, Insurance & Real Estate	8%
	Services & Retail Trade	13%
	Information	25%
	Professional Scientific & Technical Services	13%
	Management of Companies & Enterprises	3%
Arts, Entertainment & Recreation	10%	
Occupation	Founder	64%
	Leading Managerial Position	27%
	Missing	9%
Most Important Collaboration Partner	other Startup	9%
	Customer	44%
	Supplier	13%
	Distributor	9%
	Consultant	2%
	University	2%
	Competitor	5%
	Funding Agency	5%
other	11%	

## **Table7 Online registers listing startup companies**

Online registers listing German Startup companies

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<http://map.startupdorf.de>

<http://monitor.hamburg-startups.net/startups>

<http://www.deutsche-startups.de/verzeichnisse/startups-a-z/>

[http://www.mweimh.nrw.de/wirtschaft/\\_pdf\\_container/Startup-Verzeichnis\\_NRW.pdf](http://www.mweimh.nrw.de/wirtschaft/_pdf_container/Startup-Verzeichnis_NRW.pdf)

<http://www.exist.de/DE/Netzwerk/Exist-Gruendungsnetzwerke>

<http://www.gruenderimpuls.de/startups-niedersachsen/>

<http://www.gruenderszene.de/datenbank/unternehmen>

<http://www.munich-startup.de/map/>

<http://www.nrw-startups.de/koelner-startups/>

<http://www.startupbrett.de/category/startup/>

<http://www.startupska.de/>

<https://deuschestartups.org/mitglieder/>

<https://rhein-main-startups.com/verzeichnisse/startup-verzeichnis/>

<https://start-green.net/netzwerk/?oid=green-startup>

<https://startup-berlin.com/startups/>

<https://www.startus.cc/companies/startup/germany>

[http://www.mweimh.nrw.de/wirtschaft/\\_pdf\\_container/Startup-Verzeichnis\\_NRW.pdf](http://www.mweimh.nrw.de/wirtschaft/_pdf_container/Startup-Verzeichnis_NRW.pdf)

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**Table8 Excluded survey items from factor analysis**

Excluded survey items from factor analysis ( $r < 0,3$ )

Construct	Survey Item
Startup Power	We use a high level of direct economic reward or punishment and or coercive or physical force with our most important collaboration partner.
Perceived Asymmetric Interdependence	There are enough potential collaboration partners to replace our current collaboration partner. Our most important collaboration partner has technological advantage over other potential partners. We have made significant relation-specific investments for collaboration with our most important collaboration partner. Our most important collaboration partner would face serious financial drawbacks if we withdrew doing business with them. Our most important collaboration partner has made significant relationship-specific investments for collaboration us.
Broker Access Utilization	We intentionally establish relationships with organizations to get access to their large networks.
Trust Expectations	Our most important collaboration partner uses opportunities that arise to profit at our expenses. Based on the past experience we cannot with complete confidence rely on our most important collaboration partner to keep promises made to us. We are hesitant to transact with our most important collaboration partner when circumstances are vague. We trust our most important collaboration partner to treat us fairly. We trust that confidential/proprietary information shared with our most important collaboration partner will be kept strictly confidential. Our most important collaboration partner can be considered to be trustworthy. Our most important collaboration partner never uses opportunities that arise to profit at our expense.
Relationship Strength	* Please indicate the number of years, holding the relationship to your most important collaboration partner. (Relationship Time) * Please indicate how many times in a moth you have business related contact to your most important collaboration partner.(Interaction Frequency)
Exploitative Relation-Specific Innovation Firm Performance	The relationship with our most important collaboration partner enables our company to improve existing products and service quality.
Explorative Overall Innovation Firm Performance	Our company accepts demands that go beyond existing products and services. Our company commercializes products and services that are completely new to our company. Our company frequently utilizes new opportunities in new markets. Our company regularly uses new distribution channels.
Exploitative Overall Innovation Firm Performance	Our company frequently makes small adjustments to our existing products and services. Our company constantly pursues to increase economies of scale in existing markets. Our company constantly seeks to expand services for existing clients. Our company frequently refines the provision's efficiency of existing products and services.

