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Dealing with the Post-Honeymoon Blues: Tensions and Governance in Industry-University Alliances

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Abstract Industry-university (IU) alliances are often subject to tensions caused by the dissimilarities between industry and university partners. Interestingly, due to a honeymoon effect, these tensions may not necessarily emerge immediately. However, shortly after the alliance is initiated, the likelihood of tension seems to increase rapidly. Thus, early detection of potential tensions seems crucial to the success of IU alliances. This paper explores how these tensions emerge and can be effectively managed through an exploratory study of two IU alliances in the energy sector. Based on our cases, we identified four types of dissimilarities (i.e., orientation-based, routine-based, administrative, and personal) that may lead to different types of tensions (i.e., orientation, routine, transaction, and distinctive), which in turn may be addressed through different governance mechanisms (i.e., communication, flexibility, contracts, and hierarchy). Beyond contributing to the literature on IU alliances, our exploratory study may help managers of these alliances in identifying potential tensions and effective governance practices.

1 Introduction

Industry-university (IU) alliances are an important phenomenon. IU alliances can have an enormous positive impact on innovation, as firms and universities have much to offer one another (e.g., Bishop et al. 2011; Du et al. 2014). Universities can generate high-quality research output and are aware of the latest developments in their field. Moreover, compared to other partners, universities are less likely to engage in competitive and opportunistic behavior (Breschi and Lissoni 2001; Du et al. 2014). At the same time, firms can provide funding and valuable research opportunities to universities (Bruneel et al. 2010).

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Despite the potential benefits, existing research on IU alliances emphasizes the tensions or barriers firms and universities face in their collaboration. For instance, Bruneel et al. (2010) argue that the different nature of university and industry partners may lead to orientation-related and transaction-related barriers. The former may occur, because universities and industry partners tend to have differing ideas about the way knowledge should be created and appropriated (Bruneel et al. 2010). Furthermore, their attitude towards the alliance goal, reciprocal objectives, and the alliance scope might differ (e.g., Estrada et al. 2016). On the other hand, transaction-related barriers appear when it is unclear to whom intellectual property belongs or when university administration challenges the collaboration (Bruneel et al. 2010). Additionally, other aspects such as routine-based dissimilarities (e.g., different communication and decision-making behavior) may challenge IU alliances (Estrada et al. 2016).

Interestingly, prior studies concluded that during early stages of IU alliances, the partners might not necessarily encounter these barriers, even when dissimilarities do exist at that point (Estrada et al. 2016). This phenomenon is described as the honeymoon effect (Fichman and Levinthal 1991). Over time, however, dissimilarities become noticeable and are more likely to provoke tension. Thus, early detection of potential tensions and barriers seems key to the governance and outcome of IU alliances (Bruneel et al. 2010; Lavie et al. 2012).

While extant research acknowledges the relevance of this phenomenon and provides valuable insights into the topics of dissimilarities, tensions, and governance, an in-depth examination of the connections between these issues in IU alliance formation is yet to be carried out. Therefore, this study seeks to explore how different types of dissimilarities and tensions emerge and can be managed through different governance mechanisms in the formation phase of IU alliances. We conducted an exploratory case study of two IU alliances in the energy industry. For theory, our study seeks to contribute to a richer understanding of the dynamics of IU alliance formation and governance. For managers, we expect to provide some recommendations for the effective design and governance of IU alliances. Overall, we expect that our study helps identifying tensions and barriers in IU alliances and potential strategies to overcome them.

2 Theoretical Framework

Scientific research has become a key knowledge source for commercial innovation (Du et al. 2014; Bruneel et al. 2010). Nonetheless, partners within IU alliances are known for having dissimilar perspectives and priorities in what concerns knowledge value and management (e.g., Carayol 2003). Industry players often engage in an alliance with strategic intentions: they strive to obtain a dominant competitive position through the integration, construction, and reconfiguration of internal and external competences (Teece et al. 1997). In order to withhold the competition, knowledge is traditionally regarded as a key resource that should be appropriated

and protected (Wernerfelt 1984). Contrarily, scientific research is generally aimed at the creation of reliable and public knowledge (Bruneel et al. 2010). Therefore, universities are regarded as independent institutions providing access to scientific knowledge (Du et al. 2014). This conflicts with the industry's perspective to protect knowledge. Because of this fundamentally different perception towards knowledge, collaboration between industry and universities is often regarded as challenging (e.g., Carayol 2003; Dasgupta and David 1994).

2.1 Formation of IU Alliances

Although collaboration between industry and university partners has been regarded as challenging (Carayol 2003), scholars and practitioners have become more open towards this type of collaboration (Bishop et al. 2011; Chesbrough 2003). The open perspective towards innovation regards the firm as the center of a network, which uses external actors—such as universities—as a source of innovation (Chesbrough 2003). Findings from several studies such as George et al. (2002) demonstrate that IU alliances can positively influence the firm's innovation and economic performance, because the required R&D expenses are relatively low, while the levels of innovative output are high.

Eisenhardt and Schoonhoven (1996) argue that alliance formation is stimulated by strategic and social needs. They propose that from a strategic perspective, firms engage in an alliance when the benefits of forming the alliance exceed the benefits of proceeding alone. From a social perspective, they argue that firms form an alliance when they know that the potential partner is a trustworthy and valuable companion. Similarly, prior experience with IU collaboration increases the likelihood that a firm or university will engage in a collaboration with that partner again (D'Este and Patel 2007; D'Este et al. 2013; Gulati 1995). In IU alliances, both strategic and social needs are visible at the industry side. Strategically, universities can provide low-priced access to high-quality knowledge (Du et al. 2014). Socially, universities are regarded as trustworthy partners, because they are not in a competing position (Bruneel et al. 2010). Although IU alliances are viewed as a win-win game, less attention has been paid to the university's rationale of forming these alliances (Bishop et al. 2011; D'Este and Patel 2007). Thus, Du et al. (2014) have requested for a more detailed analysis of the interaction and contributions of both types of partners.

