Chapter 1: The Effects of Prior Experience in the Context of University-Industry Linkages

Abstract
Under consideration of constantly adapting to changing environments and markets, organizations are increasingly engaging in alliances. In doing so, one significant factor gaining increased attention is the effect of alliance experience. Understanding university-industry linkages (UILs) as an alliance form, this literature review reflects on (strategic) management and UIL literature to provide insight on the effect alliance experience has on 1) the organizational level and 2) the individual level. The discussion distinguishes between having alliance experience in general and a specific partner on the organizational level and between having prior experience in conducting UILs and prior experience in working in the opposite environment, on the individual level.

Keywords: alliance experience, individual and organizational experience, university-industry linkages

1. Introduction
Alliances as one of the most important organization forms (Anand and Khanna, 2000) are receiving increased attention in literature and practice. Referring to resource-based research and organizations’ pursuit of creating competitive advantages, Barney and Arikan (2001) emphasize how firms engage in alliances to “either exploit their pre-existing resources or to develop new resources” (Barney and Arikan, 2001, p. 170). This is similar to the claim by Harrison et al. (1991), stating that using alliances to gain complementary resources is a well-established form of securing a competitive advantage. Closely related to the topic of the resource-based view is the one of dynamic capabilities (Barney et al., 2001), which is suggested to be a process organizations engage in to expand their resource base and thereby gain a competitive advantage (Eisenhardt and Martin, 2000). One way of expanding an organization’s resource base is to learn from experience (Barney et al., 2001; Grant, 1991). Similarities between dynamic capabilities and alliances with the aim of creating a competitive advantage are found in that they are both dynamic in nature and that experience contributes significantly in constantly improving and advancing organizations in managing capabilities and alliances to achieve overall success (Kale et al., 2002; Kale and Singh, 2009).

For the purpose of this literature review, the term “alliance” is to be regarded as a “voluntary agreement between firms involving exchange, sharing or co-development of products, technologies or services, which can occur as a result of a wide range of motives and goals” (Gulati, 1998, p. 293). Considering this definition and by endeavoring to specifically enhance the knowledge and technology transfer (KTT) between universities and industry, university-industry linkages (UILs) can be regarded as a form of an alliance between two different types of organizations. Several aspects can be learned by drawing on social network and social identity theory in respect to knowledge transfer networks, which can thus be made applicable to UILs. For alliances to function, individuals need to engage in interaction, from their base with a partner on the other side. In participating in prolonged

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interaction, this requires working with and engaging the differences in norms, habits and routines that apply for each of these different organizations.

In understanding and identifying potential solutions and approaches for overcoming collaborative challenges that organizations face while engaging in alliances, the literature provides insight and offers suggestions drawing from various research fields such as (strategic) management and organizational learning literature. One significant aspect presented is the one of benefiting through learning and the resulting experience acquired when engaging in alliances (Sampson, 2005; Anand and Khanna, 2000). The relevance of experience is apparent on many different levels within an organization and its various objectives. Experience does not only support an organization in improving its production performances but also its organizational performance such as gaining the additional competence of managing collaborations (Sampson, 2005). Gioia et al. (2013) argue that past experiences serve as a key internal resource of organizations for determining organizational identity formation processes. In the pursuit of constructing an identity, individuals of that organization refer to their past experience with other organizations (Gioia et al., 2010). Drawing from past experiences is also a topic in the network and resource dependency theory in analyzing inter-organizational ties and, more specifically, the alliance formation patterns of organizations within a social context (Gulati, 1995, a and b). Adding to this is Zollo et al. (2002) who propose that if organizations have alliance experience with the same partner, the likelihood of continuing work with that partner is very high, even more so in case the alliance is contract bound. The basis of such a continuation most probably resides both at the organizational and through the collaborative experience of individuals. The experience at the organizational level ties in with the finding that alliance capability of organizations increases over time – the more alliance experience an organization has, the better the organization is at managing numerous alliances concurrently (Rothaermel and Deeds, 2006). Looking at alliance formation from a transaction cost economics perspective, Gulati (1995a) found that social aspects need to be considered in the formation of such linkages. While organizations repeatedly engage in new alliances with each other, trust between the partners emerge and prevents opportunistic behavior (Gulati, 1995a and b). Using trust as a mechanism to manage alliances one has to note that trust is not only a mechanism on the individual level but also on the organizational level. As suggested by Faems et al. (2008) who looked at trust dynamics in alliances, the more trustworthy the relationship on the operational (individual) level, the more trust is present on the managerial (organizational) level. Subsequently, trust shapes the manner in which organizations and people from these organizations handle operational, contractual and action aspects of the collaboration. This argument stresses that it is important to not only understand alliance dynamics and its facets caused by experience on the organizational but also on the individual level.