Note: \* Relationship time and interaction frequency are still used separately for hypothesis testing



**Table9 Exploratory factor analysis for independent survey items**

Summary of exploratory factor analysis results for independent survey items (n=45)

Rotated Factor Loadings	1	2	3	4	5	6
We have specific, well-detailed agreements with our most important collaboration partner.	<b>0,795</b>	-0,059	0,018	0,159	0,229	0,060
We have customized agreements that detail the obligations of both parties.	<b>0,790</b>	0,033	0,124	-0,047	-0,113	-0,020
We have detailed contractual agreements specifically designed with our most important collaboration partner.	<b>0,830</b>	0,044	0,069	0,022	0,210	0,094
We have gotten new potential partner contacts through our most important collaboration partner.	-0,004	<b>0,903</b>	0,079	0,033	-0,138	0,089
Our most important collaboration partner opened the doors to other potential collaboration partners.	0,086	<b>0,862</b>	-0,014	0,218	0,190	0,075
We use our most important collaboration partner as a source of information about potential new partners.	-0,102	<b>0,705</b>	0,028	-0,069	-0,134	-0,360
It would require much trouble and expense for our firm to switch to a different collaboration partner.	0,186	0,137	<b>0,795</b>	0,148	0,013	0,006
There are satisfactory alternate collaboration partners available to keep our operations running.	0,100	0,098	<b>0,800</b>	0,186	0,130	-0,028
Our most important collaboration partner has adapted its management methods to work effectively with our company.	-0,035	-0,130	<b>0,788</b>	0,028	0,012	0,146
Our most important collaboration partner used a high level of direct economic reward or punishment and/or coercive or physical force with our firm.	0,045	-0,037	0,329	<b>0,766</b>	-0,282	-0,055
Our most important collaboration partner has access to, influence on, or the ability to impact our firm.	0,012	0,017	0,096	<b>0,778</b>	-0,004	-0,341
Our most important collaboration partner has power to enforce its claims.	0,015	0,185	0,051	<b>0,861</b>	0,178	0,189
Our most important collaboration partner has always been evenhanded in its negotiations with us.	0,199	-0,030	0,038	0,055	<b>0,733</b>	0,104
We are not hesitant to transact with our most important collaboration partner when the specifications are vague.	0,059	-0,122	0,011	-0,066	<b>0,848</b>	0,039
What best describes the role of your most important collaboration partner? (Intensity)	0,003	0,384	0,411	-0,060	<b>0,569</b>	-0,158
We have power to enforce our claims over our most important collaboration partner.	0,556	-0,132	0,061	-0,324	0,056	<b>0,595</b>
We have access to influence on, or the ability to impact our most important collaboration partner.	0,039	-0,004	0,083	-0,030	0,050	<b>0,880</b>
Eigenvalues	3,360	2,943	1,991	1,565	1,502	1,135
% of variance	19,77	17,31	11,71	9,20	8,84	6,68
$\alpha$	0,772	0,787	0,750	0,774	0,647	0,646

Note: Factor loadings over 0,59 appear in bold.

**Table10 Exploratory factor analysis for dependent survey items**

Summary of exploratory factor analysis results for dependent survey items (n=45)

Rotated Factor loadings	1	2
The relationship with our most important collaboration partner enables our company to open up new markets.	<b>0,935</b>	0,042
The relationship with our most important collaboration partner helps our company to enter new technology fields.	<b>0,934</b>	0,031
The relationship with our most important collaboration partner helps our company to extend our product range by developing successful new offerings.	<b>0,912</b>	0,167
The relationship with our most important collaboration partner is beneficial for improving production flexibility.	0,056	<b>0,922</b>
The relationship with our most important collaboration partner enables our company to reduce production cost.	0,097	<b>0,916</b>
Eigenvalues	2,722	1,591
% of variance	54,43	31,81
$\alpha$	0,922	0,816

Note: Factor loadings over 0,7 appear in bold.