According to Doz et al. (2000), the process of alliance formation can be emergent or engineered, depending on the environmental interdependence between partners. In the emergent path, environmental interdependence is high, and partners are driven by similar interests (Doz et al. 2000). This situation often involves a market event by which all partners are affected. By joining forces, technological components can be combined to generate new innovation, or a shared standard can be created to stimulate a certain technology. In the engineered path, environmental interdependence is low, but alliance formation is driven by a triggering entity (Doz

et al. 2000). In this case, an external institution or individual plays a substantial role in connecting the alliance partners. This triggering entity often has the lead in defining the alliance goals, partner contributions, and alliance governance. In IU alliances, however, the process of alliance formation can be more complex. On the one hand, pooling diverse entities can be a valuable source for new ideas, and it can ease the process of commercializing them (Chesbrough 2003; Deng and Hendrikse 2017). On the other hand, environmental interdependence is generally low, because partners do not necessarily depend on the success of the alliance (Carayol 2003; Gulati 1995). Because of this complexity, further research on the collaborative dynamics during the formation stage of IU alliances is needed.

2.2 Dissimilarities in IU Alliances

Scholars seem to have reached a consensus on the essence and risks of dissimilarities between industry and university, each forming their own tensions and barriers[1] (Bruneel et al. 2010; Carayol 2003; Cyert and Goodman 1997). First of all, orientation-based dissimilarities form a barrier in IU collaboration (Bruneel et al. 2010; Estrada et al. 2016). These involve dissimilar goals, such as the contrasting incentives for university and industry partners to engage in an alliance, as the products they deliver are substantially different (Cyert and Goodman 1997; Dasgupta and David 1994). Universities aim to generate state-of-the-art knowledge, to find proof for theoretical concepts, and to publish their findings (Carayol 2003). Conversely, companies aim to access new knowledge to stimulate innovation and to eventually increase their profits. Furthermore, expectations can differ, for instance, in what concerns reciprocal obligations, alliance scope, and alliance horizon (Estrada et al. 2016). Orientation-based dissimilarities increase the probability that tensions arise in an IU alliance and increase the likelihood for an IU alliance to fail shortly after the alliance has been initiated (Bruneel et al. 2010; Estrada et al. 2016). Despite these findings, scholars call for further research on the topic (Estrada et al. 2016).

Routine-based dissimilarities originate from the proposition that universities and firms fundamentally differ in culture and working behavior (Cyert and Goodman 1997; Estrada et al. 2016). These cultural differences become apparent in terms of language, learning, time perception, and behavior. Language and learning differences are regarded as a result of cognitive distance (Muscio and Pozzali 2012). An example of this is when a specialized professor uses jargon to explain a studied phenomenon to a less specialized company representative. Furthermore, time perception differs, because companies are often oriented at short-term deadlines, whereas university research is commonly based on long-term investigations (Du et

[1] In this study, we do not make an explicit distinction between "tension" and "barrier." We use both terms interchangeably to refer to challenges or situations of conflict in the context of IU alliances.

al. 2014; Muscio and Pozzali 2012). Estrada et al. (2016) point to other examples of routine-based dissimilarities, such as differences in decision-making or task execution. These authors suggest that, assuming that no other dissimilarities are present, these dissimilarities can lead to tension when the alliance partners put no coordination efforts to mitigate them.

Transaction barriers or tensions are partly related to orientation barriers, because they are often a result of the different orientations of universities and industry partners (Bruneel et al. 2010). However, transaction barriers are more related to patent filing or other time-consuming, administrative procedures that are required in IU alliances. An illustrative example of a transaction barrier is the conflict concerning intellectual property (Bruneel et al. 2010). As the provider of knowledge, universities may expect that the property rights belong to them. At the same time, companies claim their part of the property rights based on their financial contribution to the project. In some cases, this barrier is so strong that the IU alliance cannot be established (Hall et al. 2001). Further, whereas universities aim to publish new findings, firms tend to protect it from leaking to the competition (Dasgupta and David 1994). To prevent these conflicts, contracts are often developed by universities and technology transfer offices, which can lead to an amount of administration that in turn forms a new transaction barrier (Bruneel et al. 2010). Nonetheless, Bruneel et al. (2010) highlight that the relationship between university coordination and transaction barriers should be further explored.

2.3 Governance of IU Alliances

The way in which IU alliances and the accompanied tensions are managed can be explained by the governance structures that are applied. Alliance governance literature has been clearly divided into two theoretical perspectives: the structural and the relational perspective (Madhok 1995; Barney and Hansen 1994; Faems et al. 2008). The structural perspective is characterized by a single transaction focus, in which alliance partners are assumed to act opportunistically (Faems et al. 2008). Under the assumption of opportunism, firms are inclined to use control mechanisms to protect their private interest (Parkhe 1993). The relational perspective is characterized by an interfirm relational focus in which partners are assumed to act in a way that is trustworthy (Barney and Hansen 1994; Faems et al. 2008). This perspective is based on the social exchange theory (Blau 1964), which builds on the assumption that a person's actions in a relationship are based on the expected rewarding reactions from their partner (i.e., reciprocity). Trust is a vital aspect of the relational perspective, because it can provide alliance partners with assurance about their partners' competence and their intentions to collaborate (Dyer and Singh 1998). Therefore, these two perspectives tend to suggest different governance mechanisms, both structural and relational (Faems et al. 2008).

Following the structural perspective, contractual safeguards are commonly used to enforce control in an alliance (Parkhe 1993). Contracts can be particularly beneficial when transaction barriers are present in the IU alliance (Bruneel et al. 2010). For example, to prevent universities from publishing essential information, legal clauses are added into the collaboration agreement. Besides reducing alliance risk, contracts can be used as a coordination mechanism by which tasks are divided and decision-making is simplified (Madhok 1995; Reuer and Ariño 2007). This can be helpful in the presence of routine barriers, which can be mitigated through close coordination (Estrada et al. 2016). Contracts, formal coordination, and planning are specifically important in the formation phase of IU alliances in order to align expectations (Morandi 2013).

Another structural mechanism stressed in literature is hierarchy (Williamson 1975). Hierarchical control can be manifested through the formal design of the alliance (Das and Teng 1998). For instance, there is an obvious line of authority from the specific project teams to the board of management. Due to their obvious dissimilarities, this type of controls can be more complex in IU alliances: all partners report to different supervisors with different goals and expectations. That is why coordination is an important aspect in mitigating barriers (Estrada et al. 2016). Coordination can be achieved through the assignment of a project manager or knowledge transfer staff in the IU alliance (DiGregorio and Shane 2003; Lockett and Wright 2005). These managers have the authority to enforce control through formal policies and procedures (Das and Teng 1998).