Continuing this thought is the finding of Bergen et al. (1992), who propose that individuals act on behalf of the organizations involved in the linkage and, as a result of this, the behavioral patterns and beliefs of the organization are communicated through the individual to the cooperation partner (Bond III et al., 2008). This implies that when extended collaboration relationships are initially built identity issues need to be solved. It is postulated that an individual’s identification with an institution is a key factor for determining the commitment, which indicates that the more an individual identifies with the organization, the higher the effective commitment to that institution is (Bergami and Bagozzi, 2000). When relating the benefits of knowledge transfer and individual identification to each other, Houston et al. (2001, p. 21) suggest that an individual acts, thinks and feels more towards achieving the overall aim of that knowledge transfer network when the parent organization values
these relations. This means, more specifically, that by demonstrating a greater effort and thereby adding more value and benefit to the relationship, organizations are more likely to have their employees engage in a partnership with that specific partner, building a relationship across differences and focusing on establishing a common alliance identity (Morgan and Hunt, 1994). Based on the aforementioned arguments, it can be concluded that an organization and individual acting as part of that entity are closely intertwined and interrelated. This implies that, when seeking to understand UILs activities and behavior, the aspect of experience needs not only to be considered on the organizational level but also on the individual level.

This paper takes this thought into consideration by first reflecting on discussing findings that relate to the alliance experience of organizations, thus the organizational level. The effects of experience on an individual level are addressed in the second part of the literature review and more specifically in the context of UILs as an alliance form. Both viewpoints provide a relevant contribution to literature as it links findings from (strategic) management literature to UILs and thereby gives a broader overview of the relevance prior experience has.

2. Literature Review

2.1. The effect of experience on the organizational level

In the process of maximizing alliance success, practitioners and academics are increasingly concerned with determining the underlying factors of such relationships (Shah and Swaminathan, 2008). Several academics (e.g. Reuer et al., 2002; Gulati, 2009; Sampson, 2007; Anand and Khanna, 2000; Hoang and Rothaermel, 2005; Kale et al. 2000) identified that experience plays a central role.

When considering the factors affecting the stability of an alliance, Jiang et al. (2008) point out that experience matters in various phases of alliance evolution, such as the partner selection and implementation. Having a record of prior experience in conducting alliances, organizations learn and thereby are better able to adapt to sudden changes in the relationships. The implementation of alliances is facilitated, as trust between the partners can be established and control mechanisms for handling the alliance can be reduced (Jiang et al., 2008). Research findings by Kale et al. (2000) show that organizations having experience in conducting alliances, demonstrate a higher ability to identify suitable partnering opportunities as well as finding an appropriate partner. The managing of future alliances and, specifically, the selection of partners may be facilitated through the development of various supporting tools such as manuals and databases (Hoang and Rothaermel, 2005). Emerging with alliance experience is the development of routines (Sampson, 2005; Hoang and Rothaermel, 2005; Gulati, 2009; Reuer et al., 2002; Rothaermel and Deeds, 2006), which relate to operational activities as well as managerial procedures (Li et al. 2008). In this respect, scholars (Kale and Singh, 2009; Lin et al., 2009) point out that for the management of alliances it is of importance to develop and implement organizational routines and structures which support the management and performance of alliances. The development of such routines has to be considered with caution as it may lead organizations to rely on the current skills and thereby forgo the opportunity to display a good performance in case the definition of success has changed (Baum and Ingram, 1998). It may well be that a partner has a different view of what success means for this specific institution, therefore it is important to set a common ground for the definition of success and to eventually adjust existing routines.