**Table11 Identified constructs in PCA, survey questions and operational measures**

Identified constructs after PCA		
Construct	Survey item	Operational measure
<b>Dependent items</b>		
Explorative innovation firm performance	The relationship with our most important collaboration partner enables our company to open up new markets.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	The relationship with our most important collaboration partner helps our company to enter new technology fields.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	The relationship with our most important collaboration partner helps our company to extend our product range by developing successful new offerings.	7-point Likert scale 1-strongly disagree to 7-strongly agree
Exploitative innovation firm performance	The relationship with our most important collaboration partner is beneficial for improving production flexibility.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	The relationship with our most important collaboration partner enables our company to reduce production cost.	7-point Likert scale 1-strongly disagree to 7-strongly agree
<b>Independent items</b>		
Perceived asymmetric interdependence	It would require much trouble and expense for our firm to switch to a different collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	There are satisfactory alternate collaboration partners available to keep our operations running.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	Our most important collaboration partner has adapted its management methods to work effectively with our company.	7-point Likert scale 1-strongly disagree to 7-strongly agree
<b>Moderation items</b>		
Relationship time	Please indicate the number of years, holding the relationship to your most important collaboration partner.	# number of years
Frequency of interaction	Please indicate how many times in a month you have business related contact to your most important collaboration partner.	# number of times
Broker access utilization	We have gotten new potential partner contacts through our most important collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	Our most important collaboration partner opened the doors to other potential collaboration partners.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	We use our most important collaboration partner as a source of information about potential new partners.	7-point Likert scale 1-strongly disagree to 7-strongly agree
<b>Control items</b>		
Startup power	We have power to enforce our claims over our most important collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	We have access to influence on, or the ability to impact our most important collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
Partner power	Our most important collaboration partner used a high level of direct economic reward or punishment and/or coercive or physical force with our firm.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	Our most important collaboration partner has access to, influence on, or the ability to impact our firm.	7-point Likert scale 1-strongly disagree to 7-strongly agree
Trust expectations	Our most important collaboration partner has power to enforce its claims.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	Our most important collaboration partner has always been evenhanded in its negotiations with us.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	We are not hesitant to transact with our most important collaboration partner when the specifications are vague.	7-point Likert scale 1-strongly disagree to 7-strongly agree
Formal control mechanisms	What best describes the role of your most important collaboration partner? (Intensity)	(1) A business acquaintance (4) A business friend (7) A personal friend
	We have specific, well-detailed agreements with our most important collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
Years since founding	We have customized agreements that detail the obligations of both parties.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	We have detailed contractual agreements specifically designed with our most important collaboration partner.	7-point Likert scale 1-strongly disagree to 7-strongly agree
	Please, indicate how many years since foundation of your company have passed?	# Number of years

## 11. SURVEY

Online Survey: Interdependence Asymmetry		
Survey Question	Answer Option	Reviewed Literature
Identification of most important collaboration partner		
Please think about cooperating relationships of your company and indicate who you consider to be your most important collaboration partner. For the remainder of this questionnaire every time you are asked to answer questions based on your most important collaboration partner please refer to the partner indicated here.	(1) Other Startup (2) Customer (3) Supplier (4) Distributor* (5) Consultant (6) University (7) Research Institute (8) Competitor* (9) Funding Agency*	Faems et al., (2005) McGrath & O'Toole (2013)*
What is the approximate number of employees of your most important collaboration partner?	#Number of partner employees	Song et al., (2008) Wang (2011)
Is your most important collaboration partner a larger company in terms of total revenue?	(1) Yes (2) No	Sawers et al.(2008)
Is your most important collaboration partner a larger company in terms of number of total sales?	(1) Yes (2) No	Sawers et al.(2008)

**Liker-Scale Questions:** Please think of the relationship to your most important collaboration partner and indicate whether you "strongly disagree" or "strongly agree" with the following statements.