Other authors highlight that, particularly in IU alliances, a relational approach can be effective (Deng and Hendrikse 2017; Du et al. 2014). Du et al. (2014) explain that close control is not fully necessary, because universities are not regarded as direct competition. Furthermore, strict management can decrease alliance performance, because it leaves little room for experimentation in the innovation process. Therefore, a way to exhibit trust in the alliance is through contractual flexibility (Das and Teng 1998). In this case, contracts are used, but there is room to adapt them to changing market conditions and partner preferences. Moreover, willingness to adapt according to the needs of the alliance rather than individual needs reinforces trust in the alliance (Das and Teng 1998).

Another relational mechanism that is argued to build trust is communication (Das and Teng 1998). Communication is necessary to develop a relationship and to make sure that frictions are dealt with in a productive manner. Moreover, communication mitigates information asymmetry. When partners openly share information, this can be perceived as an indication of trust (Creed and Miles 1996). Also, Mohr and Spekman (1994) define joint problem-solving as an effective mechanism to solve conflicts in alliances. They argue that this is an example of a constructive conflict resolution technique in which the outcome of the conflict is mutually satisfactory. In the process of joint problem-solving, communication is essential (Ariño and Doz 2000).

Table 1 The Wave Energy and Power Network alliances

	Wave Energy	Power Network
Goal of the project	Developing a new technology to generate sustainable energy	Developing a new technology to measure energy quality
Initiator	University	Industry
Phase	Pre-formation	Post-formation
Duration	At least 4 years	At least 4 years
Partners	Few contracts signed, looking for investors	Consortium of 8 partners

3 Methodology

To explore the emergence and governance of dissimilarities and tensions in IU alliances, we conducted an exploratory case study[2] (Yin 1984). This research design is suitable given the novelty of our focal topic (Eisenhardt 1989). Prior research emphasizes the relevance of dissimilarities, tensions, and governance in IU alliances. However, an in-depth examination of the connections between these issues has not yet been performed in the context of IU alliance formation.

We studied two cases selected for theoretical reasons (Eisenhardt 1989). To guarantee confidentiality, we use pseudonyms for both cases: "Wave Energy" and "Power Network" (see Table 1). While both cases are representative of the focal phenomenon (i.e., recently initiated IU alliances), they represented different alliance developmental stages. For simplicity, we refer to these stages as pre-formation stage (Wave Energy) and post-formation stage (Power Network). Analyzing these two cases together allowed us to map the full phase of IU alliance formation and to provide richer insight on the collaboration dynamics in recently initiated IU alliances.

We conducted two types of interviews in two phases: expert interviews and case interviews. In the first phase, before selecting the cases, we conducted five semi-structured interviews with experts in the energy industry. These interviews were used to find and select suitable cases for this study. Furthermore, we used insights from these interviews, combined with insights from extant research, to design the case interviews. In the second phase, ten semi-structured interviews were conducted (five in each case). In order to collect richer data, we asked interviewees to provide examples and we asked follow-up and "why" questions. Furthermore, similar questions were asked to different interviewees to identify similarities (or differences). The use of multiple sources and informants helped us enhance validity (Eisenhardt 1989). The results from the interviews were triangulated with available documents, which also helped us mitigate retrospective data collection biases (Yin 1984). Thirteen of the interviews were conducted in Dutch: the native language

[2]This study is based on the first author's master thesis project (MSc BA SIM, University of Groningen, 2018). We acknowledge the contributions of Pedro de Faria to this project.

of the interviewees. As Dutch was not the native language of all interviewees, two interviews were conducted in English. An overview of the data sources can be found in Appendix 1.

To analyze the data, we transcribed and coded the interviews and looked for initial links with relevant concepts from the literature review (Miles and Huberman 1984). First, the expert interviews were coded and linked to quotes from academic articles. Based on this, an initial codebook was developed, which was used to assign codes to the cases. As the analysis followed an iterative process, complementary, "open" codes were assigned to the interview transcripts and the supplementary documents. Thereafter, codes were assigned to all interview transcripts. Similar codes were combined and the least relevant codes were erased. Additional case-specific codes were again connected with the literature. The coding process was structured around three themes: dissimilarities, tensions, and governance. After the coding process, we examined the connections between the three themes, relying on interview data and insights from extant research. Eventually, four types of tension were identified, caused by four types of dissimilarities, and leading to four types of decisions.

4 Findings

4.1 Wave Energy Alliance

Wave Energy was initiated in 2013 by a university researcher. The project aimed to conduct research on wave energy and trigger the commercial interest of industry in the near future. To do so, a spin-off company would be founded. When this study started, this process had already been set in motion. The alliance structure had been set and a business plan had been developed. However, additional activities, such as establishing a physical knowledge infrastructure, developing agreements for intellectual property, and perfecting the marketing strategy, were still under construction. Upon completion of these processes, the company would officially recruit financial and supply partners that could contribute to the development of a prototype and the eventual commercialization of the product. At the time of our study, a few partners had been approached, but no official contracts were signed yet.

4.1.1 Dissimilarities and Tensions

Most of the partners at Wave Energy were connected with the university. A few industry partners had been involved to develop the first prototype, which could put them in an advantageous position when the product would be produced on a large scale. However, since there was still a long way to go until production, industry partners needed to be willing to invest in an uncertain project. This could

challenge the collaboration. Additionally, university partners needed to be able to trust investors not to take advantage of their position. For example, when a large energy conglomerate invests in the project, it is important that they invest in the idea and the technology, rather than "buying the competition." Thus, trust was essential in the Wave Energy alliance:

> [Trust is important,] because we are in the development stage, in which we need to showcase that the principle will work. If a partner cannot be trusted, that means that either they cannot deliver what they are promising, or they probably sell the technology to other parties. (University partner)

Another barrier resided in the conflicting work ethic of entrepreneurs and employees of the university. One of the advisors at Wave Energy described the existence of a fundamental cultural difference between entrepreneurs and university researchers:

> Scientists are used to work from nine to five with regular breaks. As an entrepreneur, you have to be willing to start at seven in the morning and go home at ten in the evening, so to speak. It is an entirely different game. Therefore, I always advise to bring someone in from outside the company. (Industry partner)

In order to bridge the gap between the working styles of the university and the startup, an external CEO was hired. The CEO had experience in both academia and business and thus was able to bridge both worlds. According to the CEO, the complex knowledge structure at the university forms a large barrier to IU collaboration. He mentioned that the knowledge and information required to found a new startup is available at the university. However, this knowledge is widely dispersed, and it is challenging to find the right person to obtain a certain piece of information. Therefore, the process of founding the spin-off company remains time-consuming and inefficient. Furthermore, the way work is prioritized at the university may not align with the strict planning that is desirable at the startup:

