
Governance contingencies for strategic technology alliances: a case in wireless business

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Abstract: Strategic management research has often emphasised the importance of alliances as efficient structure to develop and commercialise technology-based innovation. The advantage of strategic alliances over the traditional hierarchical and market-like organisational forms has been evident in high-tech markets, featured by high degree of resource specificity and intense need for know-how transfer. Drawing from several theories, the paper proposes a novel contingency model to explain how organisations decide on the governance structure of alliances by taking into account their strategic motivations and a number of contextual factors. The model is applied to a real-life case study in the wireless market to demonstrate its applicability.

Keywords: strategic technology alliances; technology innovation; contingency model; wireless business.

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1 Introduction

Alliances have increasingly been viewed as the necessary means for firms that wish to implement strategies of innovation creation, scope expansion or simply to address the challenges of market and technology uncertainty (Alm and McKelvey, 2000; Hagedoorn and Schakenraad, 1990; Ring and van de Ven, 1992; Tsang, 1998). As a result, inter-firm collaborative agreements have increased, not only in number, but also in diversity. One of the fundamental topics in alliances research is the governance mechanism that defines an alliance's structure and operation (Keil, 2000). This paper explores how firms' motivations for alliance formation and contextual factors (industry-specific, firm-specific and alliance-specific alike) combine to determine firm preferences for alliance governance.

Our investigations focus on a specific type of alliances, namely strategic technology alliances (*STAs*), which occur within the context of technology innovation in high-tech and volatile environments. Technological innovation may refer to either new products/services (*product/service innovation*) or new production and delivery processes (*process innovation*) (Tether, 1999).

We can distinguish between two kinds of *STAs*. The first includes collaboration between firms for developing technology-based product or service innovations. Examples of such collaborations include the joint venture between Sony Corporation and Ericsson to jointly develop mobile handsets or the cooperation between mobile network operators in Europe (for example, T-Mobile, Telecom Italia, Telefonica Moviles and Orange), which have joined forces to develop homogeneous services for their customers across the countries of their operation so that they can effectively compete with global competitors, like Vodafone. These types of collaborations are mainly intra-industrial.

The second type of *STAs* includes collaborations between firms for the purpose of exploiting product or service innovations. The exploitation phase requires inter-firm cooperation so that actors who have developed innovative services can collaborate with actors who will use and provide the services within their business and industrial context. For example, mobile network operators may choose to form alliances with developers of specialised vertical market solutions (for example, mobile workforce management applications) under a customer-supplier relationship for the purpose of innovation exploitation. These types of collaborations are mainly cross industrial.

This paper focuses on cross-industry strategic technology alliances in high-tech and volatile environments. Propositions made regarding the way in which the governance structure of such alliances is to be decided are tested in the wireless business market. Wireless business is characterised by high market and technology uncertainty and resource exclusivity, which not only favour alliance formation but also make them a competitive necessity.

The rest of the paper is organised as follows. The next section outlines the background theory on which our approach is anchored. Then, in Section 3, we critically revisit major theories used to explain the formation and governance of STAs to identify elements that are useful for determining firm motivations, as well as exogenous factors that affect alliance formation. In Section 4, these elements are synthesised into a contingency model, which is applied and validated, in Section 5, in the context of a real-life case study. The last section discusses the achievements and limitations of our research and proposes future research directions.

2 Governance structures of STAs

The most popular theory used to explain alliance governance has been transaction cost economics (TCE). While early TCE literature was restricted to the choice between markets and hierarchies (Williamson, 1975), later work (Williamson, 1985, 1991) has extended the basic framework of analysis to include choices between other, intermediate, forms of governance as well. Such include the choice between equity and non-equity alliances. Equity alliances are conceived as quasi-hierarchies, that is they rely more on hierarchical governance mechanisms, while non-equity alliances are conceived as quasi-markets (Osborn and Baughn, 1990). Gulati and Singh (1998) have proposed a typology of alliance structures, differentiating them by the degree of hierarchical control. At the one end are *joint ventures*, which involve partners creating a new entity in which they share equity, and at the other end are *contractual agreements*, which are alliances with no sharing of equity and only a few hierarchical controls built into them. In between, we can find *minority alliances* in which firms agree to cooperate by possessing minority equity in each other.

The degree of hierarchical control, as exemplified by the presence of equity sharing, is a clear differentiator between alliance types, but it may also mask differences within each type of alliance, thus providing only a partial perspective on classifying alliance governance structures. Duysters and Hagedoorn (2000) introduce strategic content as an additional factor that can distinguish alliance types. Strategic content concerns the long-term impact of the alliance on its involved partners, and distinguishes between partnerships that follow a cost-economising strategy and those following a long-term positioning strategy. At an intermediate position, we find alliances that follow a mixed strategy. The above two factors used to discern alliance governance structures (degree of hierarchical control and strategic content) are not strictly independent of each other. Table 1 synthesises the various types of alliance governance structures according to the degree of likelihood of their occurrence.

