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Adopting IOIS in asymmetrical partnerships. Evidence from asymmetric alliances between Tunisian and European companies

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Adopting inter-organizational information systems in asymmetrical partnerships

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ABSTRACT

Previous research in inter-organizational information systems (IOIS) is usually organized around three themes: adoption of IOIS, its impact on governing economic transactions, and its organizational consequences (Robey et al.*, 2008). This article aims to study the factors affecting a specific type of IOIS adoption, the one, within asymmetric strategic alliances. Drawing on qualitative research involving ten cases of asymmetric alliances between Tunisian and European companies, the present study develops a set of testable propositions that sheds light on factors affecting the adoption of IOIS within asymmetric alliances. These mainly refer to the asymmetric alliance as well as a set of technological, organizational and environmental factors.*

Keywords: *Inter-organizational information system, Adoption decision, Strategic alliance, Asymmetry, Qualitative research.*

RÉSUMÉ

La littérature sur les Systèmes d'information inter-organisationnels (SIIO) est regroupée traditionnellement autour de trois pôles d'études : les facteurs influençant l'adoption des SIIO, l'impact des SIIO sur le management des transactions économiques et les conséquences de l'adoption de ces technologies (Robey et al.*, 2008). Cet article vise à analyser les facteurs influençant la décision d'adopter des Systèmes d'information inter-organisationnels (SIIO) au sein des alliances stratégiques asymétriques. En s'appuyant sur l'étude de dix cas d'alliances asymétriques entre des entreprises tunisiennes et européennes, nous proposons un ensemble de propositions de recherche concernant les facteurs qui pourraient avoir un impact sur l'adoption des SIIO au sein d'alliances stratégiques asymétriques. Il s'agit notamment des caractéristiques de l'alliance asymétrique ainsi qu'un ensemble de facteurs technologiques, organisationnels et environnementaux.*

Mots-clés : *Systèmes d'information inter-organisationnels, Décision d'adoption, Alliance stratégique, Asymétrie, Recherche qualitative.*

INTRODUCTION

Inter-organizational information systems (IOIS) are defined as automated information systems shared by two or more companies to facilitate the creation, storage, transformation and transmission of information (Johnston and Vitale, 1988). Since 2000, the growing use of the Internet has affected how organizations conduct their commercial transactions and has led to a progressive migration to open standards and more flexible information technologies (Zhu *et al.*, 2006; de Corbière and Rowe, 2013; Uotila *et al.*, 2017). Diverse types of IOIS have thus emerged, including shared databases, extranets, B2B electronic commerce systems, Internet-based systems centered on open standards such as XML-based data standards (eXtensible Markup Language), etc.

Few studies have been conducted on the factors that influence strategic partners to adopt IOIS (Mirkovski *et al.*, 2016), especially in the case of asymmetric alliances involving companies of different sizes, different resource levels and different capacities (Chen and Chen 2003, Mouline, 2005; Cho *et al.*, 2017). Then, issues such as power and dependence asymmetry, partners' opportunism, and uncertainty were not taken into consideration. The adoption of an IOIS is important for trading partners, particularly when they present asymmetric characteristics regarding their size, assets, turnover and/or national origin. In fact, coordinating asymmetric partners' activities becomes more complicated due to differences or even incompatibilities between their cultures, organizational processes, and managerial systems (Salk and Shenkar, 2001; Meschi and Riccio, 2008; Rajaguru and Matanda, 2013). These difficulties can be amplified by the geographical distance that separates partners as well as the high degree of opportunism and uncertainty that characterizes an asymmetric strategic alliance, which therefore exacerbates information asymmetry problems (Chen and Chen, 2002). The adoption of an IOIS can thus fulfill the need for additional information resources and facilitate asymmetric partners' coordination activities (Gulati *et al.*, 2012; Kim *et al.*, 2016). In addition, a large number of studies have found that these technologies may provide substantial benefits, such as enabling integration and interoperability with business partners and strengthening their relationships, shortening lead time, reducing errors and returns, and enabling all parties to attain high operational efficiency and capability through faster, more efficient and accurate data exchange (Yao *et al.*, 2007; Grover and Saeed, 2007; Boukef Charki *et al.*, 2011; de Corbière, 2011; Goethals *et al.*, 2011; Loukis and Charalabidis, 2012).

However, contradictory results have been reported in previous studies on IOIS adoption (Hameed and Counsell, 2012). For example, some researchers seeking to explain IOIS adoption have emphasized that some of its variables (relative advantage, compatibility, observability, trialability, and complexity) have no effect on adoption decisions (Fichman, 2004; Chan *et al.*, 2012; Pan *et al.*, 2013). In this perspective, Sila (2013) found that complexity does not play a significant role in contributing to firms' decisions to adopt B2B Electronic Commerce. In contrast, Li (2008) and Chong *et al.*, (2009b) argued that this factor does influence partners to adopt information technology (IT) tools. Likewise, the variable related to the environmental context has been the subject of controversy between authors, some of whom claim that this variable significantly influences IT adoption (Gibbs *et al.*, 2003; Mirkovski *et al.*, 2016), while others ignore its impact (Teo *et al.*, 2006; de Corbière *et al.*, 2012). This inconsistency in the literature findings gives only narrow insight as to how these factors motivate or hinder adoption decisions.

Moreover, most studies of IOIS adoption and its use by strategic partners have focused on a single partner and tested only well-documented factors taking different theoretical approaches, such as the technology-organization-environment (TOE) framework and the innovation diffusion theory. Little research has thus been conducted on the factors influencing the adoption of IOIS by strategic partners from an inter-organizational perspective (Kim *et al.*, 2016). Given the situation, more studies are expected to make greater insights on this issue. This research will therefore take these theoretical gaps into consideration by examining factors affecting adoption decision within asymmetrical partnerships.

In order to answer our research question, we used a qualitative case study covering ten cases of asymmetric alliances between Tunisian and European companies. We therefore conducted 60 face-to-face semi-structured interviews with Tunisian and European partners. Our findings have diverse implications for both researchers and practitioners. We highlight the importance of technological, organizational and environmental factors to drive the adoption of IOIS within asymmetric alliances. We also show the role of the alliance characteristics in determining whether or not an IOIS is needed to support partners' interdependence across the relationship. From a managerial perspective, our study helps alliance managers to determine the factors that contribute to adopting new IOIS within their asymmetrical partnership, and guide their choice of the most appropriate technology for the organizational form of alliance. Empirically, scholars have focused mainly on Asian countries like China (Tan *et al.*, 2007), Vietnam (Van Huy *et al.*, 2012), Indonesia (Kurnia *et al.*, 2015) and Malaysia (Sin Tan *et al.*, 2009) to study the adoption of IOIS. Little attention has thus been paid to the study of asymmetrical partnerships in North African countries (Triki and Mayrhofer, 2016; Demirbag *et al.*, 2011), and in particular Tunisia, which was profoundly affected following the advent of the Arab Spring in 2011. Our research will fill this vacuum and participate in extending the geographical scope of empirical studies in this context.