> The entire institution is built around research and education, but now you are basically doing something else. [. . .] You just notice that the spin-off company does not have the highest priority and therefore you need to adjust your activities to the pace of the university. (CEO)

Because the spin-off company was involved in both research and business activities, patenting and publishing could form a conflict of interest. Two patents had been filed, which were owned by the university. The patents were made accessible to Wave Energy through licenses. This system was favored because it could prevent the patents from dissipating if the spin-off company runs into financial problems. In case the company succeeded, the spin-off company would eventually acquire the patents. However, the university would stay closely connected to Wave Energy, as fundamental research would be required to improve the product and to test its propositions. Furthermore, the project offered research opportunities for students. Nonetheless, since the publication of research might intervene with the patents, the partners regarded this as a large barrier:

> Half a year ago, we had an idea about energy storage. We did not have a patent, so we had to stay quiet. If we published it, we could never apply for a patent, because the idea would

> already be out in the open. So, you have to be careful and make sure that certain pieces of technology are not published by academics. (University partner)

In order to found the spin-off company, investors were needed. However, as Wave Energy had been operated solely by university researchers in the past years, there was a lot of knowledge, but little entrepreneurial experience. When looking for financial partners, this could put Wave Energy in a disadvantageous position, relative to more experienced entrepreneurs. Furthermore, the university's knowledge base was highly dissimilar to that of potential industry partners. Many investors had extensive entrepreneurial experience, and they were trained in selecting high-potential projects. Therefore, creating partnerships could be challenging:

> It is like an adventure. I do not have experience with [founding a company], so I do not know the best way to run it. I just think that, as a team, we all have to agree on the decisions we make and the direction we take. (University partner)

> As an investor, I always look at the management team first: what do they do, what is their attitude, how do they talk, et cetera. I have done this for 20 years and within five minutes I have an impression. So, I hope that with the entrance of [the CEO], more experience is added to the management team. (Business Developer and Investor)

4.1.2 Tensions and Governance Decisions

In the formation of the spin-off company, recruitment of new partners was primarily based on mutual trust. In order to achieve this, the interviewees indicated that they attended networking events to establish relationships with potential partners. An important criterion for investment partners was that they were prepared to take a risk. Furthermore, the interviewees highlighted that a personal connection with the potential partner was essential, since the collaboration was meant to be long term. Once partners became involved in the spin-off, the relationship would become more formal:

> At this stage, it is especially important that there is mutual trust and simply a connection with a potential partner. (University partner)

> If the company is looking for a low risk activity or it is not open towards innovation, it is already a clear indication that they are not really a good match. (University partner)

Furthermore, interviewees stated that there was a conflicting work ethic between the university and the industry. Therefore, flexibility was an important aspect in managing the alliance. Differences in time perception were managed by adapting the planning of the spin-off to the speed of the university. As long as no industry partners were actively involved, there would still be time to do this:

> [The timing difference] is not a big problem, but you just have to know that your project does not have the highest priority, so the throughput time of the project will be adapted to the speed of the university. [. . .] For now, there is time to do so. (CEO)

However, when industry partners would become more involved in the spin-off, profitability would become more important. In order to achieve this, flexibility was

essential. The long-term goals of the project were clear, but the steps in between could still change. In order to increase the chances of success, it was still possible to put some parts of the product aside if that would increase profitability prospects. Furthermore, the partners were positive towards the creation of a joint venture if that appeared necessary to continue developing the product:

> It is a modular product, so eventually, we look at the parts that generate the most value for the company. Whether that is the storage part or an entirely different technology, that does not matter. Either way, there will be enough research opportunities for the university. (CEO)

In order to prevent unintended knowledge spillovers due to the publication of competitive research, research and business would become two separate entities. The research entity would stay connected to the university and would provide research and development for the spin-off. Furthermore, the university would still arrange research projects for students, but it would not publish information that could harm the competitive position of the spin-off. The spin-off company itself would focus on the commercialization of the concept. This separation would prevent conflicting stakes and interests from entangling. Further conflicts between patenting and publishing would be formally prevented through contracts:

> To become less dependent on the university, we keep research at the university, but try to separate it from the company. This has some advantages for the company: you can apply for different types of funding and attract different types of investors. [. . .] Furthermore, it allows the company to grow in value. So, you can keep all intellectual property within the firm. (University partner)

Lastly, in order to compensate for the lack of entrepreneurial experience at Wave Energy, an external CEO was hired. Accordingly, the management team would become more convincing when they needed to pitch the concept in front of potential investors. The interviewees highlighted the importance of having someone in a leading position at the company. To illustrate, all knowledge about founding a company was available at the university, but accessing this knowledge was a demanding process. Hiring a CEO should ease the process of founding a company. Furthermore, the CEO could make sure that deadlines were met, agreements were followed, and responsibilities were clear. Nonetheless, the CEO stressed the need for formal guidelines at the university, in order to ease the processes of alliance formation and setting up a company:

> I think the entire process would have lasted much longer if I were not involved. You have to find a balance between your speed and the velocity of the university. [. . .] However, it would be useful if there was a general guideline for university startups or a first draft that explains how you would organize it and share information. (CEO)

4.2 Power Network Alliance

Power Network was initiated in 2017 as one of the pilots within a larger project that examined the commercial application of the 5G mobile network. This network

was expected to be deployed for a wide range of novel products and services. Power Network was established as a consortium consisting of eight partners, with the objective to develop a digital platform that measures energy quality. This objective and the accompanied responsibilities were clearly laid out in a project plan. Although the consortium was formed, the project was in an early stage of development, as the platform had not yet been developed.