Table 1 Types of STA governance structures

		<i>Degree of hierarchical control</i>		
		<i>Quasi-hierarchy</i> (e.g., <i>joint ventures</i>)	<i>Intermediate</i> (e.g., <i>minority alliances</i>)	<i>Quasi-market</i> (e.g., <i>contractual agreements</i>)
<i>Strategic content</i>	Long-term positioning	●	○	○
	Mixed strategy	○	●	○
	Cost-economising	○	○	●

●: high likelihood; ○: medium likelihood; ○: low likelihood.

3 Factors affecting the STA governance structure choice

Several theories have been proposed to explain the formation and governance of STAs. Apart from the Transaction Cost Economics (Williamson, 1985) that has been mentioned above, the Resource-based View of the firm (Pfeffer and Nowak, 1976), Dynamic Capabilities (Teece et al., 1997), the Knowledge-based View of the firm (Grant and Baden-Fuller, 2004; Connor and Prahalad, 1996), Organisational Learning (Kogut, 1988), Population Ecology (Hannan and Freeman, 1977), Institutional Theory (Powell and DiMaggio, 1991), Social Exchange Theory (Gulati, 1995; Gulati and Singh, 1998) and Network/Innovation Theories (Hakansson, 1989; Mytelka, 1991; Dyer and Singh, 1998) have also been employed to explain how STAs are governed. Each of these provides a different perspective on why alliances occur and how firms choose an alliance governance structure.

3.1 Transaction cost economics (TCE)

Within TCE, alliances are often considered as hybrid forms of governance that combine elements of the two extreme forms: markets and hierarchies (Williamson, 1985). According to TCE, firms enter alliances to economise on the combination of transaction costs (higher in case of market exchanges) and production costs (higher in the event of in-house development).

Under transaction cost theory, the alliance governance decision is dependent on two critical parameters: the type and degree of asset specificity involved in supplying the good or service of the alliance, and the uncertainty to which transactions are subject (Williamson, 1991).

Asset specificity can take a variety of forms, such as ownership of a rare resource, development of an advanced competence, a special privilege or a patent. The higher the asset specificity, the higher the need for alliance coordination. Thus, high asset specificity requires more complex institutional forms of alliances, where common administrative systems are used to govern the partners' bilateral dependencies and appropriate resolution mechanisms are employed to handle possible disputes and contracting hazards (Williamson, 1991).

Uncertainty is an intrinsic feature of all transactions (Ring and van de Ven, 1992) leading to various types of risks, such as commercial, technology and innovation risk. Coupled with the phenomenon of information asymmetries that characterises high-tech industries (Vilkamo and Keil, 2003), the overall uncertainty to which alliances are exposed is not negligible. In dealing with this risk, parties usually select a governance structure that provides appropriate safeguards against this risk. While some authors proclaim that, under conditions of uncertainty, firms prefer more complex hierarchical structures, because they provide safeguards against the implied risk (Ring and van de Ven, 1992), others have found that non-equity governance forms (intermediate or market) are more flexible than, and thus preferable to, equity arrangements under such conditions (Hagedoorn and Narula, 1996; Osborn and Baughn, 1990).

Supporters of an evolutionary version of the TCE perspective, namely Dynamic Transaction Cost Economics (DTCE), claim that in high-velocity environments, where changes in technology are not only fast but also discontinuous, the increased need for flexibility may urge firms towards non-equity forms of collaboration (Vilkamo and Keil, 2003). Adding to that, Osborn and Baughn (1990) argue that firms

might prefer contractual arrangements early in the technology lifecycle, while as technology matures and market stabilises, firms might quasi-internalise through joint venture agreements.

3.2 Resource-Based View (RBV) of the firm

The RBV theory is particularly relevant for examining strategic partnerships because firms typically use alliances to gain access to other firms' valuable or complementary resources. Firms organise their own resources together with resources acquired from outside the firm towards the production and sale of goods and services at a profit (Penrose, 1959). According to Wernerfelt (1984), resources embrace anything that could be considered a strength or weakness of a company, whether it is physical, human or organisational (Barney, 1991).

RBV is also discussed in the literature under the term competence-based view of the firm (Williamson, 1999). Competence entails coordination and learning, is based on skill, assets and routines, and is judged in comparison with rivals (Williamson, 1999). According to Penrose (1959), the distinctive competence of the firm resides in making better use of its resources.

According to RBV, the basic motives of firms to form alliances are related to obtaining an asset, learning a capability and generally growing their technical, market and organisational competence. Tsang (1998) presents five basic motives for forming an alliance from a resource-based perspective.

- Possessing valuable scarce resources that can produce similar products at a lower cost, better products at a similar cost or better products at a lower cost, and thus create rents for their owners.
- Putting idle resources into use or expanding the use of existing resources in new areas. An important factor affecting the choice of transfer mode is the proportion of tacit knowledge embodied in the resource to be transferred. Tsang (1998) argues that the higher the proportion of tacit knowledge, the more likely that the chosen governance will be of intermediate or hierarchical mode, which require greater resource commitment from partners. Moreover, small firms are less likely than larger ones to choose hierarchical governance modes that require substantial resource commitments (Tsang, 1998).
- Dealing with uncertainty. Even though a company may possess all resources necessary for a product development and exploitation, sometimes it makes more sense to involve additional firms to share risks.
- Disposal of resources that do not contribute to the core business.
- Learning. Since many resources are non-tradable and non-imitable, firms forge alliances with their resource owners in order to learn from them and imitate their resources. However, imitation is linked with less integrated and stable alliance structures, since the learning partner may choose to exit the alliance after the resources have been successfully imitated.