Further, being experienced in conducting collaborative work, signals to potential partners to be an attractive choice, thereby securing and easing the process of finding future partners (Sampson, 2007;
Reuer et al., 2002). The formulation of alliance content and boundaries as well as the management of the relationship is enhanced with advanced experience levels and the accompanying mechanisms and skills.

When analyzing the effect of prior experience, one has to distinguish between collaboration experience with the same partner and being experienced in conducting collaborative work in general (Sampson, 2005; Gulati, 2009; Hoang and Rothaermel, 2005). Looking at the effect of alliance experience from an organizational learning standpoint, the findings suggest that while general alliance experience positively influences the alliance success, experience with the same partner does not. In both scenarios, the overall success of the linkage diminishes over time (Hoang and Rothaermel, 2005). On the contrary, Sampson (2005) found that acquired experience with the same partner enhances the project outcome and additionally supports the overall effectiveness of attaining a successful relationship with that partner. Interesting to note is the fact that relationships characterized with high uncertainty with respect to the expected outcome, are more affected by prior experience that those with low-uncertainty (Sampson, 2005). Both studies conclude that the learning effect of the organization and additional knowledge acquired in that alliance are reduced with advancing experience (Sampson, 2005; Hoang and Rothaermel, 2005). Supporting the findings of Sampson (2005) is Gulati (2009), who in this respect proposes that organizations benefit more from the alliance when drawing from partner-specific experience. This outcome calls for developing alliance strategies with partners for the long term. The differences among the studies may be reasoned in the fact that the alliance performance was measured differently. As such, Hoang and Rothaermel (2005) investigated the pharmaceutical and biotechnology industry and set the drug approval as a measure for alliance success, whereas Gulati (2009) focused on the benefits gained for an organization (Gulati, 2009). Based on this difference, the finding of the effect of alliance experience with the same partner cannot be generalized. This may be reasoned by the fact that each alliance with a partner is highly individual, thus heterogeneous (de Rond and Bouchikhi, 2004), by following and adhering to its own rules as well as procedures, and that only broad generalizations can be made. While UILs are to a great extent very individual, the management of UILs could be supported by establishing a history of working together, thus making UILs more productive at the organizational level. Also enabling and integrating mechanisms to deal with heterogeneous partners is of use to manage linkages effectively.

Based on the individualization of each alliance, it is obvious to say that not only do organizations differ in their characteristics; the persons engaged in such linkages also vary in terms of their characteristics. One aspect which can be stated is that it is the individuals in an organization who dispose over experience in conducting and managing alliances due to their previously gained experience (Kale and Singh, 2009).

2.2. The effect of experience on the individual level

As the attention and importance of UILs as innovation drivers are continuously increasing, so is research on the topic. Researchers identified individual specific characteristics relevant for explaining how and why academic researchers engage in UIL activities, which include for instance the gender, age, academic rank, previous experience in either the industry or in UIL activities in general (Bjerregaard, 2010; Bruneel et al., 2010; van Rijnsoever and Hessels, 2011; van Rijnsoever et al., 2008; Boardman and Ponomariov, 2009; Giuliani et al., 2010; D’Este and Patel, 2007; Klofsten and Jones-Evans, 2000; Bekkers and Bodas Freitas, 2008; Martinelli et al. 2008; Louise et al., 1989;
Clarysse et al., 2011; Dutrénit et al., 2010; van Dierdonck et al., 1990; Lin and Bozeman, 2006). Others focused on organizational specific aspects to determine academic researchers’ participation in UILs, such as the type of higher education institution, available funding, area of knowledge and center affiliation (Boardman and Ponomariov, 2009; Ponomariov, 2009; Ponomariov, 2008; Bozeman and Gaughan, 2007; Lee, 2000; Nilsson et al., 2010; Link et al., 2007; Boardman, 2009; Boardman and Corely, 2008). In understanding individual motivation for engaging in UILs and formation of those relationships, intensity of conducting UIL activities and type of UILs, scholars articulate that neither individual nor organizational factors can be regarded separately; rather it is a combination of both. Individual factors put in relation with having previous experience D’Este and Pate (2007) suggest that experience on the individual level outweighs the importance of organizational characteristics when explaining the variety of UIL activities an academic researcher is engaged in. Thus, it seems as though both characteristics play an important role in explaining academics engagement in UILs, however in different ways. Individual factors can be regarded as the driving force of UILs and are supported, enhanced and fostered with organizational characteristics. Throughout the literature it is argued that characteristics related to the individual play a dominant role in explaining academics UIL involvement. However, the question remains as to whether these are located sufficiently in the context and history of UILs performed at the organizational level.