4.2.1 Dissimilarities and Tensions

At Power Network, the university had a supporting role, providing one of their university buildings as an experimentation hub. In turn, the project offered an opportunity for education, as graduation projects had been established for students. At the same time, industry partners were mainly motivated by exploration opportunities to improve their business. When 5G would be launched, the industry partners of Power Network would be among the first to have a commercial application for it:

> First, we want to discover the market potential of these new network applications. [. . .] Second, we can test our new services. [. . .] Third, it improves our brand and image to work on innovation projects. (Industry partner)

> We have many outdated medium voltage stations that all need to be supplied with communication. Currently, we use 4G to achieve this. With this project, we want to see if 5G is an option to supply the stations with communication. (Industry partner)

The different motives of the university and industry partners had provoked some tension in the Power Network alliance. One of the industry partners described an example in which university students worked on a project. The students were involved for a brief period, which limited their knowledge about the alliance. Therefore, their input turned out to have little value for Power Network:

> I think it is good to involve students in innovation projects. However, I wonder how reliable the results of the students are. [. . .] I saw the presentation of the students, but decided not to use the results, because the data was unreliable and the students had not completely understood the line of questioning. (Industry partner)

In the project plan, the objectives of the alliance were carefully projected. The project had four successive objectives, dividing the project into four phases. Within this structure, some tension emerged: industry partners focused on short-term goals, whereas the university had a long-term orientation. Before finalizing the first phase, the university had started preparing for the second phase. However, one of the industry partners indicated that it would have been more effective to focus on the first phase of the project before continuing with the next phase:

> What I find difficult in this type of innovation projects is that some partners focus mainly on pursuing their own interest. [. . .] The scope is clear for now, so we need to focus on that first, before we continue with the next phase. (Industry partner)

Because the consortium consisted of eight partners, various interests and stakes had to be managed. Interestingly, some tension emerged because of the lengthy

administrative procedures of subsidy application. For the university and smaller industry partners, funding was essential. They did not have the budgets to invest in this type of projects. Therefore, they were willing to go through the long procedures of subsidy application:

> Currently, I have the time to work with students on these projects. If I had to arrange budgets within the university, this would not have been possible. (University partner)

Conversely, one of the larger industry partners highlighted that he did not want to be involved in the process of subsidy application. In the beginning of the project, this partner had a leading position as formal owner of the project. However, according to him, the time and effort needed for the application process outweighed the benefits of receiving the funding:

> I have plenty experience with subsidy projects, and I told my co-worker that [subsidy application] is something you should not want. It costs way too much time and effort, especially in a consortium with eight parties. (Industry partner)

> We noticed that during the formation, [a large industry partner] started to distance itself from the collective goals and focus on their own goals. [. . .] Eventually, we discovered that they did not like the extra responsibilities of being a project owner. (Project leader)

Shortly after the consortium was formed, each partner had established a role in the project. According to the interviewees, this had naturally emerged. However, the partners worked in a chain of activities, in which each activity depended on the progress of the precedent activity in the chain. Therefore, the partners did not all contribute to the project at the same time. As a result, some showed less commitment than other partners, which frustrated one of the partners:

> There are several parties who do not actually contribute to the project. [. . .] I think we could have achieved the same with four partners, we do not need all eight of them. (Industry partner)

> At this stage, some partners show little commitment, because they do not have a clear role yet. But once we have finished the first stage, they will have a larger role in the project and we will step down. (Industry partner)

The project leader at Power Network explained that dissimilar commitment was also caused by the partners' dependency on the outcome of the project. For university partners, the project served as an opportunity for research and education. It would have been in their interest if the project succeeded, but they did not financially or strategically depend on its continuity. Contrarily, the industry partners did depend on each other. They had a practical problem to solve, whereupon they were involved in the alliance. Whether the alliance succeeded or failed, it would have affected their position in the market:

> In the technical infrastructure, all partners are structured in a certain order. One partner has knowledge about the hardware, the other about the connections, and another about the physical energy infrastructure. These are complementary skills and knowledge. [. . .] Eventually, we are all working towards the same goal. (Project leader)

> From the perspective of the university, they just say: "We have to work on this type of projects, but whether it is this project or another, that doesn't really matter." It is more

about finding the right people who enjoy working on a project and who can make it happen. (University partner)

4.2.2 Tensions and Governance Decisions

In the Power Network alliance, there had been tension between university and industry partners, because their motivation to collaborate differed. For instance, because university students were involved for a brief period, their contribution had little value to the overall project. According to an industry partner, this could have been solved through communication and supervision of the students:

There had been a miscommunication between what was asked and what the students had understood. I think the communication between the students and their supervisor could have been improved. The supervisor could have said: "These are the questions being asked and this is what you have to answer." (Industry partner)

Furthermore, one of the university partners described the importance of the human aspect of collaboration. He characterized collaboration as a social process in which the overall atmosphere is centralized:

You have to keep the human factor in mind. It starts with the individual enjoying working on such a project and collaborating with other people. [. . .] In a project such as this one, we work on clear, tangible goals, which contributes to the group atmosphere. Many people look at collaboration in a systematic way, but all in all, it is the people who are doing it. (University partner)

Another issue that resulted from the interviews is a distinction in work ethic. University partners tended to take on a long-term approach, whereas the larger industry partners preferred focusing on short-term deadlines. This had frustrated one of the industry partners. In order to solve the problem and ease his frustration, he decided that an informal approach was the best solution:

I made clear that we have defined the scope of the project and that it is important for me that we stick with that for now. The other plans are nice, but I want to focus on the first phase first. So right now, the others will take that into account and we will see how it turns out. (Industry partner)

Additionally, the project leader highlighted that the involved parties were not used to this type of collaboration. Therefore, they had to familiarize with the different cultures and routines they encountered. In managing these differences, he highlighted the importance of flexibility in addressing the needs of each partner:

An important aspect is to bring matters to the surface. When there is friction between parties, and sometimes this can be invisible, I make sure we talk about it by asking questions such as: "What is actually going on?", "Why is this so important to you?" and "How does this intervene with the goals of the project?" And in general, the answers to these questions are already half of your solution. (Project leader)

As the above quotation indicates, governance was highly informal at Power Network. Nonetheless, most of the interviewees indicated that having clear agreements beforehand is important. For that purpose, a clear project plan had been developed

and an additional clause defined how patents were handled in case they were filed. Nonetheless, the project leader mentioned that formally, the project plan had not been signed. Furthermore, the interviewees indicated that the project plan served as a guideline, but the content was flexible. Since the start of the project, the project plan had been adapted three times, and depending on the outcome of the first phase, it could still change:

> Well, formally there is a project agreement, but it is not even signed yet. So actually, it is inferior to the informal process. (Project leader)

> We were not satisfied with the plan, so [the project leader] has completely rewritten the plan. [...] I do believe that if we would have understood each other from the beginning, it was not necessary to rewrite it three times. (Industry partner)