3.3 *Dynamic capabilities view (DCV) of the firm/knowledge-based view (KBV) of the firm/organisational learning (OL)*

The dynamic capabilities view, the knowledge-based view and the organisational learning theories are considered as evolutions of the older resource-based view of the firm. These theories discuss how firms may best exploit their resources, knowledge and learning capabilities in a dynamic perspective in order to grow. Dynamic capabilities are defined as the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments. Furthermore, they reflect an organisation's ability to achieve new and innovative forms of competitive advantage given firm-specific and complementary assets, organisational routines, core competence and transaction cost constraints.

According to this perspective, a firm's alliance decisions are driven by strategies of expansion and diversification into related areas (Alm and McKelvey, 2000). The focus of this theory is often on the exploitation of complementary assets for expanding in new areas (Obleros and Macdonald, 1988). Another important incentive leading firms to collaborate, according to the dynamic capabilities theory, is saving time from product development to market exploitation (Deeds and Hill, 1996).

Coombs and Metcalfe (1998) address how capabilities are developed through inter-firm collaborations, ranging from market-mediated relationships through strategic alliances to joint ventures. For deciding the appropriate alliance governance, Coombs and Metcalfe (1998) argue for a number of attributes that need to be taken into consideration, including creation vs. exploitation of new capabilities, relative size and power of collaborators and levels of uncertainty and risk.

The knowledge-based view of the firm, similarly, emphasises the significance of knowledge as a competitive asset to produce new products and services. If an alliance generates risks of property rights leakage for a firm, then the firm will choose to exert a high degree of control to commit partners to the alliance and provide safeguards for knowledge protection.

Both the dynamic capabilities approach and the knowledge-based view of the firm embrace the organisational learning perspective. Organisational learning is defined as the process through which managers seek to improve organisation members' desire and ability to understand and manage the organisation and its environment so that they can make decisions that continuously raise organisational effectiveness (Senge, 1990). According to this perspective, alliances are vehicles towards internalising technology-related competences of other firms to enhance the firm's competitiveness (Foss, 1996). The key question posed by organisational learning scholars is whether it is better to learn in a single firm or in collaboration with other firms. Such a decision is greatly influenced by the pace of learning in the sector concerned. In sectors where learning is slower, the firm can diversify internally rather than using alliances, thereby keeping control in-house. However, if learning is rapid, technological trajectories are colliding and selection is tight, alliances will be preferred (Alm and McKelvey, 2000).

3.4 *Population ecology (PE) and institutional theory (INST)*

Both population ecology and the new institutional theory differ from RBV in that they adopt an environmental, rather than an organisational, perspective. They stress the impact of the environment on a firm's internal and external structure, arguing that the

environment has the power to select, from a group of competitors, those organisations that have the best fit. Therefore, external conditions drive the formation of institutions, either organisations or alliances.

Population ecologists argue that the environments of organisations consist of other organisations, and that environmental demographic and structural properties shape an organisation's behaviour (Hannan and Freeman, 1977). Conversely, institutional theorists pay more attention to social, cultural and normative features of the environment in discussing and explaining organisational behaviour. Regarding the firm's propensity towards alliance formation, proponents of institutional theory emphasise the role of isomorphism, whereby organisations follow the actions of other organisations for a number of reasons, including coercive pressures, legitimacy pressures or simply to reduce uncertainty. Regarding the firm's decision over the alliance governance structure, the environment may nudge firms towards imitation and copying existing practices and models of organising their activities via hierarchical, market or intermediate structures (Powell and DiMaggio, 1991).

3.5 *Social exchange theory (SET)*

Similar to the institutional theory, SET also points out the importance of social context in explaining the formation of alliances. Social context is taken to refer to the accumulation of prior direct or indirect ties that create 'social networks'. Social networks enable their members to learn about each other's existence, needs, capabilities and alliance requirements at a given time, and they also serve as a basis for trust building between partners (Gulati, 1995).

Dodgson (1993) defines trust as "a state of mind, an expectation held by one trading partner about another, that the partner will behave in a predictable and mutually acceptable manner". The SET literature suggests that two main sources of trust exist: reputation and shared values (Young-Ybarra and Wiersema, 1999). Reputation requires knowledge of previous relationships or which may develop over time as partners continue to interact. Thus, the decision over alliance formation and choice of governance structure depend on the number of past alliances, duration of past alliances, time elapsed from past alliances, nature of prior ties (i.e., joint ventures, market exchanges), total number of partners involved in previous alliances (Gulati, 1995; Gulati and Singh, 1998), the number of prior indirect ties and the distance between firms, which refers to the shortest path in the relevant social network (Gulati, 1995).