This paper is organized as follows. We first examine factors affecting IOIS adoption decisions and explain the specific characteristics of asymmetric strategic alliances. Then we present our research methodology, more specifically the data collection and the data analysis technique we used. We present and discuss our findings based on the analysis of ten cases of asymmetric alliances between European and Tunisian companies. Finally, we conclude the research by presenting its research and practical implications, limitations and future research of this paper.

LITERATURE REVIEW

A substantial amount of research was conducted to examine the various factors that affect IOIS adoption. After presenting an overview of the theoretical approaches used to analyze this decision, we present the major characteristics of an asymmetric alliance. We then focus on factors impacting the adoption of IOIS within asymmetric strategic alliances.

IOIS adoption theories

Competing theories on IOIS adoption include, among others, innovation diffusion theory, TOE framework, resource dependence theory, and a set of integrated approaches.

Rogers' (2003) innovation diffusion theory has received the most attention and interest from researchers seeking to explain IOIS adoption as an optional innovation decision from a purely rationalistic perspective

(Robey *et al.*, 2008). Innovation diffusion theory features numerous perceived innovation characteristics, including relative advantage, complexity, compatibility, observability and trialability (Sila, 2013). Based on this approach, several studies have argued that these technological attributes are considered as antecedents of EDI adoption (Premkumar *et al.*, 1994; Chwelos *et al.*, 2001). However, Chong *et al.*, (2009a), Chan *et al.*, (2012) and Pan *et al.*, (2013) found that some of these variables have no effect on the adoption decision, particularly compatibility and complexity, which are not barriers to adoption in many e-business applications because the Internet is based on consistent standards. Moreover, Fichman (2004) revealed that the innovation diffusion theory totally overlooks the complex business environment in which organizations are established. The innovation diffusion theory is thus considered as an individualist approach, since it only focuses on singular technologies that are autonomously adopted by individual entities not embedded in complex networks, while ignoring the impact of organizational, inter-organizational and environmental factors (Lee and Cheung, 2004).

The TOE framework, developed in 1990 by Tornatzky and Fleischer, identifies three aspects of an enterprise's context that influence the process by which it adopts a technological innovation: technological context, organizational context, and environmental context. Technological context describes both the internal and external technologies that are relevant to the firm, such as security concerns, reliability, complexity, etc. Organizational context refers to descriptive measures about the organization such as size, centralization, formalization, quality of human resources, amount of slack resources available internally and complexity of the organization's managerial structure. Finally, environmental context is the arena in which a firm conducts its business—its external pressure, business environment and industry environment (Tornatzky and Fleischer, 1990). The TOE framework has been examined by a large number of empirical studies in various IOIS domains such as Electronic Data Interchange (EDI) (Kuan and Chau, 2001; Ramamurthy *et al.*, 1999), e-business (Kuan and Chau, 2001. Zhu *et al.*, 2006) and the adoption of e-commerce (Hong and Zhu, 2006; Tan *et al.*, 2007).

Resource dependence theory (Pfeffer and Salancik, 1978) has also received considerable attention from researchers studying IOIS adoption. According to this theory, organizations that provide scarce resources or access to these resources have power over those who are highly dependent on such resources. Thus, the greater the relative dependence, the greater the power of a resource-rich firm to influence resource-dependent firms (Blau 1964, Emerson 1962, Pfeffer and Salancik 1978, Thompson 1967). The interdependence between organizations is the focus of IOS literature on resource dependence theory. From this perspective, IOIS are viewed as devices employed by organizations to reduce their dependence on other organizations or to increase the dependence of other organizations on resources controlled by the organization itself (Reimers *et al.*, 2010). Variance of IOIS could then be explained by different types of dependency (pooled – sequential – reciprocal)[1] or different types of resource that create dependencies among firms (Kumar and Van Dissel, 1996). Power and trust are key concepts in resource dependence theory and play a critical role in adoption decisions and in determining whether and how IOIS are used (Hart and Saunders, 1997; Alsaad *et al.*, 2014).

[1] Types of task interdependence (Thompson, 1967).

Because of the inherent complexity of the adoption process, several authors employ different approaches to analyze the adoption decision (Chwelos *et al.*, 2001, Ham and Johnston, 2007, Kurnia and Johnston, 2000; Sila, 2013). As cited by Lyytinen and Damsgaard, (2011, p.506): "*the investigator needs to mobilize several theoretical frames: organizational, industrial and institutional at different levels of analysis*". Some previous studies have applied the TOE framework (Tornatzky and Fleischer, 1990) employing the theory of diffusion of innovation (Zhu *et al.*, 2006; Wang *et al.*, 2010; Oliveira and Martins, 2011), the resource dependence theory (Chong *et al.*, 2009a; Alsaad *et al.*, 2014), and all of the above-mentioned theories (Li, 2008). Also in this perspective, the Iacovou, Benbasat, and Dexter (1995) model (based on three factors: perceived benefits, organizational readiness, and external pressure) was combined with the TOE framework (Oliveira and Matins, 2010), as well as the TOE framework and the innovation diffusion theory (Hsu *et al.*, 2006).

After presenting an overview of the competing theories on IOIS adoption, we describe, in the following, the characteristics of asymmetric strategic alliances.

Asymmetric strategic alliances

Strategic alliances represent voluntary cooperative inter-firm agreements aimed at obtaining competitive advantage for partners (Das and Teng, 2000). These relationships provide a firm with desired strategic capabilities by linking it to a partner with complementary resources, or by pooling its resources with those of a partner of similar capabilities (Porter and Fuller, 1986; Chen and Chen, 2003). In the literature on general strategic alliances, we distinguish between symmetrical and asymmetrical relationships. Asymmetric strategic alliances may exist when there is an asymmetry in the partners' characteristics (e.g. size, assets, resources, turnover, national origin) and/or an imbalance in the governance structure of the relationship (Harrigan, 1988, Chen and Chen 2003, Mouline, 2005). Strategic alliances can take a variety of forms, including, but not limited to, joint ventures, minority equity alliances, joint R&D, joint production, joint marketing, distribution agreements, and licensing agreements (Das and Teng, 2000). To better organize such a wide range of alliance forms, researchers have proposed several typologies of strategic alliances (Dussauge and Garrette, 1995; Lorange and Roos, 1990; Pisano and Teece, 1989), and mainly the equity/non-equity dichotomy (Gulati, 1995; Osborn and Baughn, 1990; Das and Teng, 2000).

On the one hand, in equity alliances, for example joint ventures, "*partners pool together a portion of their resources within a common legal organization*" (Kogut, 1988; p. 319). The choice of this form is particularly interesting in asymmetric cooperations to increase the partners' commitment and the costs of breaking the relationship, and to reduce the risks of opportunistic behavior (Chen and Chen, 2002, Mouline, 2005). Park and Russo (1996) distinguish between integrative and sequential joint ventures. According to the authors, the creation of integrative joint ventures represents a means to enhance the coordination of the resources pooled by both partners since some of their resources can be combined within an integrated organization. A deeper level of interdependence and mutual engagement characterizes, therefore, the partners' joint venture, since each party mobilizes part of its resources, technologies, processes and staff to collaborate effectively with its counterpart (Contractor and Lorange, 1988). This interdependence is all the more important because it covers a wide scope of

activities encompassing the alliance's entire value-chain (Porter, 1985). Nevertheless, sequential joint ventures are characterized by a low level of interdependence between partners, since organizations assign all activities to individual partners in a sequential path, with no joint operations within a separate joint venture facility (Mitchell *et al.*, 2002).