One essential and reoccurring topic is the aspect of individuals having prior experience, not only in conducting UILs in general (D’Este and Patel, 2007) but also having gained experience while working in the opposite environment (Lubango and Pouris, 2007; Lin and Bozeman, 2006; van Rijnsoever et al., 2008) – that is e.g. academics working in industry. The following paragraphs elaborate on these two types of experience and the effect they have on the individual level.

Prior experience in the opposite environment

Prior to providing an overview of research results incorporating the factor of having prior experience in the opposite work environment, it has to be noted that a vast scope of existing literature does not consider this factor solely, but rather in combination with other individual and/or organizational factors. The following paragraphs only reflect on results emerging from investigations that consider prior experience separately.

Previous research study identified prior experience in the opposite working environment to be of great influence on individual UIL activities. Not only does previous working experience equip academic researchers with the ability to better understand their counterparts and to adapt more easily to organizational and attitudinal differences, thereby lowering the barriers to UIL (Bjerregaard, 2010; Bruneel et al., 2010) but also to enhance the knowledge transfer between the institutions (Lubango and Pouris, 2007). However it has to be noted that, despite having worked with universities before, barriers related to the administrative bureaucracy and intellectual property rights are reduced only slightly, whereas barriers related to the management and interaction of both parties can be minimized through prior experience (Bruneel et al., 2010). In seeking to advance UILs activities in South African universities, in particular in the area of creating inventions and patenting them, Lubango and Pouris (2007) suggests employing academics who have previously worked in industry, as they are more likely to engage in inventive activities. The shift in behavior in UIL activities may be reasoned in the fact that, as a former employee of a company, individuals can better identify and place themselves into the position of what might be demanded from the standpoint of a company, and thereby are better able to combine and understand differences in university and industry settings. The findings of Gioia et al. (2010) also partially explain academics behavior when
having worked in industry before, as individuals draw from past experiences with other organizations.

When relating the years of experience at other universities or in industry to the network activity academic researchers have and to the discipline the research is conducted in, it was suggested that the more years spent at another institution (university/organization), the greater the industry network activity is (van Rijnsoever et al., 2008). Researchers with about 20 years of work experience are the most active in networking, which broadens the contact base and provides them with a benefit over other researchers, while younger and more senior persons lack the great repertoire of contacts (van Rijnsoever et al., 2008). This may be reasoned in the fact that, the longer the tenure of the academic researcher is, the greater the chance of him/her having established a network to work with (Lee and Bozeman, 2005). A greater scientific and technical human capital (S&T human capital) to be able to support students was also identified for academics with previous careers in industry (Lin and Bozeman, 2006). In their work, they refer to a person’s S&T human capital as the “knowledge and skills and ties to professionally relevant networks” (Lin and Bozeman, 2006, p. 271), where the knowledge and skills address the ability to produce the knowledge and the network serves to disseminate the knowledge. An engagement in more patent applications was detected by Lubango and Pouris (2007). One explanation for the enhanced patent awareness may be due to the additional knowhow and better understanding of the patenting potential. A factor identified as a predictor for determining the intensity and likelihood for academic researchers to be engaged in UIL activities is having worked as a consultant before (Ponomariov and Boardman, 2008). Adding to the intensity of UIL activities, research conducted by Lin and Bozeman (2007) found that academics having held a position in industry were by far more active in engaging in joint collaborations. When having a look at specific UIL activities, it was shown that a career in industry leads academics to producing fewer publications compared to those who pursue a purely academic career; but on the other hand, however, the amount of students supported increases (Lin and Bozeman, 2006). This finding can be extended by results provided by Clarysse et al. (2011), who identified that being previously involved in entrepreneurial activities heightens academics’ possibility to act in an entrepreneurial way themselves.

**Prior Experience in UILs**

Compared to the literature elaborating the effect of prior experience in the opposite working environment on individual UIL activities, research on experience in conducting UIL is not as extensive. However, the effect of individuals having prior experience in conducting joint projects and working with different partners is recognized and acknowledged in literature and practice (Barnes et al., 2002).