Partner Power								
Our most important collaboration partner used a high level of direct economic reward or punishment and/or coercive or physical force with our firm.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Tang et al., (2014) Tang & Tang (2012)
Our most important collaboration partner has access to, influence on, or the ability to impact our firm.								Tang et al., (2014) Tang & Tang (2012)
Our most important collaboration partner has power to enforce its claims								Tang et al., (2014) Tang & Tang (2012)
Startup Power								
We use a high level of direct economic reward or punishment and or coercive or physical force with our most important collaboration partner.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Tang et al., (2014) Tang & Tang (2012)
We have access to influence on, or the ability to impact our most important collaboration partner.								Tang et al., (2014) Tang & Tang (2012)
We have power to enforce our claims over our most important collaboration partner.								Tang et al., (2014) Tang & Tang (2012)
Perceived Asymmetric Interdependence								
It would require much trouble and expense for our firm to switch to a different collaboration partner.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Gulati & Sytch (2007) Sawers et al., (2008) Wang (2011) Kumar et al., (1995)
There are enough potential collaboration partners to replace our current collaboration partner. [reverse coded]								Gulati & Sytch (2007) Kumar et al., (1995) Lusch & Brown (1996)

There are satisfactory alternate collaboration partners available to keep our operations running. [reverse coded]									Gulati & Sytch (2007)
Our most important collaboration partner has technological advantage over other potential partners.									Gulati & Sytch (2007)
Our most important collaboration partner has adapted its management methods to work effectively with our company.									Gulati & Sytch (2007)
We have made significant relation-specific investments for collaboration with our most important collaboration partner.									Gulati & Sytch (2007)
Our most important collaboration partner would face serious financial drawbacks if we withdrew doing business with them.									Gulati & Sytch (2007)
Our most important collaboration partner has made significant relationship-specific investments for collaboration us.									Gulati & Sytch (2007)
<b>Explorative Relation-Specific Innovation Firm Performance</b>									
The relationship with our most important collaboration partner helps our company to enter new technology fields.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011) Wang & Hsu (2014)
The relationship with our most important collaboration partner helps our company to extend our product range by developing successful new offerings.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011) Ashnai et al., (2015)
The relationship with our most important collaboration partner enables our company to open up new markets.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011)
<b>Exploitative Relation-Specific Innovation Firm Performance</b>									
The relationship with our most important collaboration partner is beneficial for improving production flexibility.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011)
The relationship with our most important collaboration partner enables our company to reduce production cost.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011)
The relationship with our most important collaboration partner enables our company to improve existing products and service quality.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Fang et al., (2011)
<b>Explorative Overall Innovation Firm Performance</b>									
Our company accepts demands that go beyond existing products and services.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009)
Our company commercializes products and services that are completely new to our company.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009)
Our company frequently utilizes new opportunities in new markets.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009)
Our company regularly uses new distribution channels.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera Crossan 2009
<b>Exploitative Overall Innovation Firm Performance</b>									
Our company frequently makes small adjustments to our existing products and services.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009) Wang & Hsu (2014)
Our company constantly pursues to increase economies of scale in existing markets.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Jansen et al., (2009) Jansen et al., (2006)