On the other hand, non-equity alliances are characterized by a poor level of integration, since firms are likely to perform individually without much collaboration or coordination (Mowery *et al.*, 1996). Gulati and Singh (1998) add that non-equity alliances, such as partnerships and license agreements, are characterized by a limited transfer of physical and information flows. Gulati *et al.*, (2012), however, emphasize that joint R&D, joint marketing and joint production tend to employ more hierarchical joint-venture governance mechanisms due to ex-ante coordination-related challenges, such as the likely complex and ambiguous interdependencies that occur in such relationships (Gulati and Singh, 1998) or due to expected cooperation-related challenges, such as the difficulty of control (Oxley, 1997; Pisano, 1989).

In the case of asymmetric alliances, one of the firms that possess more substantial assets in terms of human and technological resources and financial performance will be able to exert power and control over its partner and its partner's resources, and to influence what happens in the alliance for its own benefit for many years (Harrigan and Newman, 1990; Inkpen and Beamish, 1997; Tinlot and Mothe, 2005). This firm (generally an MNC) will also be able to define the management mechanisms of the alliance in terms of formal rules and procedures to be followed by the dominated firm. However, the capabilities of the host country partner may remain undeveloped while it is locked in a state of continuing dependence. Since the latter expects that its gains from behaving opportunistically will surpass the potential payoffs of not behaving that way, he will be prone to show opportunism (Williamson, 1985).

Significant uncertainty and greater opportunism accordingly characterize asymmetric strategic alliances (Chen and Chen, 2002). Such a situation may hamper reciprocal commitment and cooperative behavior, and make it difficult to gather all relevant information, which may lead to several coordination problems. In fact, coordinating partners' common activities becomes more complicated because of differences or even incompatibilities between their cultures, organizational processes, and managerial systems (Salk and Shenkar, 2001; Meschi and Riccio, 2008; Rajaguru and Matanda, 2013). These differences can be amplified by the geographical distance that separates partners and accordingly exacerbates information asymmetry problems. In this perspective, information sharing via IOIS can fulfill the need for additional information resources, as long as the partners are trustworthy and willing to share relevant information (Gulati *et al.*, 2012; Kim *et al.*, 2016). IOIS technologies increase the level and quality of communication between partners, improve their decision rationality, and facilitate the coordination of the alliance activities. However, unfavorable relationships and conflicts, which often exist between strategic partners, can make IOIS adoption difficult (Ham and Johnston, 2007; Kumar and van Dissel, 1996).

After presenting an overview of the competing theories on IOIS adoption and the specific features of an asymmetric alliance, in the following we concentrate on the main factors that impact the adoption decision in the context of asymmetric strategic alliances.

Factors that influence the adoption of IOIS in asymmetric strategic alliances

To understand the factors that influence IOIS adoption among asymmetric partners, it is important to consider factors from the innovation diffusion theory, the TOE framework, and the resource dependence theory. By integrating these factors, we provide more insights into the complex process of IOIS adoption in strategic alliances, which requires a decision based on internal and external assessments.

Factors from the innovation diffusion theory

Relative advantage. Relative advantage is related to the degree to which an innovation is perceived to be better than the innovation it is replacing (Rogers, 2003). In this context, Bensaou (1997) has argued that partners may choose to continue using an existing platform for inter-firm coordination when facing high costs in implementing new IOIS. Following Premkumar and Ramamurthy (1995), we consider "relative advantage" as an internal organizational variable playing a significant role in the decision to adopt a new technology.

Complexity. Complexity represents the degree to which an innovation is perceived as relatively difficult to understand and use (Rogers, 2003). While Chong *et al.*, (2009b) argued that complexity is an important determinant of whether an organization adopts e-collaboration tools, Tan and Teo (2000) and Sila (2013) found that this variable does not play a significant role in the adoption decision.

Compatibility. Compatibility is whether the innovation is compatible with the potential adopters' values, needs and experiences (Rogers, 2003). Several authors have argued that a lack of interoperability, process compatibility and relational extendibility between partners' information systems may hinder the adoption of IOIS (Tan and Teo, 2000; Teo *et al.*, 2006; Venkatesh and Bala, 2012).

Factors from the TOE framework

Organizational readiness. Organizational readiness refers to financial resources, trading partner readiness, and IT sophistication (Iacovou *et al.*, 1995; Chwelos *et al.*, 2001).

Top management support. Top management support is related to the leveraging of necessary resources to effectively assimilate the innovation (Premkumar and Ramamurthy, 1995; Zhu *et al.*, 2006). When senior management has a good understanding of the various types of benefit to be gained from IOIS, its commitment and engagement to these technologies is reinforced. In the context of interorganizational relationships, adopting an IOIS requires readiness and top management support from both trading partners (Chwelos *et al.*, 2001).

Environmental uncertainty. Environmental uncertainty refers to the competitive environment that encompasses a firm's customers, suppliers and business partners, and the legal, regulatory and social environments that could potentially influence the firm's behavior (Teo *et al.*, 2006). In our context, a turbulent environment is characterized by high levels of uncertainty regarding the legal, regulatory and social environments. A large body of research has focused on the relationship between the external environment, IOIS adoption and assimilation in organizations, arguing that state policies, legal issues, and international trade regulations significantly influence IT adoption (Gibbs *et al.*, 2003; Mirkovski *et al.*, 2016). In contrast to these findings, Teo *et al.*, (2006) found that the absence of appropriate organizational and

technological contexts has a greater impact on inhibiting B2B e-commerce deployment than the absence of an appropriate environmental context.

Industry pressure. Industry pressure is related to the adherence to the degree of competition intensity, the industry type, and even Universal Industry Standards (Howard *et al.*, 2006). In this context, Bensaou (1997) has argued that the automotive sector may affect trading partners' decisions to adopt EDI to strengthen their integration.

Factors from the resource dependence theory

Partners' level of interdependence. Barua and Lee (1997) argued that partners' decision to join an IOIS network can be largely attributed to strategic necessity, based on their degree of dependence rather than financial or technical incentives. A low level of interdependence between partners (Keruzer *et al.*, 2015) as well as a fear of adopting the wrong technology (Venkatesh and Bala, 2012) can hinder partners' decisions to adopt a particular IOIS.

Trust. Trust between strategic partners is of great importance when firms decide to adopt an IOIS (Grover and Saeed, 2007; Bouchbout and Alimazighi, 2008; Chan *et al.*, 2012; Venkatesh and Bala, 2012). Rai *et al.*, (2006) found that information flow integration for inter-organizational coordination is positively correlated with relational interaction routines and trust between partners. In contrast, Chong *et al.* (2009a) found that trust does not contribute to the intention to adopt new IOIS.