Previous research has demonstrated that prior experience plays a key role in understanding and explaining individual behavior in UILs. Based on a study conducted in the UK, analyzing the extent to which prior experience in conducting UILs has an effect on the variety of activities engaged in, it was concluded that, the variety of UIL activities is generally greater in the event that academics have prior work experience with industry (D’Este and Patel, 2007). This indicates that individuals have more knowledge, gained through the experience, which is beneficial to numerous UIL activities.

From a relational point of view, Petruzelli (2011) found prior ties between university and organizations to be more efficient and effective in respect to organizational and coordination efforts, as those relationships are more trustful and goals are better agreed on. This finding was also made
earlier by Hagedoorn and Schakenraad (1994) who indicate that collaboration success in prior linkages increases the probability of future engagement with that partner. Plewa and Quester (2008) extend this thought by suggesting that individual experience in UILs strengthens the development of such relationship, as they have a better understanding of the counterpart’s needs, demands and requirements and can thereby better relate to the background of the partner.

Not only does prior experience in UILs affect linkages as a whole but it also impacts the attitude individuals have in respect to their counterpart. Van Dierdonck et al. (1990) detected that individuals undergo an attitude shift towards industry partners, going from a rather reluctant and skeptic attitude to a more open and appreciating one. This attitude shift may be reasoned in the fact that, with increased experience in working with partners from industry, they can better identify with and understand possible concerns they might have. A change in the attitude towards the industry counterpart may also be caused as the academics realize the great benefit and value of the collaboration and its effect on their research. Constructing a common alliance identity, as suggested by Morgan and Hunt (1994), is certainly supported by a greater appreciation of the industry partner.

When taking about specific abilities individuals gain through being involved in numerous UILs, D’Este et al. (2012) identified that for academic entrepreneurship, prior collaboration experience with industry partners leads to an increased ability to exploit technological opportunities. This is reasoned in the fact that while academics research on products potentially suited for the market, they gain a greater understanding of the market’s needs, environment and organization’s processes (D’Este et al., 2012). In addition to that, Reagans et al. (2005) suggest that experience leads individuals to be more competent and confident in their actions, which eventually results in a better performance. An advanced set of abilities gained through experience may lead individuals to behave differently. As such Lam (2010) identified that, in order to set the boundaries of the linkage, individuals try to influence their industry partner’s expectations. Demonstrating a clear separation of academia and industry territories was presented as one way academics could avoid interest discrepancies and thereby also critical situations (Lam, 2010).

With advancing UILs experience levels, Bercovitz and Feldman (2008) propose that through the engagement in professional relationships individuals have the opportunity to be observant and thereby learn which behavior is most applicable in certain situations. As such, individuals with advanced experience levels in UILs engage in routines that result from certain behavior and procedures that have proven successful in previous collaboration projects (Bruneel et al., 2010). Routines that emerged while partners collaborated on a frequent basis relate to the agreement of shared research targets and outcomes (Gomes et al., 2005), the dissemination of those (Hall et al., 2003) and the time frame for delivering these (van Dierdonck and Debackere, 1988). More specifically, certain strategies for engaging in UILs and selecting partners, as well as for defining the project objectives, optimizing UIL processes or making use of research results were identified (Bjerregaard, 2009).

While routines developed on the individual level are regarded beneficial to achieve project success, routines acquired on team level do not lead to additional intellectual advantages (Dutrénit et al., 2010) but rather to economic benefits gained from experience in working as a team.
3. Conclusion

By drawing from (strategic) management theory, organizational learning and UIL literature, this review commenced by elaborating the effect of alliance experience on the organization, where a distinction between partner specific experience and general alliance experience was made. The second part was dedicated to the analysis of the individual level, more specifically in UILs. Here, two viewpoints were addressed – namely academics having experience in working in industry and its influence on UIL activities as well as academics being experienced in conducting UILs in general. The literature review considered the aspect of prior experience as a separate item and thus did not extend the discussion about the interrelationship and combination of experience with other individual and organizational factors impacting on individual or organizational behavior. To summarize, it can be concluded that the aspect of prior experience in UIL is of great importance on the organizational as well as on the individual level. Based on the premise that individuals actually engaged in the linkage act on behalf of the organization (Bergen et al., 1992), issues related to the experience levels of the organization do impact the individual level.