								Jansen, Vera & Crossan (2009) Wang & Hsu (2014)
Our company constantly seeks to expand services for existing clients.								Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009) Wang & Hsu (2014)
Our company frequently refines the provision's efficiency of existing products and services.								Jansen et al., (2009) Jansen et al., (2006) Jansen, Vera & Crossan (2009) Wang & Hsu (2014)
<b>Relationship Strength</b>								
What best describes the role of your most important collaboration partner?	(1) A business acquaintance (4) A business friend (7) A personal friend							Lowik et al., (2012) Newbert et al., (2013)
Please indicate the number of years, holding the relationship to your most important collaboration partner.	#Number of years of the relationship							Capaldo (2007)
Please indicate how many times in a moth you have business related contact to your most important collaboration partner.	#Number of times, business related contact							Capaldo (2007)
<b>Broker Access Utilization</b>								
We have gotten new potential partner contacts trough our most important collaboration partner.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Li et al., (2010) Yli-Renko et al., (2001)
Our most important collaboration partner opened the doors to other potential collaboration partners.								Li et al., (2010) Yli-Renko et al., (2001)
We use our most important collaboration partner as a source of information about potential new partners.								Ritter et al., (2002)
We intentionally establish relationships with organizations to get access to their large networks.								Lowik et al, (2012)
<b>Shared Goal Expectations</b>								
In the relationship to our most important collaboration partner both parties are enthusiastic about pursuing collective goals.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Li et al., (2010)
In the relationship with our most important collaboration partner both parties are committed to improvements that may benefit the relationship as a whole and not only the individual parties.								Li et al., (2010)
We share the same ambition and vision in the relationship with our most important collaboration partner.								Li et al., (2010)
In most aspects of the relationship to our most important collaboration partner both parties are jointly responsible for getting things done.								Li et al., (2010)
<b>Trust Expectations in Partner Benevolence</b>								
Our most important collaboration partner uses opportunities that arise to profit at our expenses. [reverse coded]	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree	Gulati & Sytch (2007)
Based on the past experience we cannot with complete confidence rely on our most important collaboration partner to keep promises made to us.[reverse coded]								Gulati & Sytch (2007)
We are hesitant to transact with our most important collaboration partner when circumstances are vague.[reverse coded]								Gulati & Sytch (2007)
We trust our most important collaboration partner to treat us fairly.								Gulati & Sytch (2007)

We trust that confidential/proprietary information shared with our most important collaboration partner will be kept strictly confidential.									Gulati & Sytch (2007)																																							
Our most important collaboration partner can be considered to be trustworthy.									Li et al., (2010) Cao & Lumineau (2015)																																							
Our most important collaboration partner has always been evenhanded in its negotiations with us.									Li et al., (2010) Cao & Lumineau (2015)																																							
Our most important collaboration partner never uses opportunities that arise to profit at our expense.									Li et al., (2010)																																							
We are not hesitant to transact with our most important collaboration partner when the specifications are vague.									Li et al., (2010)																																							
<b>Formal Control Mechanisms</b>																																																
We have specific, well-detailed agreements with our most important collaboration partner.	Strongly disagree	Disagree	Somewhat disagree	Neither agree or disagree	Somewhat agree	Agree	Strongly Agree		Li et al., (2010) Cao & Lumineau (2015) Yang et al., (2011)																																							
We have customized agreements that detail the obligations of both parties.									Li et al., (2010) Cao & Lumineau (2015) Yang et al., (2011)																																							
We have detailed contractual agreements specifically designed with our most important collaboration partner.									Li et al., (2010) Cao & Lumineau (2015) Yang et al., (2011)																																							
<b>Context Questions</b>																																																
Are you the owner or founder of the company? If not, what is your position within the company?	(1) Yes (2) Position:								Hoang & Antoncic (2003) Wang (2011)																																							
How many years since foundation of your company have passed?	#Years since foundation								Song et al.,( 2008) Wang (2011) Fang et al., (2011)																																							
What is the number of employees of your company?	# Employees								Song et al.,( 2008) Wang (2011) Fang et al., (2011)																																							
Which industry sector does your company belong to?	(1) Agriculture, Forestry & Fishing*		(2) Mining, quarrying, oil & gas extraction*		(3) Utilities*		(4) Construction*		(5) Manufacturing*		(6) Transportation & Public Utilities*		(7) Communication Technology		(8) Electronic*		(9) Gas*		(10) Public Administration*		(11) Sanitary Service*		(12) Wholesale, Trade*		(13) Finance, Insurance & Real Estate*		(14) Services* Retail trade°		(15) Warehousing°		(16) Information°		(17) Real Estate Rental & Leasing°		(18) Professional Scientific & Technical Services°		(19) Management of Companies & Enterprises°		(20) Administrative support, Waste management & remediation services°		(21) Arts, Entertainment & Recreation °		(22) Accommodation & Food Services°		(23) Other Services (except public administration)		(24) Other:	