Dominant partner power. *"Power is defined as the capability of a firm to exert influence on another firm to act in*

Table 1: Factors that influence the adoption of IOIS in asymmetric strategic alliances

Factors	Approach	Author
Relative advantage Complexity Compatibility	Innovation diffusion theory (Rogers, 2003)	Premkumar *et al.*, (1994) Premkumar and Roberts (1999) Tan and Teo (2000) Teo *et al.*, (2006) Chong *et al.*, (2009b) Venkatesh and Bala (2012)
Organizational readiness Top management support Environmental uncertainty Industry pressure	TOE framework (Tornatzky and Fleischer, 1990)	Grover (1993) Premkumar and Ramamurthy (1995) Chwelos *et al.*, (2001) Teo *et al.*, (2006) Venkatesh and Bala (2012) Zhu *et al.* (2006)
Partners' level of interdependence Trust Dominant partner power	Resource Dependence Theory (Pfeffer and Salancik, 1978)	Zaheer and Venkatraman (1994) Hart and Saunders (1997) Grover and Saeed (2007) Chong *et al.*, (2009b) Lyytinen and Damsgaard (2011)

a prescribed manner" (Hart and Saunders, 1997, p.24). Dominant partner power is thus the exertion of bargaining power by dominant firms to coerce their dominated partners to adopt IOIS (Lyytinen and Damsgaard, 2011). According to Bala and Venkatesh (2007), dominant firms can oblige their non-dominant counterparts to assimilate innovations, engaging them in relationships based on these technologies to increase the likelihood of the standards eventually becoming successful. However, Chong *et al.*, (2009a) found that trading partners' power had no significant influence on the adoption of e-business in the supply chain of Malaysian SMEs. According to these authors, SMEs have more trading partner options in the current business environment, so that forcing or inciting them to adopt might not have a positive effect on the adoption decision.

After presenting an overview of the major factors that affect IOIS adoption in asymmetric alliances, we synthesize them in the table 1 (above). These factors will be used to study the adoption decision in the context of asymmetric alliances between Tunisian and European partners.

RESEARCH METHODOLOGY

In line with the object of our research, namely to understand the factors that lead asymmetric partners to adopt IOIS, we carried out a positivist case study (Benbasat *et al.*, 1987; Dubé and Paré, 2003).

Case research is widely used in a positivist perspective for generating propositions, providing explanations and testing hypotheses (Benbasat *et al.*, 1987; Sarker and Lee, 2002; Yin, 2003; Khedhaouria, Belbaly and Benbya, 2014). Several reasons motivated us to adopt a case study methodology. First, positivist case research represents "*the dominant paradigm in IS case research*" (Dubé and Paré, 2003; p.599). Second, IOIS is a phenomenon that is difficult to separate from its environment (Reimers *et al.*, 2014). Third, a strategic alliance is a complex phenomenon (Gulati *et al.*, 2012). The case of asymmetric alliances between European and Tunisian companies provides an opportunity to investigate in a real-life setting the factors that can lead partners to adopt new IOIS (Yin, 2003). Qualitative data are thus essential to provide *thick descriptions* for a specific phenomenon nested in a real context (Miles and Huberman, 1994). Also, according to Dubé and Paré (2003), positivist case studies are used when a priori fixed relationships exist within phenomena capable of being identified and "tested" via descriptive analysis. Using descriptive case studies of asymmetric alliances between Tunisian and European companies, we attempted no theoretical interpretation of the phenomena; rather, we presented what we believe to be straightforward, objective, factual accounts of events to illustrate some factors that lead asymmetric partners to adopt IOIS.

Adopting a positivist case research requires paying attention to construct validity, reliability, and external validity (Dubé and Paré, 2003).

Construct validity suggests that the data collection method includes multiple sources based on a triangulation approach (Yin, 2003). In fact, we carried out 60 face-to-face semi-structured interviews between June 2011 and September 2016. Based on an inter-organizational perspective, we simultaneously interviewed Tunisian and European partners to carry out an in-depth investigation on the antecedents of IOIS adoption and implementation decisions. We were careful to interview actors involved in the management of these alliances such as Tunisian and European IS managers, executive directors, R&D managers, marketing managers and production managers. Each

interview lasted about an hour, for a total of 62 hours of interviews. The verbatim has been made anonymous to respect the confidentiality of the answers. Moreover, we used other secondary data consisting of internal and external documents (e.g. corporate documents, screen captures, activity reports, websites, press cuttings, etc.).

Reliability emphasizes the trustworthiness of data, which is demonstrated by the appropriate use of the case study protocol (Yin, 2003). The interviews encompassed 20 semi-structured questions addressing four main themes, i.e. factors related to the asymmetric alliance (the form of the alliance, partners' level of interdependence, scope of activity, trust between partners, dominant partner power and dominant partner opportunism), technological factors (complexity and compatibility), organizational factors (relative advantage, organizational readiness and top management support) and environmental factors (environmental uncertainty and industry pressure) (see Appendix 1). We recorded and transcribed our interviews within 24 to 72 hours to ensure that data were more exhaustive and reliable. We also submitted our interviews to the interviewees in order to validate their ideas and confirm their comments. Interviews were coded and analyzed by thematic analysis using codes related to our theoretical framework as presented in Appendix 2. The NVIVO qualitative data analysis software (version 10) was used to link each sentence or paragraph to the themes and help identify patterns in interviewees' responses. 10% of the units were double-coded by another researcher and compared to our own coding to ensure the reliability of the coded data. The inter-coder reliability rate obtained was 81%.

External validity involves determining whether a study's findings can be generalized beyond the immediate case study (Yin, 2003). According to this author, multiple cases have higher external validity than single cases. To meet this objective, we adopted a multiple case study based on ten asymmetric alliances between Tunisian and European companies presenting distinct organizational forms. The choice of studying the case of alliances between European and Tunisian companies was initially motivated by our concern to investigate asymmetric alliances which present a set of specific features that are likely to impact the adoption decision. Secondly, since previous studies addressing the issue of IOIS adoption within asymmetric partnerships between developed and developing economies have focused mainly on Asian countries (Tan *et al.*, 2007; Sin Tan *et al.*, 2009; Van Huy *et al.*, 2012; Kurnia *et al.*, 2015), little is known about North African countries (Triki and Mayrhofer, 2016). Accordingly, we address this literature gap by conducting our research on the case of asymmetric alliances in Tunisia. Lastly, the creation of the Euro-Mediterranean Free Trade Area in 1976 and the inclusion of the Tunisian government in the General Agreement on Tariffs and Trade – World Trade Organization (GATT-WTO) in 1990 increased the number of strategic alliances with European Union countries, which are the leading trade and foreign investors in Tunisia, representing more than 80% of the country's total Foreign Direct Investment (FDI) in 2010 (The World Bank). Nevertheless, the political instability linked to the advent of the Arab Spring and the fall of the Ben Ali regime in 2011 has deeply affected the amount of information exchange, the level of trust between partners, and the coordination of these relationships (European Commission, 2011).