Shared values require only current knowledge about the goals and values of the partner, as well as about the level and quality of communication between partners. Relevant factors that affect firm's propensity towards alliances include currently established level of communication between candidate partners (i.e., frequent and informal exchange of information), and shared values, measured through shared nationality/culture (domestic vs. international alliances) and shared motives (Young-Ybarra and Wiersema, 1999).

3.6 *Network theories (NT) and innovation theories (INT)*

Network Economics, Economics of Innovation and Strategic Network are amongst the most recent theories used to explain alliance formation and configuration. These theories have one thing in common: they point out the importance of external relationships for

explaining success and failure of innovations. Hakansson (1989) argues that alliances are important for innovation because cooperation increases the opportunities for discovering solutions through exploiting resources in new ways.

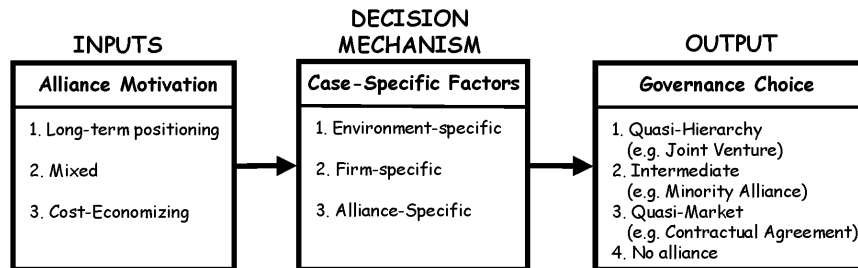
Mytelka (1991), similarly, emphasises the importance of alliances for changing firm routines in order to innovate as well as to reduce time-to-market. Moreover, Powell et al. (1996) argue that collaboration could be the result of combining forces to generate something entirely new (innovation development), which could not be delivered without the alliance. Another motive for entering alliances concerns the creation of new knowledge. Inter-organisational learning in networks is seen as contributing to innovation because the dynamics of knowledge creation are often endogenous to a particular network of actors. Powell et al. (1996) also raised the importance of competition in determining firms' propensity towards alliance formation. Firms in a strong competitive position, in terms of technical or market leadership, are less likely to form alliances with others. On the contrary, alliances are mainly pursued by less powerful firms seeking a better strategic position in their industry.

Research, examining the relationship between innovative and collaborative behaviours of firms, has placed importance on the issue of relative size of firms entering alliances. According to Grabher (1993), two main patterns of alliances can be observed: between large firms, which usually takes the institutional form of joint ventures; and between large and small firms. The main incentive for large firms to enter the alliance is to gain access to new resources, while the basic incentive for small firms is to achieve economies of scale. Small firms usually opt towards more loose governance structures in order to keep their autonomy, while large firms wish greater interdependence in order to assure better control over their partners' resources.

4 A contingency model for STA governance decisions

Although, in the past, some of the theories discussed in the previous section have been considered as somewhat contradictory, they are nowadays believed to be rather complementary, with each providing a different analytic lens through which to view and analyse the complex phenomenon of STAs (Glaister and Buckley, 1996; Osborn and Hagedoorn, 1997; Leiblein, 2003). The theoretical discussion in the previous section has revealed a number of factors that may influence the firm's decisions on whether to pursue STAs, and under what preferred governance structure. In this section, we synthesise factors identified from the previously discussed theories to construct an integrated contingency model explaining how firms raise their preference for a specific alliance governance structure.

The model contends that the preferred governance structure (G) of each participant at the inception of an alliance is a function of its endogenous motivation (M) and a number of exogenous factors (F), or $G = f(M, F)$. The motivation is a key input to the decision process, since the alliance is initiated and shaped by the partners' objectives. However, given the firm motivation, exogenous factors then act as catalysts, either reinforcing or diverting the endogenous 'want-to-do' towards a more realistic 'can-do', exemplified by a preferred strategy for STA governance. Thus, the contingency model consists of three (3) parts (Figure 1).

Figure 1 Contingency model

- *Alliance motivation (input)*. As seen earlier, firms may follow a long-term positioning, a cost-economising, or a mixed strategy, each of which has different consequences on the analysis of factors determining preferred alliance governance structure. A set of social motives may also influence, either empowering or questioning, their decision.
- *Case-specific factors (decision mechanism)*. Motivations are a necessary, but not a sufficient, condition for entering into an alliance. The outcome also depends on a number of choices that refer to environment-specific (i.e., competition intensity, technology maturity, market uncertainty), firm-specific (i.e., firm size, strategic position) and alliance-specific (i.e., prior ties, past governance structures, communication frequency) factors. The theories discussed in the previous section provide ample ground upon which such factors can be further analysed.
- *Governance choice (Output)*. Based on their perceptions for certain case-specific factors (e.g., firm size, competition, resource complementarity) and given their motivation for inter-firm collaboration, firms opt for a specific governance mode to structure their alliance. The alternatives range from a no-go decision (no formation of an alliance) to different types of preferred alliance governance structure: equity alliances (i.e., joint ventures), shared-equity alliances (i.e., minority investment alliances) and non-equity (i.e., contractual arrangements).