Regarding the application of funding, some tension did arise. In the beginning of the project, one of the industry partners had a leading position as formal owner of the project. To him however, the efforts required for the application process outweighed the benefits of receiving the funding. Therefore, he decided to become a regular partner instead. Consequently, one of the smaller industry partners formally became the project owner. Thus, a structural change in the alliance solved the problem:

> [As a project owner], you have to apply for funding, there are all kinds of agreements and things you have to do. So, we decided that the project plan was rewritten with [our company] as a regular partner instead of a project owner. (Industry partner)

> We noticed that [the project owner] became distant from the collective goal and started to focus on their own goals. First, we tried to convince them to stay, up until the board level and through conversations with deputies from the province. That did not work. Therefore, we chose to involve another industry partner as project owner. This way, the problem was solved quickly and [the former project owner] found a suitable role in the project. (Project leader)

To conclude, in the Power Network alliance, partners were not equally committed at the same time, which led to tension in the alliance. The interviewees indicated that the project leader and the project coordinator played a large role in restoring commitment. The project leader organized all the meetings and paperwork. Additionally, the project coordinator served as an external expert. He was involved to advise and support the project leader when necessary:

> Having someone in a managing position is important. [...] People collaborating in the project normally do not work together, that relationship needs a little glue. (Project leader)

4.3 Summary of Findings

In Table 2, the findings are summarized. From left to right, the columns of the table represent (1) the different types of dissimilarities between industry and university

Table 2 Summary of findings

	Dissimilarities *Industry*	*University*	Tension	Decision
Wave Energy *Motivation*	Strategic intent	Personal interest	Lack of trust	Carefully choose partners
Power Network *Motivation*	Focus on strategic outcome	Focus on education	Misalignment of individual goals	Supervision, focus on "human aspect"
Wave Energy *Work ethic*	Strict deadlines	No driver to be quick	Different working styles	Flexibility
Power Network *Timing*	Focus on short-term goals	Focus on long-term goals	Different time perspective	Adaptable contracts
Wave Energy *Patenting*	Protect innovation	Publish findings	Conflict over IP	Split research and business
Power Network *Funding*	Avoid unnecessary procedures	Funding is essential	Conflict over administration	Formal agreements
Wave Energy *Experience*	Highly experienced	Little experience	Lack of experience	Hire new CEO
Power Network *Dependence*	High dependence on alliance success	Low dependence on alliance success	Lack of commitment	Project management

partners that were more salient in our cases,[3] (2) the different types of barriers or tensions that were caused by these dissimilarities, and (3) how these tensions were managed in the two alliances we studied.

First, in both our cases, tensions emerged due to the different motivation of industry and university partners. The motivation of the industry partners is clearly strategic (business-related), whereas the motivation of the university seems to be driven by personal factors. Second, tension arose because of different work ethic and time perspectives of both partner types. Whereas industry partners tend to have a more short-term focus with strict deadlines, university partners tend to have a more long-term perspective. Third, partners' different attitudes towards funding and administration became evident in our cases. For industry partners, applying for funding seems time-consuming and knowledge should be protected with patents. For university partners, on the contrary, it is vital to apply for funding and publish research papers. Fourth and last, two case-specific sources of tension became apparent. At Wave Energy, the knowledge base and level of experience differed between industry and university partners. At Power Network, commitment was an

[3]Besides orientation-based and routine-based dissimilarities, two key types of dissimilarities identified in prior studies (Estrada et al. 2016), we identified administrative and personal dissimilarities. We did so to fully describe the realities of the two alliances we analyzed in this study.

issue. In the next section, these findings will be discussed in connection to the topic of alliance governance.

5 Discussion

Extant research has widely stressed the role of interpartner dissimilarities in IU alliances (Bruneel et al. 2010; DiGregorio and Shane 2003; Estrada et al. 2016; Lockett and Wright 2005). While these dissimilarities do not necessarily cause tension immediately, due to a honeymoon effect (Estrada et al. 2016; Fichman and Levinthal 1991), early detection of potential barriers may be key to the effective governance of the alliance (Bruneel et al. 2010). In this paper, we have focused on this phenomenon and explored the connections between dissimilarities, tensions, and governance mechanisms in IU alliances. The resulting theoretical propositions are discussed below.

5.1 Orientation-Based Dissimilarities

In both alliances, we found dissimilarities regarding the partners' motivation to collaborate. From the industry perspective, the interviewees indicated that they were in the alliance for strategic reasons: being part of the alliance provided commercial opportunities when the eventual products would be launched. This is in line with the literature, stating that alliance formation is stimulated by strategic needs from the industry (Eisenhardt and Schoonhoven 1996). Conversely, university interviewees indicated that they were involved because of their personal interest in the topic. Therefore, university partners at Wave Energy aimed to find industry partners that could be trusted not to take advantage of their position as investor. This is in line with literature about social needs, stating that firms are more likely to form alliances with trustworthy partners (Eisenhardt and Schoonhoven 1996). At Power Network, these different motives have led to tension in the alignment of goals that were not included in the project plan. The fact that tension emerged because of different goals and motivations of partners is in line with theory about orientation-based dissimilarities (Bruneel et al. 2010).

At Wave Energy, these different goals and expectations have led to a situation where recruitment of industry partners was predominantly based on trust. In order to do so, they join network events and try to establish a personal connection with potential partners. At Power Network, differing goals and expectations have actually led to tension. More specifically, misalignment of the goals that were not specified in the project plan has led to misunderstanding. In governing this barrier, interviewees at both alliances stated that close communication and informal management were the right approach. In the literature, equally, communication is seen as a method to prevent tensions caused by information asymmetry (Das and Teng 1998). Moreover,

communication is a vital element in joint problem-solving (Ariño and Doz 2000; Mohr and Spekman 1994). Our results build on these propositions and extend it with the context in which communication is an appropriate mechanism in IU alliances:

Proposition 1 Communication may be an effective governance mechanism in IU alliances in a situation in which orientation barriers are apparent.

5.2 Routine-Based Dissimilarities

Interviewees at both alliances experienced differences in the time orientation of the university and the industry. Whereas industry partners had the tendency to focus on strict deadlines and short-term goals, university partners had a more long-term perspective. Moreover, university partners were focused on long-term goals. This is in line with the literature, stating that universities consider the short-term orientation of firms a disadvantage of collaboration (Carayol 2003). Furthermore, one of the interviewees emphasized the difference in work ethic between the university and an entrepreneur. According to him, university employees often work from nine to five with regular breaks, whereas the entrepreneurial mindset is more flexible, timewise. Similarly, Estrada et al. (2016) describe that routine barriers occur because of differences in behavior, such as communication, decision-making, and flexibility of tasks.