Table 2 presents the different characteristics of our case studies, i.e. alliance form, field of activity, creation date, nationality of the European partner and alliance scope. Thus, we analyzed five equity alliances (three cases of integrative joint ventures and two cases of sequential joint ventures),

Table 2: Sample presentation

Cases	Alliance Form	Field of activity	Creation date	Nationality of the partners	Alliance scope
1	Joint venture (50/50)	Agro-food	1997	Tunisia / France	Wide, encompassing the entire alliance value chain
2	Joint venture (55/45)	Agro-food	2007	Tunisia / Spain	
3	Joint venture (49/51)	Agro-food	2005	Tunisia / Germany	
4	Joint venture (70/30)	Pharmaceutical	2006	Tunisia / France	Narrow, including manufacturing and quality control
5	Joint venture (65/35)	Pharmaceutical	2001	Tunisia / France	
6	License agreement	Agro-food	2001	Tunisia / France	Narrow, including manufacturing, quality control and sale
7	License agreement	Pharmaceutical	2001	Tunisia / France	
8	License agreement	Pharmaceutical	2001	Tunisia / France	
9	Vertical partnership	Automotive	2010	Tunisia / France	Narrow, including manufacturing
10	Vertical partnership	Automotive	2002	Tunisia / France	

and five non-equity alliances (three cases of license agreement and two cases of vertical partnerships). The analysis concerned four cases from the agro-food sector, four cases from the pharmaceutical sector and two cases from the automotive sector. The date of creation of these alliances is between 1997 and 2010. Lastly, we point out that the foreign partners are mainly French (eight cases).

FINDINGS

Our analysis of ten cases of asymmetric alliances between Tunisian and European companies emphasizes a set of factors that influence the adoption and implementation of new IOIS technologies. We first identify the factors related to the asymmetric alliance, namely the alliance form (Equity/non-Equity); scope of activity; partners' level of interdependence; trust between partners; dominant partner power and dominant partner opportunism. We then highlight the role of compatibility between partners' IS, partners' awareness of the relative advantage of IOIS; organizational readiness of the host country partner; top management support of both partners, and industry pressure as determinants of IOIS adoption within an asymmetric alliance.

Factors related to the asymmetric alliance

Partners' level of interdependence and alliance scope. In cases (1, 2 and 3), the European partner allowed the host country partner to access and use its knowledge database comprising its high-potential employees as well as its relevant previous experience in different locations. The European partner justified this decision by its growing commitment, along with the host country partner, to the alliance activities, as well as a bilateral exchange of multiple and varied resources. In fact, the scope of these joint ventures is wide, involving both partners in the whole value

chain, such as R&D, production, marketing, logistics and sales, thereby reinforcing their mutual dependence. Thanks to this Web-based platform, the host country partner can share multiple knowledge to effectively monitor several activities including R&D (e.g. innovation with new recipes adapted to the changing tastes and requirements of the Tunisian consumer), production (e.g. technological expertise in order to optimize its production process) and marketing (e.g. advertising and promotion methods and techniques). As an illustration:

> *"If we encounter problems, the partner grants us access to a Web-based platform fed by past experiences, results obtained, difficulties encountered and adapted solutions to make sure that the image of our brand doesn't deteriorate"* (Tunisian R&D Manager, case 1).

> *"Considering our expanded portfolio of activities, we have designated a computer specialist for the Tunisian company to harmonize databases. He travels one week a month to Tunisia to help the partner improve its IS, develop standard reports, and harmonize the two computer systems. This will allow us to easily integrate information into our IS, and so make it easier to assess the situation as well as decision-making since we share the same management indicators"* (Spanish Marketing Manager, case 2).

Conversely, the analysis of the results of cases (4, 5, 6, 7 and 8) shows a low involvement of the Tunisian and European partners in the alliance's value chain. For cases 4 & 5, the alliance scope is confined to a manufacturing and quality control of the European partner's products, which is performed by the host country partner. In addition, only low value-added products are entrusted to the local company for the needs of its industrial equipment and low-cost, high-quality manpower. The European partner concentrates, on the other hand, on high value-added activities generating competitive advantages, notably R&D and marketing. Thus, the joint venture assumes a coordinating role between partners, based on standardized operations and procedures that must be respected and fully adopted on both sides. In the same vein, the partners of cases (6, 7 and 8) have a low level of involvement in the alliance value chain to lead manufacturing and distribution of the licensed product on the Tunisian market. According to our interviewees, the limited scope of these partnerships does not require adopting new IOIS. The alliance has not impacted the host country's freedom to operate and make autonomous decisions, with the result that it does not feel the need to connect or share an information system with its foreign partner. As mentioned in the following:

> *"The partner is not involved in forecasting inputs and sales or in defining the alliance's profitability. Profitability data are not transmitted to our partner"* (Tunisian Production Manager, case 6).

> *"The IS doesn't hamper decision-making or management in the alliance because we're not part of the managerial and operational aspects of the licensing activity"* (French Area Manager, case 7).

Trust despite an increasingly uncertain environment. Despite the advent of the Arab Spring, which generated uncertainty and increased concern among foreign investors, the results show a high level of trust evolving over time between partners in cases 1, 2 & 3. In fact, European partners seem little influenced by the complex and turbulent environment in Tunisia after these events. Results indicate that they continue to invest in alliances by developing new activities and launching new products with their Tunisian partners. Accordingly, the volume of data and information exchanged between both partners has increased, covering turnover, production volume, financial performance, investment in advertising or marketing, customer satisfaction, the rate of return on promotion, and the rate of coverage of orders, etc. This situation leads

partners to implement new IOIS capable of integrating all information requests from both sides, and to deploy a large number of functionalities, such as single information, real-time updating of the modified data in all of the affected modules, and total traceability of management operations. In addition, partners have adopted new information technologies, such as videoconferencing and screen sharing to improve communication and coordinate their activities efficiently and effectively, thereby reducing asymmetric information problems and communication errors. As an illustration:

> *"Tunisia is not the only country experiencing difficulties. The relationship is improving and achieving performance. Relations between partners are good and trust is mutual (…)".* (Spanish Director-General, case 2).

> *"We equipped our partner with a whole set of communication and interaction tools, such as videoconferencing, to establish a professional social network between us, and to improve coordination of our common projects"* (French IS Manager, case 1).

Asymmetry and power position of dominant partners. In cases (1, 2, 3, 9 and 10), results further show that the European companies exert their power on the Tunisian partners to perform reporting corresponding to the agreed-on frequency and format of communication. Reports have to respect a single reference frame, which is specified and required by the European partner, to avoid bias related to the representation, processing and interpretation of data, and to improve the decision-making process on the basis of standardized, crosschecked and verified information. Accordingly, dominant partners have benefited from rapid and reliable feedback on the consequences of management actions.

> *"We have to report monthly all the results of our activities, such as sales, production, financial report, cash flow statement, etc. according to the standards of our partner",* (Tunisian IS Manager, case 3).

An increasing risk of dominant partner opportunism. In cases (4, 5, 6, 7 and 8), we identify a greater risk of opportunistic behavior from the foreign partner, which may increase the alliance's instability and uncertainty, and lead to a lack of trust between partners. According to our Tunisian interviewees, the European partner can terminate the alliance or minimize its own investments in the relationship if it encounters another more competitive host country partner (case 4, 7 and 8). A high level of flexibility thus characterizes these alliances, which, in turn, discourages both Tunisian and European firms from making this decision.