In the following sub-sections, we discuss the inputs and decision mechanism of our contingency model in more detail to explain how motivations and case-specific factors combine to determine the firm's choices on specific alliance structures. The usefulness and validity of the contingency model are then further illustrated through an application in a real-life case study.

4.1 Alliance motivation

As discussed earlier in the paper, firms might pursue alliances for two main reasons (Hemphill and Vonortas, 2003):

- *cost economising* motivations, which aim at increasing cost-efficiency of parties and are mainly addressed by economic theories such as transaction cost economics
- *strategic (long-term) positioning* motivations, which aim at reinforcing the strategic position of firms and are mainly addressed by theories of strategic management (such as RBV, KBV, network, and innovation theories).

Furthermore, firms might also pursue alliances through an intermediate strategy that involves mixed motivations of both cost-economising and strategic positioning nature. Although there is no strict correlation between alliance types and strategic motivations, quasi-hierarchy alliances are mostly strategically motivated while quasi-market collaborations tend to be more cost-economising oriented (Hagedoorn, 1993; Hagedoorn and Schakenraad, 1990).

The existing literature is limited by the fact that the above categories do not encompass additional motivations that might be raised from the social network to which partners belong. Social motivations, which are mainly addressed by sociological theories such as the social exchange theory, population ecology and the institutional theory, might not be strong enough to motivate an alliance formation on their own, but when combined with cost economising or strategic positioning motives, they can empower and reinforce alliance decisions. Table 2 summarises the main motives for alliance formation, which were identified in the theoretical analysis of the previous section.

Table 2 Motivations for strategic technology alliances

<i>Alliance motivations</i>	<i>Source theories</i>
<i>Cost economising motives</i>	
Economise production or R&D costs	TCE
Economise frequent market transaction costs	TCE
Save costs of developing own capabilities and resources	TCE
Gain access to financial resources	RBV
<i>Strategic positioning motives</i>	
Share risks/address uncertainty	DTCE, DCV, RBV
Gain access to resources, skills, knowledge and technology	RBV, DCV, KBV
Exploit complementary assets	RBV, DCV
Put idle resources into use	RBV, NT
Expand the use of current resources into new markets and product areas	RBV, DCV
Internalise external competence through inter-organisational learning	RBV, DCV, KBV, OL
Create new knowledge through inter-organisational learning	KBV, OL
Expand existing competences	DCV
Dispose of non-core business resources	RBV
Combine forces towards innovation development	NT, INT
Reduce time to market	DCV, NT
Change organisational routines (process innovation)	NT, INT
Obtain competitive advantage/Reinforce strategic position	DCV, NT
Decrease competition in the industry	NT
<i>Social motives</i>	
Imitate other alliances (isomorphism)	PE, INST
Exploit established ties	SET, NT
Mandated formation	PE, INST

4.2 Case-specific factors affecting STAs

The factors that may affect the formation and governance of strategic technology alliances are analysed in three levels: *environment-specific*, *firm-specific* and *alliance-specific*. These levels denote different sources of influences as the significant determinants of the firms' preferred choices towards alliance governance structures given an initial endogenous motivation. Table 3 lists factors that belong to each level, indicating the theories from which they have emerged and outlining their predicted impact on STA structure (contingency model outputs).

Table 3 Factors affecting formation and governance of strategic alliances

<i>Case-specific factors</i>	<i>Impact</i>	<i>Likely outcome</i>	<i>Source theories</i>
<i>Environment-specific</i>			
Degree of competition	In industries with many competitors, firms will exhibit a higher propensity towards alliances	Low competition: no alliance or quasi-market. High Competition: quasi-Hierarchy/intermediate	INST
Market and technology maturity	As technology matures and market stabilises, alliances are more likely to be hierarchical	Immature: quasi-market Mature: quasi-hierarchy	DTCE
Degree of risk/uncertainty	As risk and uncertainty rise, firms select more complex governance modes to assure success	Low risk: no alliance or quasi-market High risk: quasi-hierarchy	(D)TCE, RBV, DCV
Regime protecting property rights	Alliances in industries where the protection of PPRs rights is weak are more likely to be organised with more hierarchical structures	Strong protection: quasi-market Weak protection: quasi-hierarchy	INST
Pace of learning	In sectors where pace of learning is rapid, firms select organised alliance modes	Rapid pace: quasi-hierarchy/intermediate Slow pace: quasi-market/no alliance	OL, INT
<i>Firm-specific</i>			
Relative size and bargaining power	Small firms pursue non-equity alliances to keep autonomy, while large firms pursue equity alliances to exercise control	Small firm: quasi-market Large firm: quasi-hierarchy	RBV, DCV, NT
Asset specificity	As asset specificity increases, dependency grows, thus requiring hierarchical modes	Low specificity: quasi-market or no alliance High specificity: quasi-hierarchy or intermediate	TCE