From the discussion it becomes clear that experience affects organizations and individuals engaging in linkages to a similar extent. As such, alliance experience both on the organizational level and individual level lead involved participants to engage in and establish routines (Sampson, 2005; Hoang and Rothaermel, 2005; Gulati, 2009, Reuer et al., 2002; Gomes et al., 2005; Hall et al., 2003; Dierdonck and Debackere, 1988; Bruneel et al., 2010). The routines apply to managerial procedures (Li et al. 2008) as well as to operational activities, such as preparing protocols. With increased alliance experience, these routines become more refined so as to get the greatest benefit out of such linkages. However, in this respect one must consider that, due to the dynamic and highly heterogeneous nature of each alliance (de Rond and Bouchikhi, 2004), only certain aspects can be formulated into routines. The interrelationships of individuals and their handling with each other cannot be routinized. This conclusion can be associated with different findings regarding the advantage/disadvantage of cooperating with the same or different partner in respect to the alliance outcome (Gulati, 2009; Sampson, 2005; Hoang and Rothaermel, 2005). As the alliance outcome is measured differently in each alliance, this also demonstrates the heterogeneity of such linkages. Therefore the only commonality is the aspect of having experience.

In collaborating, another effect of having experience is that partners gain a better understanding of how to handle and approach the counterpart, which eventually establishes a foundation based on trust for the involved parties (Petruzzelli, 2011; Jiang et al., 2008). Under consideration of the development of routines and trusting relationships it must be noted that, with increased experience, the learning capabilities decrease after a certain time spent working with that partner, eventually leading to a reduced overall performance (Hoang and Rothaermel, 2005; Sampson, 2005). Thus individuals and organizations must be careful not run into the trap of relying on established capabilities and not leaving room for further development.

Opposing findings were detected regarding the effects of experience made with a specific partner on the organizational level. Here, the contrasting statements argued the relevance of partner specific experience in respect to alliance outcome (Hoang and Rothaermel, 2005; Sampson, 2005).

Experience effects, specifically related to UILs, indicate observations regarding individuals’ network activity and engagement in various types of UILs as well as attitudinal shifts and differing behavior patterns (D’Este and Patel, 2007; Lam, 2010; Bercovitz and Feldman, 2008; Van Dierdonck et al.,
1990; Clarysse et al., 2011; van Rijnsoever and Hessels, 2011; Boardman and Ponomariov, 2009; Lin and Bozeman, 2007; van Rijnsoever et al., 2008; Lubango and Pouris, 2007).

Concluding, experience in terms of UIL, whether on the organizational and/or individual level bears great insight in explaining and understanding the behavior of organizations and academics and can potentially explain variance in the success of this particular type of alliances.

4. Future Research Directions
Based on the above discussed literature review addressing the effect of prior experience – both on the organizational level and individual level – several future research directions can be formulated.

Referring to the differences noted on the behavioral and attitudinal level of academics, it would be of interest to study this aspect in more detail. As UILs require representatives from both institutions, a related area is to investigate whether the behavioral and attitudinal differences are similar for industry and academic representatives, with increased experience levels.

As only a few studies investigated relational aspects of UILs, it is of interest to dedicate additional research to elaborate on specific components relating to interpersonal relationships between individuals with advancing experience levels. Empirically looking at dyadic relationships would be of great interest, as both partners engaging in UILs can be analyzed.

Considering the premise that individual and organizational factors both contribute to perform successful UIL, it is worth studying the insights from experienced academics, in retrospective on the institutional supporting mechanism that were and were not useful. In doing so, the individual perspective is connected with the organizational level of a university.

As pointed out by Kale and Singh (2009) and Lin et al. (2009) organizations need structure and organizational routines to efficiently engage and manage alliances. In this respect, when developing, implementing and translating structures into practice, it is of interest to investigate how the organizational level interacts with the individual level. This holds true especially in respect to the development of an alliance management system and system to support individuals in better managing alliances.

All future proposed research directions hold potential to be subject of longitudinal studies and studies comparing countries.