To overcome these barriers, several decisions were made. At Wave Energy, the interviewees indicated that flexibility was essential. Partners were willing to adapt their planning when this would benefit the collective outcome of the alliance, even though the business plan was already operative. This aligns with theory about trust-building through contractual flexibility (Das and Teng 1998). At Power Network, routine barriers were mitigated by bringing tension to the surface in order to find a solution. Within this solution, the interviewees indicated that they were flexible in changing their planning. Furthermore, the project plan had been developed, but when the interviews were conducted, it was not formally signed. This allowed for contractual flexibility, which may indicate interpartner trust (Das and Teng 1998). This is in line with theory about relational governance (e.g., Barney and Hansen 1994), stating that trust is a vital aspect of collaboration. In this case, flexibility was used as a mechanism to constitute trust in the alliance (Das and Teng 1998). Combined with the case results on routine barriers, this leads to the following proposition:

Proposition 2 Flexibility may be an effective governance mechanism in IU alliances in a situation in which routine barriers are apparent.

5.3 Administrative Dissimilarities

All interviewees mentioned the disconnection between the university's objective of publishing new insights and the industry's tendency to protect new technologies. This issue is regularly mentioned by scholars as well (Dasgupta and David 1994; Carayol 2003) and aligns with literature on transaction barriers: barriers related to conflicts over intellectual property and university administration (Bruneel et al. 2010). However, in neither of the alliances, an actual conflict had arisen because of this phenomenon. In fact, one of the interviewed experts described that this disconnection is often an imaginary problem. At Power Network, no patents had been filed when the interviews took place. At Wave Energy, patents were filed, but this had not led to tension. Therefore, one could argue that the main barrier lies in the partners' perception of possible conflict regarding intellectual property, rather than it actually being a source of conflict.

Nevertheless, in both alliances, formal clauses and contractual safeguards were used to prevent tension. This aligns with the structural perspective on governance, in which scholars argue that conflicts should be prevented through formal contracts (Parkhe 1993; Morandi 2013). Furthermore, the development of formal structures is considered as an effective mechanism to create a successful alliance (Doz et al. 2000). At Wave Energy, the formal structure was used to prevent the publication of scientific articles from conflicting with the patents. The spin-off company would formally be divided into two separate entities: one focusing on the research side and one focusing on the business aspect. This division would be formalized in a contract, which could prevent unwanted knowledge leakages, even internally. These examples provide a context for IU alliances in which contracts are an effective governance mechanism, leading us to the following proposition:

Proposition 3 Contracts may be an effective governance mechanism in IU alliances in a situation in which transaction barriers are apparent.

5.4 Personal Dissimilarities

Lastly, we observed dissimilarities that were specific to the individual cases. At Wave Energy, university partners clearly had less entrepreneurial experience than the industry partners. Therefore, Wave Energy's main activities were aimed at gaining experience and preparing for the establishment of the startup. This aligns with theory about alliance formation, stating that experience increases the probability of alliance success (e.g., D'Este and Patel 2007). Moreover, at Power Network, lack of commitment formed a large barrier. Interviewees explained that dependence on the alliance was low for some of the partners, and therefore they had less incentive to be committed to the alliance. This aligns with alliance formation literature, stating that when interdependence is low, the alliance follows an engineered path (Doz et al. 2000). Because these dissimilarities were not found in either of the alliances, they

can be considered case-specific. Therefore, we created a fourth barrier: distinctive barriers. These can be defined as the barriers that (1) are related to dissimilarities between industry and university partners in the alliance, but (2) are not specifically apparent in IU alliances in general.

We found a similarity between the approaches to managing this type of dissimilarities. At Wave Energy, lack of experience was compensated by hiring a CEO externally. This person had experience in both the business and academia, making him a suitable partner at Wave Energy. At Power Network, interviewees highlight that in order to increase commitment, the role of the project leader was essential. This "objective outsider" would have the ability to connect the alliance partners and motivate partners to stay involved in the projects. The appearance of an external party is also known in literature about alliance formation, stating that when interdependence is low, a triggering entity is necessary to connect partners (Doz et al. 2000). Furthermore, Das and Teng (1998) describe that hierarchical control can be an effective governance mechanism in alliances. We found that hierarchy is used to handle more unusual, case-specific barriers. This way, control can be enforced while having a pragmatic approach to governance. This leads to the following proposition:

Proposition 4 Hierarchy may be an effective governance mechanism in IU alliances in a situation in which distinctive barriers are apparent.

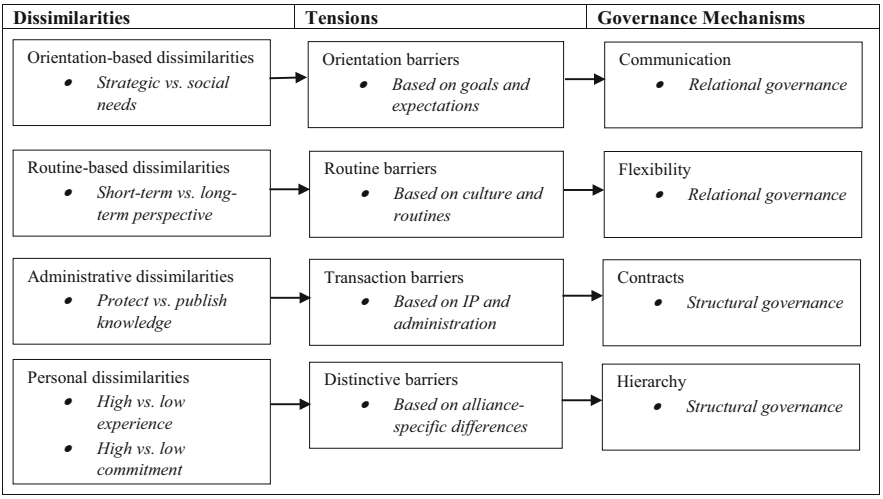
6 Concluding Remarks

6.1 Tension and Governance in IU Alliance Formation

In this study, we have explored two key questions in the context of IU alliance formation: *How do interpartner dissimilarities lead to tension? How does tension caused by interpartner dissimilarities connect to alliance governance decisions?* Regarding the first question, based on our cases, we identified different types of dissimilarities and observed that each can lead to different types of barriers or tensions: (1) orientation-based dissimilarities lead to orientation barriers; (2) routine-based dissimilarities lead to routine barriers; (3) administrative dissimilarities lead to transaction barriers; and (4) personal dissimilarities lead to what we refer to as distinctive barriers. In turn, and connecting to the second question, observations in the cases under study suggested different governance solutions that can be deployed to address each type of tension: (1) orientation barriers may be mitigated through communication; (2) routine barriers may be mitigated through flexibility; (3) transaction barriers may be mitigated through contracts; and (4) distinctive barriers may be mitigated through hierarchy. These findings are summarized in Table 3, where we proposed an exploratory framework to describe the emergence and governance of tension in IU alliance formation.