Table 3 Factors affecting formation and governance of strategic alliances (continued)

<i>Case-specific factors</i>	<i>Impact</i>	<i>Likely outcome</i>	<i>Source theories</i>
<i>Firm-specific</i>			
Strategic position in the network	Firms that are strong compared to their partners prefer looser structures	Strong position: quasi-market Weak position: quasi-hierarchy/intermediate	NT
Firm regime protecting PPRS in alliances	Firms with a weak PPR regime are more likely to prefer hierarchical structures	Strong regime: quasi-market Weak regime: quasi-hierarchy	DCV
<i>Alliance-specific</i>			
Heterogeneity of partners (e.g., international vs. domestic alliances)	As heterogeneity increases, dependency grows, thus requiring hierarchical modes	Heterogeneous partners: quasi-hierarchy/intermediate Homogeneous partners: no alliance/quasi-market	DTCE, SET
Tacit knowledge embedded in exchanged resources	As volume and frequency of knowledge increases, more hierarchical modes are preferred	Low knowledge: no alliance/quasi-market High knowledge: quasi-hierarchy/intermediate	RBV, KBV
Number of prior direct and indirect ties	As number grows, trust increases	Many prior ties: quasi-market Few prior ties: quasi-hierarchy	SET
Duration of direct ties	As duration grows, trust increases	Long prior ties: quasi-market Short prior ties: quasi-hierarchy or intermediate	SET
Time elapsed since last prior alliance between partners	As time increases, trust decreases	Recent prior alliance: quasi-market Old prior alliance: intermediate/quasi-hierarchy	SET
Total number of partners in previous alliances	As no grows, trust decreases	Many partners: quasi-hierarchy Few partners: quasi-market	SET
Governance mode of previous alliances	Firms tend to copy the same structure	Same as previous alliance	SET, INST
Distance between firms in the social network	As distance grows, trust decreases	Large distance: quasi-hierarchy or intermediate Small distance: quasi-market	SET
Frequency of communication	The higher the level, the more trust exists	High communication: quasi-market Low communication: quasi-hierarchy/intermediate	SET
Shared motives amongst partners	Existence of common motives drive collaboration in an agreed mode	Agreed motives: as agreed Disagreed motives: intermediate/no alliance	SET

4.3 Use and usefulness of the contingency model

The contingency model’s utility lies in explaining and predicting a firm’s decision about alliance structure based on the combined impact of its motivations and its perceptions about case-specific factors. The model can be deployed by first identifying the primary strategic and economising motives of the firm entering the alliance. Social motives that further strengthen or diminish the firm’s economic and strategic intentions are then incorporated in the analysis. Once the firm’s motives have been identified, the model can be used to identify their impact on firm preference for an alliance structure.

Having developed an overall ‘taste’ for the appropriate alliance type based on the firm’s motivations, the analyst can then further scrutinise this choice by placing it against the detailed list of firm-specific, environment-specific and alliance-specific factors that collectively influence the alliance formation and structure. The examination of case-specific factors may produce contradicting results regarding the preferred governance structure. It is not the intention of the model to point to one direction only, as this would over-simplify the complexities associated with STA-related decisions. Instead, the analyst should critically evaluate the result of the motivation analysis (first step in the model) against the result of the case-specific factors’ examination (second step in the model) and search for incompatibilities and gaps. The alternative results of using the contingency model, as well as the resulting interpretations, are summarised in Figure 2.

Figure 2 Contingencies and interpretations

		MOTIVATION ANALYSIS	
		Quasi-hierarchy	Quasi-market
CASE-SPECIFIC FACTOR ANALYSIS	Quasi-hierarchy	<p>Quasi-hierarchy (Equity)</p> <p>Analyses are confirmatory. Equity alliances are more preferable.</p>	<p>Intermediate or No alliance</p> <p>Analyses are contradicting. The firm aims at cost economizing, but external conditions favor tighter alliances.</p>
	Quasi-market	<p>Intermediate or No alliance</p> <p>Analyses are contradicting. The firm aims at long-term strategic positioning, but external conditions favor looser alliances.</p>	<p>Quasi-market (Non-equity)</p> <p>Analyses are confirmatory. Non-equity alliances are more preferable.</p>

Figure 2 indicates that when motivation analysis and analysis of case-specific factors lead to similar suggestions (either in favour of quasi-market or quasi-hierarchy types of STAs), the firm can place increased confidence in its initial strategic motivation. However, when the two analyses present contradicting results, then the firm should be cautious about its next steps. In practice, conflicting directions may lead organisations to either adopt intermediate types of governance structures (that can later be more flexibly diverted to quasi-hierarchies or quasi-markets) or choose to withhold their initial intention and choose not to enter an alliance at that stage.

5 Applying the model: a case in wireless business

5.1 Case study setting

The contingency model has been applied to explain the decision over an alliance structure of a leading Greek firm in the market of organising professional exhibition shows (we will call the firm *Inter-Fair* for anonymity purposes). Inter-Fair wished to partner with a wireless application service provider (henceforth called *WirelessCom*, also for anonymity purposes) to introduce and commercially exploit a wireless product innovation in the market. The innovation is a new product, named wireless exhibition guide (*WEG*), which has been jointly developed by a consortium of ICT providers, research institutes and European exhibition venue owners aiming to exploit the evolution in the areas of wireless networks and indoor positioning technologies (Giaglis et al. 2002) to support the professional exhibition industry in a context-aware manner.