> *"Our partner is opportunistic and seeks to consolidate its position without having a real counterpart in the alliance"* (Tunisian Director-General, case 8).

Besides factors related to the asymmetric alliance, we identify a set of factors related to the technological, organizational and environmental contexts that may also motivate or hinder the adoption decision as explained in the following.

Other factors affecting IOIS adoption within asymmetric alliances

Technological factors

For cases (4, 5, 6, 7 and 8), the analyses show that the CEOs of both European and Tunisian partners are reluctant to implement an IOIS within their alliance. Aware of the complex skills required for the adoption process, coupled with their low interactivity and engagement in the alliance, Tunisian and European CEOs make no effort to share their firms' information systems. Hence, resistance to change inhibits the adoption of any new system. As indicated by all of the interviewees, the exchange

of information through pre-existing communication tools (fax, telephone, e-mail) is sufficient to manage and monitor their partnership.

> *"IOIS adoption is a strategic decision that can upset our work. It's not easy to make such a decision. This kind of IT project requires a lot of training, effort and collaboration as well as financial resources"* (Tunisian IS Manager, case 5).

The partners in cases 9 and 10 are developing new IOIS comprising EDI (for the case 9) and the exchanging of XML files (for the case 10) to favor interoperability and eliminate all possible incompatibilities between their heterogeneous information systems, thereby reinforcing their interactivity on the different phases of the project. Also, the compatibility of partners' business processes and needs plays a crucial role in the adoption process.

> *"Exchanging XML files with our partner allowed us to reduce errors and be more efficient. The decision to migrate to this technology was proposed by our partner, which uses it to coordinate most of its relationships and to solve the problem with compatibility"* (Tunisian IS Manager, case 10).

Organizational factors

The European and Tunisian partners' awareness of the usefulness of such technologies, and their appreciation of their relative advantage in terms of improving the coordination and control of their common activities, positively affect their adoption decision. In fact, new IOIS results in better communication and interaction between partners (cases 1, 2 &3). In the same perspective, the implementation of EDI and the exchange of XML files facilitate the coordination of an alliance's activities and increase partners' profitability across their projects (cases 9&10).

> *"Our company appreciated the benefits of using this IT. The adoption process was not very complicated since we have the required skills and resources"* (Tunisian IS Manager, case 9).

However, for cases (4, 5, 6, 7 & 8), this decision is not sufficiently justified being understood as presented below:

> *"The decision of the partnership had no impact on our IS. Neither the French partner nor our company expressed the need to implement new IOIS for the alliance. There is only a classic exchange of information with the partner using conventional means such as Excel spread sheets, e-mails, telephone, and regular physical meetings"* (Tunisian Marketing Manager, case 4).

Moreover, in all cases it appears that the European partner is characterized by a certain level of technological expertise and IT sophistication that can lead it to motivate the host country partner to adopt new IOIS in order to improve the management and coordination of their mutual relationship. On its side, the host country partner can decide whether or not to adopt, depending on its organizational readiness and the level of top management awareness and understanding regarding using new IT to achieve the alliance objectives. Results show for cases (1, 2, 3, 9 & 10) that the host country partner is characterized by an organizational readiness based on the ownership of sufficient IT sophistication, or at least sufficient financial resources to make IOIS investments. Top management support is thus strongly needed to persuade Tunisian employees to embrace new IOIS and make necessary changes in the inter-organizational workflow.

Environmental factors

For cases 9 & 10, factors motivating the decision to adopt new IOIS also correspond to the high frequency of transactions

between partners in the automotive industry. Partners must continuously interact to efficiently and effectively manage their complex projects and achieve faster product development cycles, lower input costs and higher end-product quality. Technical exchanges and technology and information transfers between Tunisian and European employees are also recurrent since automotive products are highly complex. Abundant information flows between the two partners relating to supply orders, production orders and tracking records, increasing the need for an IOIS to link partners and enable their businesses to grow faster with reduced operational costs. The implementation of new IOIS allows continuous interaction between partners to manage real-time activity and follow the progress of all phases, from the design of automotive components to their fabrication, quality control and assembly, before delivery to the final customer.

> *"We have to run and manage several projects with our partner. These projects are particularly complex and require a lot of responsiveness and flexibility, mainly in the automotive industry. Using EDI allows us to automatically receive launch orders and respond quickly to our partner's request"* (Tunisian Project Manager, case 9).

The results of our empirical study show that the characteristics of an asymmetric alliance, which are mainly the alliance form and scope of activity, the partners' levels of interdependence and trust, dominant partner power and opportunism, affect the adoption of IOIS within asymmetric alliances between Tunisian and European partners. We also highlight the extent to which other factors related to the technological, organizational and environmental contexts can impact the adoption decision. A table summarizing these findings is presented in the appendices (see Appendix 3).

DISCUSSION OF FINDINGS

Our study sheds light on factors affecting the adoption of IOIS within asymmetric alliances between Tunisian and European partners. Our findings strongly indicate that the characteristics of the alliance are key drivers of the adoption decision. In fact, strategic alliances involve a wide variety of organizational forms, such as equity and non-equity forms (Gulati, 1995), which play a significant role in contributing to partners' decisions to adopt IOIS.

Concerning equity alliances, it appears, first, that the level of interdependence between partners is more important in integrative joint ventures compared to sequential joint ventures (Park and Russo, 1996). As mentioned by Hart and Saunders (1997) and Kreuzer *et al.*, (2015), a deep level of interdependence between partners mobilizes them to adopt new IOIS to facilitate communication and effectively and efficiently coordinate their common activities. Integrated joint ventures imply a high level of mutual engagement between partners resulting from the integration of their resources, technologies, personnel and processes in order to conduct several common activities, such as R&D, innovation, production and marketing, and create joint synergies. The reinforcement of organizational interdependence within this type of alliance is then accompanied by a greater need for data synchronization and information exchange between partners, which positively affects their adoption decision, even if the external environment is uncertain. However, sequential joint ventures whose scope is limited to some secondary activities of the alliance's value chain do not require such decisions insofar as the joint subsidiary is devoted to administrative and legal coordination between partners. Similarly, non-equity alliances, especially license arrangements, involve a low level of interdependence and engagement between

Table 3: Factors that influence the adoption of IOIS per alliance form

Factor \ Alliance form	Equity alliance		Non-equity alliance	
	Integrative joint venture	Sequential joint venture	License agreement	Vertical partnership
Level of interdependence between partners	+	-	-	-
Scope of activity	+	-	-	-
Trust	+	-	-	-
Dominant partner power	+	-	-	+
Dominant partner opportunism	-	+	+	-

partners, which therefore hinders their adoption of new IOIS.