Our exploratory framework provides initial insight into the connections between interpartner dissimilarities, tension, and governance in the formation phase of IU

Table 3 Tension and governance in IU alliance formation: an exploratory framework



alliances. This way, our study adds to earlier work on IU alliance barriers and dissimilarities (Bruneel et al. 2010; Estrada et al. 2016) by extending the integrative perspective on alliance governance (Faems et al. 2008) to the context of IU alliances. By focusing on the formation phase, we were able to provide a detailed analysis of dissimilarities and tensions that may specifically affect the initial phases of these alliances. Moreover, we were able to indicate some ways in which governance design can be used to promptly mitigate tension or prevent it from escalating beyond the initial phases. For example, we identified the presence of what we refer to as distinctive barriers, barriers that (1) are related to dissimilarities between industry and university partners in the alliance, but (2) do not seem to be specifically apparent in all IU alliances. We have argued that this barrier can be managed through hierarchy, because it seems to require a pragmatic, yet controlled approach to governance. Overall, we hope that future studies in the field can build upon and extend our framework to further explore the links between dissimilarities, tension, and governance in IU alliances. At the same time, we hope that managers involved in the formation of these alliances can make use of our framework to timely detect problematic dissimilarities that can lead to tension in the alliance and, thus, anticipate to tension in the process of alliance design. Insights from our case studies may also assist managers in responding adequately when tensions do emerge in the IU alliance.

6.2 Limitations and Future Research

In this chapter, we have presented insights from an exploratory study of two IU alliances in the energy industry. These insights are primarily based on the

15 interviews we conducted with different informants. While our study offers initial insight on the connections between dissimilarities, tension, and governance in IU alliances, we need to acknowledge the limitations of our results in terms of generalizability. Further research on the topic would benefit from larger-scale research endeavors (e.g., a multiple case study based on large amounts of interview data). Moreover, future studies should explore tensions and governance in IU alliances in settings beyond the energy industry. It is also important to note that, since we studied two alliances in the formation phase, key aspects remained beyond the scope of our study. For instance, we did not formally assess the success of the governance mechanisms on the medium term. Therefore, future studies may build upon and extend our framework by conducting longitudinal analyses that cover the entire IU alliance lifecycle. Another interesting avenue concerns the fact that, in our cases, transaction barriers did not seem to lead to tension, whereas other barriers did. We pointed to contracts as a sort of preventive governance mechanism to address this type of tensions. However, in alliances where transaction barriers actually arise and lead to tension, contracts might not be effective. Exploring differences between types of barriers and between preventive and reactive governance mechanisms are, thus, promising research opportunities in the context of IU alliances.

Appendix 1 Overview of Data Sources

Interview	Type of interview	Role of interviewee	Interview details
1	Expert interview	University professor	Face to face, 01h22
2	Expert interview	Valorization expert	Face to face, 00h54
3	Expert interview	University advisor	Face to face, 01h02
4	Expert interview	University professor	Face to face, 01h02
5	Expert interview	University professor	Face to face, 01h19
6	Case interview: Wave Energy	Project leader & CTO	Face to face, 00h58
7	Case interview: Wave Energy	Assistant professor	Face to face, 00h49
8	Case interview: Wave Energy	Associate professor	Face to face, 00h29
9	Case interview: Wave Energy	Investor	Face to face, 00h57
10	Case interview: Wave Energy	CEO	Face to face, 01h09
11	Case interview: Power Network	University professor	Face to face, 00h50
12	Case interview: Power Network	Business developer	Face to face, 00h47
13	Case interview: Power Network	Project manager	Skype call, 00h52
14	Case interview: Power Network	Technical specialist	Telephone call, 00h45
15	Case interview: Power Network	Project coordinator	Face to face, 00h51

Document	Case	Type of document	Document details
1	Wave Energy	Private	Business plan
2	Power Network	Private	Project plan

Appendix 2 Overview of Coded Concepts

Dissimilarities	
Strategic position	Extent to which being part of the alliance enables a firm to access financial resources and other resources (Eisenhardt and Schoonhoven 1996)
Social position	Extent to which extensive personal relationships and trust create an awareness of alliance opportunities (Eisenhardt and Schoonhoven 1996)
Short-term vs. long-term orientation	Extent to which partners are accustomed to applying a long-term vs. short-term orientation research and innovation
Protect knowledge	Extent to which knowledge remains hidden within the firm or disclosed in a limited way through patents (Bruneel et al. 2010)
Publish knowledge	Extent to which research aims to create public knowledge (Bruneel et al. 2010)
Experience	Extent to which an organization is experienced with alliancing
Low vs. high interdependence	Extent to which an organization financially depends on the alliance outcome (Doz et al. 2000)
Tensions	
Orientation barriers	Partners have different ideas about the alliance rationale, their reciprocal obligations, and the alliance horizon and scope (Estrada et al. 2016)
Routine barriers	Partners behave differently towards communication, joint work and decision-making, and alliance task execution and flexibility (Estrada et al. 2016)
Transaction barriers	Partners have conflicting views on IP; also, barriers related with dealing with university administration (Bruneel et al. 2010)
Governance	
Trust	Extent to which partners rely on trust to address issues of safeguarding and coordination (Faems et al. 2008)
Flexibility	Extent to which partners are willing to accommodate deviations from the contract when necessary (Das and Teng 1998)
Contracts	Extent to which contractual rigidity is used to make sure that contingencies are dealt with and opportunism is mitigated (Das and Teng 1998)
Hierarchy	Extent to which partners rely on control based on authority and giving orders to subordinates and then evaluating their performance (Das and Teng 1998)

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