WEG has been developed to serve the information, communication and navigation needs and requirements of the three exhibition stakeholders: visitors, exhibitors and organisers. Specifically, the WEG service portfolio includes the following service categories:

- information services (i.e., information to visitors regarding the exhibition show, exhibitors' profile and product/service catalogue, statistics regarding the visitors' volume and traffic and behaviour within the exhibition centre)
- navigation services (i.e., navigation map indicating the visitor's position in the exhibition centre and routing advice for exhibition sites, such as restaurant, presentation room, exit or an exhibition stand)
- communication services (i.e., real-time messages between visitors belonging to a closed group, as well as targeted messages sent by organisers and exhibitors to visitor clusters).

More details on the WEG product can be found in Mathes et al. (2002) and in mEXPRESS (2001).

This case setting was selected because it exhibits the key feature that the targeted alliances of this research has: it is a cross-industry alliance between partners aiming at commercially exploiting a product/service innovation, which has resulted from technology-based development. In the following paragraphs, we apply the contingency model to explain Inter-Fair's preference for entering into a contract-based, rather than a minority or joint venture, alliance with WirelessCom.

Step 1: Motivation analysis

According to the evidence provided during an interview with the firm's management, and particularly its managing director and its marketing manager, the most important incentives that drove Inter-Fair's decision to enter into an alliance with WirelessCom, who would assume responsibility for operating the Wireless Exhibition Guide, included:

- gaining access to resources, skills, knowledge and technology for the administration and maintenance of the application
- saving costs of developing own capabilities and resources, basically technology-related capabilities (application administration) and resources (including servers and wireless user access devices) needed to operate the wireless exhibition guide
- sharing risks and addressing uncertainty from being the first organisation of its kind to introduce a wireless application in the exhibition industry
- expanding the use of current resources into new areas, including the provision of info-communication and navigation services to exhibitors and visitors
- changing organisational routines, for example hall surveillance and event management, through exploiting capabilities provided by the wireless exhibition guide
- obtaining competitive advantage and reinforce its strategic position in the exhibition industry.

Five out of six of these motives belong to the ‘strategic positioning’ category (see Table 2). We can therefore deduce that Inter-Fair should aim for an equity STA (either quasi-hierarchy or intermediate).

Step 2: Analysis of case-specific factors

Table 4 summarises the case-relevant factors, as well as their impact on alliance formation and governance, as identified in the case analysis. Factors were identified based on a series of semi-structured interviews with senior company representatives who were asked to comment on all firm-specific, environment-specific and alliance-specific factors of the contingency model, as well as to present additional factors that would influence their preference for a specific alliance structure.

Table 4 Wireless case study conditions

<i>INTER-FAIR-specific factors</i>	<i>Impact</i>
<i>Environment-specific</i>	
(Market and technology maturity) The wireless technology is at an early phase of its development lifecycle. The Greek market of technology services in exhibition shows is also in an emergent stage of development.	Immature (quasi-market)
(Degree of competition) Competition in providing wireless services in exhibition shows is expected to rise sharply as industry-specific services are provided, thus opening new profit-making opportunities.	High (quasi-hierarchy or Intermediate)
(Degree of risk/uncertainty) Owing to the immaturity of wireless technology, the degree of risk and uncertainty surrounding any venture of providing wireless services in the exhibition market is high.	High (quasi-hierarchy)

Table 4 Wireless case study conditions (continued)

<i>INTER-FAIR-specific factors</i>	<i>Impact</i>
<i>Firm-specific</i>	
(Relative size and bargaining power) INTER-FAIR is small in size compared to its candidate partners in the concerned alliance.	Small (quasi-market)
(Asset specificity) INTER-FAIR has a large customer base, including a great number of large exhibitors from various sectors. Recently, it has been the first private organiser to build own exhibition hall, which is the first exhibition centre in Greece equipped with WLAN access points. As a result, INTER-FAIR can be said to own valuable assets to be offered in an alliance.	High (quasi-hierarchy or Intermediate)
(Strategic position) INTER-FAIR's competences and assets provide it with a significant competitive advantage that places it in a strong strategic position in the exhibition industry.	Strong (quasi-market)
<i>Alliance-specific</i>	
(Heterogeneity of partners) The candidate partners of the alliance reside in the same country and share similar values and work practices.	Homogeneous (quasi-market)
(Tacit knowledge embedded in exchanged resources) To operate the Wireless Exhibition Guide, INTER-FAIR and its customers (organisers, exhibitors, visitors) need to exchange significant volume of confidential information. Thus, the alliance should be based on trust.	High (quasi-hierarchy or Intermediate)
(Number of prior direct and indirect ties) INTER-FAIR has recently signed several cooperative agreements with other technology partners, which can also be candidate partners in the proposed STA.	Quite many prior ties (quasi-market or Intermediate)
(Duration of direct ties) Existing inter-firm collaborations have been contracted only recently.	Short prior ties (quasi-hierarchy or Intermediate)
(Total number of partners in previous alliances) Existing inter-firm collaborations concern bilateral supplier–customer relationships.	Few partners (quasi-market)
(Governance mode of previous alliances) Existing collaborations are structured as contractual arrangements.	Contract-based (quasi-market)
(Shared motives amongst partners) The candidate partners in this case wish to collaborate with INTER-FAIR to gain access to its physical and organisational resources (e.g., exhibition premises), expand the use of their current skills and resources in the exhibition industry, exploit complementary assets (such as WLAN access points in exhibition premises), and reinforce their strategic position in their industries. As a result, the candidate partners share common motives for the alliance formation.	Agreed motives (quasi-hierarchy or Intermediate)