Second, the quality of the relationship between partners, based on a high level of trust, is particularly important in the decision to adopt IOIS, as highlighted by numerous previous studies (Zaheer and Venkatraman, 1994; Grover and Saeed, 2007). Despite increasing uncertainty due to the advent of the Arab Spring, foreign partners continue to invest in Tunisian companies, which shows once again the importance of trust in managing strategic alliances. Conversely, low trust may increase uncertainty and thus discourage IOIS adoption and use. Furthermore, as asymmetric alliances involve a high level of partner opportunism acknowledged as a significant threat to alliance survival and success, adopting opportunistic behavior from one of the parties, mainly the dominant one, leads to a degradation of trust (Chen and Chen, 2002). This, in turn, discourages both partners from making the investment decision.

Third, a host country partner is influenced to adopt a reporting system when the dominant partner exerts its power to better control the decision-making process and get involved in the governance and management of the alliance's activities. This mainly characterizes integrative joint ventures, since foreign partners have invested capital and committed resources to the joint venture. This finding corroborates the results of (Subramani, 2004; Chan *et al.*, 2012; Chong *et al.*, 2013). According to these authors, a dominant partner will use its power capability to influence firms that depend on it to invest in similar and complementary technologies.

Table 3 differentiates the major factors that influence the adoption decision per alliance form.

In addition, we identify a set of factors related to the technological, organizational and environmental contexts that may influence the decision to adopt new IOIS within asymmetric alliances.

At the technological level, unlike previous studies (e.g. Chong *et al.*, 2009a, Pan *et al.*, 2013), we emphasize that the complexity of skills required for the adoption process may inhibit asymmetric partners to implement new IOIS, particularly if they are little involved in the alliance. Compatibility between Tunisian and European partners tends to be a key driver for the adoption decision, as advanced by Teo *et al.*, (2006) and Venkatesh and Bala (2012).

At the organizational level, our results highlight that European and Tunisian partners' awareness of the usefulness of videoconferences and shared databases, and their appreciation of their relative advantage, positively affect their decision to adopt such technologies. This therefore corroborates the innovation diffusion theory (Rogers, 2003) and many other studies based on this approach (Grover, 1993; Tan and Teo, 2000). Moreover, it appears that the organizational readiness of the Tunisian company and full support from senior management are fundamental to promote partners' willingness and ability to make this decision, as shown by Chwelos *et al.*, (2001). Conversely, process changes for IOIS implementation in the Tunisian company can hinder the decision to adopt by affecting job responsibilities and even organizational structures. Accordingly, it is difficult to exploit the benefits of IOIS when partners are reluctant to join an IOIS network, especially when the scope of their alliance is narrow and their level of interdependence is low.

At the external level, our findings consider the importance of industry pressure. As shown by Schmitt *et al.*, (2007), we highlight that the automotive industry is confronted with increasing competition leading to higher cost pressures, which imposes electronic coordination of activities and optimized production processes and value chains (Bensaou *et al.*, 1997; Tuunainen, 1999; Chwelos *et al.*, 2001). Contrary to the existing literature (Teo *et al.*, 2003; Gibbs *et al.*, 2003; Mirkovski *et al.*, 2016), this research found that environmental uncertainty has no influence on the adoption of IOIS, particularly if the alliance takes the form of an integrative joint venture involving a high level of interdependence between partners.

The set of factors discussed above forms the theoretical basis of our propositions, which we present below.

P1. The creation of an integrative joint venture (which implies a high level of interdependence and trust between partners, a wide scope of activities, and dominant partner power) associated with technological, organizational and environmental factors will positively influence the adoption of IOIS within an asymmetric alliance.

P2. The creation of a sequential joint venture (which implies a low level of interdependence and trust between partners, a narrow scope of activities, and dominant partner opportunism) associated with technological, organizational and environmental factors will negatively influence the adoption of IOIS within an asymmetric alliance.

P3. The creation of a license agreement (which implies a low level of interdependence and trust between partners, a narrow scope of activities, and dominant partner opportunism) associated with technological, organizational and environmental factors will negatively influence the adoption of IOIS within an asymmetric alliance.

P4. The creation of a vertical partnership (which implies a low level of interdependence and trust between partners, a narrow scope of activities, and dominant partner power) associated with technological, organizational and environmental factors will positively influence the adoption of IOIS within an asymmetric alliance.

From a theoretical perspective, our study makes several contributions. First, it focuses on the factors that influence asymmetric strategic partners to adopt IOIS, a topic that has received little attention in the IOIS literature. Although the IOIS literature acknowledges the role of technological, organizational and environmental factors as potential drivers for the implantation of these technologies, studies examining the impact of the alliance characteristics on the adoption decision remain rare. Our case studies give an interesting illustration to shed light on these issues by suggesting that strategic partners take several factors into consideration when adopting

a new IOIS, mainly the alliance's form and scope of activity, and the companies' level of trust and interdependence. Second, although abundant literature has increased our understanding of the benefits of implementing IOIS within a strategic alliance to support partners' interdependence and to strengthen their relationship (Lu *et al.*, 2006, Yao *et al.*, 2007; Grover and Saeed 2007, Loukis and Charalabidis 2012), little has been done to differentiate between symmetric and asymmetric alliances and to analyze the role of these technologies within asymmetric alliances. In this perspective, our study highlights the effects of IOIS for asymmetric partnerships taking into account partners' opportunism, power and dependence asymmetry. Third, our study confirms the importance of adopting IOIS within asymmetrical partnerships (Cho *et al.*, 2017) by allowing partners to communicate better, reduce coordination costs, and overcome the barrier of geographical distance.

Our findings are also important from a practical perspective as they improve understanding of the phenomenon of IOIS adoption in a North African country, Tunisia, whose importance is growing on the global scene following the Arab Spring (Triki and Mayrhofer, 2016). We show that, despite general political and business uncertainty in this country, Tunisian and European partners continue to invest in alliances and implement new IOIS to manage their activities and strengthen their relationships. Thus, the environmental context, which is one of the most frequently cited driving factors in many studies of IOIS adoption in developing countries (Kurnia *et al.*, 2015; Tan *et al.*, 2007) is not identified as an important factor in this study. The main drivers in the Tunisian context are: the characteristics of the asymmetric alliance (form, scope of activity, partners' level of interdependence and trust, dominant partner power and opportunism), the compatibility between Tunisian and European partners' IS, the readiness of the Tunisian company, full support from senior management and industry pressure.

CONCLUSION

IOISs are used in various ways to facilitate inter-organizational relationships. In this paper, we have analyzed the case of asymmetrical partnerships between European and Tunisian partners in order to examine the factors that have encouraged them to, or restrained them from, adopting IOIS. In this context, we have studied 10 cases of asymmetrical partnerships including five equity alliance cases and five non-equity alliance cases in the agri-food sector, the pharmaceutical sector, and the automotive sector.