Step 3: Governance choice

The motivation analysis drives Inter-Fair towards equity STAs (quasi-hierarchy or intermediate). Out of the 13 case-specific conditions listed in Table 4, seven drive decisions towards non-equity (quasi-market) alliances, while six lead to equity (quasi-hierarchy). Moreover, five out of these 13 conditions, coinciding in the table with either quasi-hierarchy or quasi-market decisions, drive shared-equity (intermediate) STAs. The balanced analysis of the antecedent factors leaves enough grounds to suggest that the company can follow its motivational choice, however, not in its extreme form (quasi-hierarchy) but rather towards a more flexible alliance of shared-equity structure.

To validate the theoretical prediction of the contingency model with the actual intentions of the decision makers who analysed the situation without the use of the model, we held a second round of interviews with Inter-Fair's senior managers. These interviews helped to verify that Inter-Fair does indeed intend to pursue a minority alliance with technology providers to share the risks and cost of service provision, while at the same time maintaining the opportunity for first-mover competitive advantage in the exhibition industry. Although the ultimate validity of the contingency model cannot be proven until the alliance negotiations are held and the STA is put to practice, the case study has allowed us to obtain initial empirical support for the validity of our theoretical propositions.

6 Conclusions and further research

The increasing number of inter-firm partnerships, especially those involving an exchange of technology components or knowledge, has motivated a growing body of research on strategic alliances formation (Grant and Badden-Fuller, 2004; Pangarkar and Klein, 1998; Eisenhardt and Schoonhoven, 1996; Gulati, 1995) and governance (Oxley and Sampson, 2004; Pangarkar and Klein, 2001; Das and Teng, 2000; Gulati and Singh, 1998). In this paper, we set out to address the research challenges in this area by developing a contingency model explaining the way in which firms raise their preference for the governance structure (quasi-market, intermediate, quasi-hierarchy) of their strategic technology alliances.

Our model is anchored on the key premise that the managers decide upon a preferred governance structure based on the combined outcome of endogenous firm's objectives for the alliance formation coupled with the influence of contextual factors that relate to their organisational status, the environment in which the firm operates and their current or/and past relationship with their partner(s). However, the motivation analysis (Step 1 of the model application) might lead to a different governance choice than the one implied by the subsequent analysis of contextual factors (Step 2). When the two analyses converge, firms may place increased confidence in their initially identified (motivationally-based) preference. When the two analyses diverge, firms might opt for more intermediate governance forms or even reconsider their decision to enter the alliance.

Potential users of the model include alliance researchers/analysts or executives having an active role in their firms' decision process regarding strategic alliances. There are several areas in which the first group can apply the model: identifying and rating factors that have mostly affected governance decisions in implemented or prospective alliances,

assessing the success of current or past alliances against the structure decision, as this was formulated by the firms' motivations and perceptions for a number of case-specific conditions, and so on. The latter can use the model as a decision-aiding tool for determining the appropriate structure of an alliance.

The validity and utility of the model is undoubtedly limited by the assumptions made during its development. The model intends to analyse and explain, rather than prescribe, the alliance governance decision process by ensuring that decision-makers do take into account all the necessary parameters before reaching a conclusion on the preferred governance form for a given alliance. In the present form of the model, all factors are equally weighted as far as their impact on the decision over inter-firm collaboration is concerned. However, it is conceivable that some factors have a greater impact than others. Therefore, a natural extension of this research would be to investigate the relative weight of each factor and expand the model to provide a more comprehensive explanation of the decision process. In such case, the expanded model might also gain prescriptive power, rather than solely descriptive or explanatory as it does now.

Moreover, the model, in its current form, does not take into account correlations that may exist between factors. Addressing this limitation would require employing statistical techniques to identify interdependencies and alternative groupings between factors, so that their collective impact can be assessed.

Finally, the model is intended to explain decisions from the perspective of a single firm before the inception of an alliance. Since any alliance involves at least two parties, it would be interesting to investigate how the individual preferences of firms entering a negotiation regarding a strategic technology alliance affect the course of the negotiation itself, and thus the finally implemented governance structure (which has been outside the scope of this research).

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