This study supplies the literature with a set of factors that are perceived to influence the decision to adopt IOIS within asymmetric strategic alliances. Primarily, we underline the impact of the form of an alliance in guiding partners not only in their choice of managerial systems necessary to their alliance's organizational structure (Teng and Das, 2008), but also in determining whether or not an IOIS is needed to support their level of interdependence across the relationship (Cho *et al.*, 2017). In fact, we highlight the importance of adopting these technologies for integrative joint ventures that involve a high level of interdependence and mutual engagement between partners and whose value chain has a broad scope. We point out, however, that the creation of a sequential joint venture (which represents an equity alliance) or a license agreement (which represents a non-equity alliance) does not increase the need to strengthen communication and information exchange, since partners are little involved in the alliance value chain, which may accordingly hamper the adoption

decision. Also, we confirm the importance of the innovation diffusion theory (Rogers, 2003) for technological variables (complexity, compatibility); the TOE framework (Tornatzky and Fleischer, 1990) for organizational and environmental variables (relative advantage, organizational readiness, top management support of both partners, environmental uncertainty, industry pressure); and the resource dependence theory (Pfeffer and Salancik, 1978) for variables related to partners' level of interdependence, trust and dominant partner power. These variables may influence the decision to implement and use new IOIS within asymmetric alliances.

From a practical perspective, our research responds to calls to study the Arab Spring (Triki and Mayrhofer, 2016) as an important contemporary phenomenon with a deep impact on the general business and political environment in Middle East and North African countries, mainly Tunisia. It reveals that the most salient factors that influence the adoption of IOIS in asymmetric partnerships between Tunisian and European companies are related to the alliance, mainly its form, its scope of activity, partners' level of interdependence and trust, dominant partner power and opportunism, as well as a set of technological, organizational and environmental factors.

Relying on the crossed view of both partners, several managerial implications can be drawn from this research. First of all, both dominant and dominated partners must appreciate the importance of implementing IOIS to effectively manage their relationship, in particular when they are geographically remote. These technologies provide platforms that allow partners to reduce processing time and improve speed and accuracy of inter-organizational communication, leading to cost savings. Second, this study can help alliance managers to determine the factors that contribute to adopting new IOIS within their asymmetrical partnership, and guide their choice of the most appropriate technology for the organizational form of alliance. Third, this study shows the importance of strategic alliances for firms evolving in developing countries. By cultivating a relationship with a potential partner from a developed country, partners from developing countries benefit from technology transfer, upgraded skills and guidance on the choice of the type of IS/IOIS to implement.

Nevertheless, we note certain limitations to this work. First, our analysis of the results did not take into account how some variables, such as the age of the alliance or the origin of European partners, impacts on the IOIS adoption within asymmetric alliances. The nationality of partners is therefore an important cultural variable that could have an impact on the managerial practices adopted, and each partner's values and IOIS choices (Waarts and Everdingen, 2005). Second, the methodological approach adopted in this research does not allow us to generalize our findings. Despite these limitations, our research provides interesting implications for research and practice. The propositions adapted in this study should be replicated in future research and tested quantitatively in other contexts. Moreover, the variable "age of the alliance" may be studied through a longitudinal study to better follow the evolution of the alliance over time and its impact on the adoption decision.

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APPENDICES

APPENDIX 1: EXTRACT FROM THE INTERVIEW GUIDE

Factors		Question
Factors related to the asymmetric alliance	Partners' level of interdependence	How do you interpret the level of interdependence with your partner? Do you think that this level of interdependence has an influence on the adoption decision?
	Trust	How do you interpret trust in your partner? Do you think that this level of trust has an influence on the adoption decision?
	Dominant partner power	Could you explain the reasons you put forward to convince your partner to adopt a new IOIS?
Technological factors	Complexity	Do you think that the adoption of new IOIS within your company was difficult? How do you interpret the complexity of implementing a new IOIS?
	Compatibility	Have you encountered problems of incompatibility when adopting a new IOIS? Do you think that this level of incompatibility has influenced the adoption decision?
Organizational factors	Relative advantage	How do you interpret the advantages of adopting new IOIS compared to pre-existing communication tools?
	Organizational readiness	How do you interpret your organizational readiness to adopt a new IOIS? How do you interpret the organizational readiness of your partner to adopt a new IOIS?
	Top management support	How do you interpret the reaction of the Top management of your company regarding the adoption decision?
Environmental factors	Environmental uncertainty	Do you think that the instability of the external environment has an influence on the adoption decision?
	Industry pressure	How do you interpret the industry environment? Do you think that it has an influence on the adoption decision?

APPENDIX 2: CODING LIST

Codes	Sub-codes	Sources
Factors related to the asymmetric alliance	Alliance form	Emergent
	Partners' level of interdependence	Barua and Lee (1997)
	Scope of activity	Emergent
	Trust	Zaheer and Venkatraman, (1994) Grover and Saeed (2007)
	Dominant partner power	Lyytinen and Damsgaard (2011)
	Dominant partner opportunism	Emergent
Technological factors	Complexity	Premkumar and Roberts (1999)
	Compatibility	Tan and Teo (2000) Teo *et al.*, (2006) Venkatesh and Bala (2012)
Organizational factors	Relative advantage	Premkumar and Ramamurthy (1995)
	Organizational readiness	Chwelos *et al.* (2001)
	Top management support	Grover (1993) Premkumar and Ramamurthy (1995)
Environmental factors	Environmental uncertainty	Teo *et al.*, (2006)
	Industry pressure	Zhu *et al.* (2006)

APPENDIX 3: OVERVIEW OF RESULTS

Case	FACTORS RELATED TO				ADOPTION DECISION
	Asymmetric alliance	Technological context	Organizational context	Environmental context	
1	High level of interdependence between partners Trust Dominant partner power		Relative advantage and top management support for both partners Tunisian partner readiness		Videoconferences and shared databases between partners
2	High level of interdependence between partners Trust Dominant partner power		Relative advantage and top management support for both partners Tunisian partner readiness		Videoconferences and shared databases between partners
3	High level of interdependence between partners Trust Dominant partner power		Relative advantage and top management support for both partners Tunisian partner readiness		Videoconferences and shared databases between partners
4	Low level of interdependence between partners Dominant partner opportunism	Tunisian partner is resistant to change due to complexity of skills required to the adoption process.			Reluctance to adoption decision (pre-existing communication tools)
5	Low level of interdependence between partners Dominant partner opportunism	Tunisian partner is resistant to change due to complexity of skills required to the adoption process.			Reluctance to adopt decision (pre-existing communication tools)
6	Low level of interdependence between partners Dominant partner opportunism	Tunisian partner is resistant to change due to complexity of skills required to the adoption process.			Reluctance to adopt decision (pre-existing communication tools)

Case	FACTORS RELATED TO				ADOPTION DECISION
	Asymmetric alliance	**Technological context**	**Organizational context**	**Environmental context**	
7	Low level of interdependence between partners Dominant partner opportunism	Tunisian partner is resistant to change due to complexity of skills required to the adoption process.	Lack of financial resources of the Tunisian partner		Reluctance to adopt decision (pre-existing communication tools)
8	Low level of interdependence between partners Dominant partner opportunism	Tunisian partner is resistant to change due to complexity of skills required to the adoption process.	Lack of financial resources of the Tunisian partner		Reluctance to adopt decision (pre-existing communication tools
9	Dominant partner power	Compatibility between partners' IT, business process and needs.	Relative advantage and top management support for both partners Tunisian partner readiness	Automotive industry	EDI adoption
10	Dominant partner power	Compatibility between partners' IT, business process and needs.	Relative advantage and top management support for both partners Tunisian partner readiness	Automotive industry	Exchange of XML files