

**Knowledge sharing, knowledge leaking in strategic alliances and firm innovation capacity:  
an empirical study**

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**Abstract:** This study aims to examine the influence of firms' alliance knowledge on their innovation capacity, under the contingencies of both intentional and unintentional leakage of business-critical knowledge. Based on a survey of 410 staff from 205 allied firms in Tunisia, this study applies the linear regression to investigate the research model. The results show that external knowledge sharing appears to have a positive effect on firms' innovative capability while high levels of intentional and unintentional knowledge leakage by a focal firms' employees, turns out to negatively moderate such a relationship. In this paper, actors of focal firm need to distinguish between the firms' critical knowledge, and the one which can be legally shared and exchanged with other partners. Sharing critical knowledge, intentionally or unintentionally, might hurt the focal firms' innovative capacity. Although the issues of knowledge sharing and innovation have been exhaustively treated in the literature, very little are the research works which have undertaken to study the links between knowledge sharing, knowledge leakage and the firms' innovation capacity. Thus, this study is designed to foster further enrichment to the literature, by proposing more clear differentiation between unintentional and intentional knowledge leakages and their impact on the firm's innovation.

**Keywords:** Knowledge sharing, knowledge leaking, strategic alliances, innovation capacity.

## 1. Introduction

The resource-based view has emphasized the noticeable role of knowledge as a vital provider and enhancer of competitive differentiation (Penrose, 1995). In this regard, Matusik and Hill (1998, p.683) state that “firms increasingly rely on building and creating knowledge as a necessary condition to innovate and survive”. Indeed, firms competitive advantage appears to increasingly depend on cooperating with partners and mutually sharing resources (Foss et al., 2010) – a phenomenon often referred to as the firms extended resource-based view. However, inter-firm knowledge sharing exposes firms to the paradox of having to deal with contradictory requirements (Hamel et al., 1989; Smith and Lewis, 2011; Van Fenema and Loebbecke, 2014). On the one hand, it may enhance total added-value as firms can individually measure new business opportunities, out of their partners’ knowledge. On the other hand, it may affect the competitive contribution of a firm knowledge repository.

Recent studies have been increasingly vocal about firms’ particular concerns about knowledge sharing potentially negative effects, stemming from unwanted knowledge spillovers (Casimir and al., 2012; Foss and al., 2010; Husted and Michailova, 2010). The risk of knowledge leakage stands as a major factor likely to hinder knowledge sharing and collaboration (Martinez-Noya and al., 2013; Ritala and Hurmelinna-Laukkanen, 2009).

Several studies discussed the means whereby firms can be protected against employees involved in the leakage of potentially harmful knowledge (Delerue and Lejeune, 2010; Hurmelinna-Laukkanen and al., 2007; Hurmelinna-Laukkanen and Puumalainen, 2007). It is by now well established that intra-firm knowledge-sharing processes are associated with serious challenges (Lam and Lambermont-Ford, 2010; Witherspoon and al., 2013). Knowledge is transmitted and transferred across organizational entities which could be competitive or non-competitive companies; having interesting new knowledge and information (Heiman and Nickerson, 2002; Kogut and Zander, 1992; Oxley and Sampson, 2004).

Managing internal knowledge sharing appears to differ noticeably from managing external knowledge (Chesbrough, 2007). The latter does not seem to stand as a major pre-occupation for most industrial firms and only few studies treated this issue. On examining the relevant literature, a consensus seems to be reached. Indeed, the overall finding highlighting that inter-firm knowledge sharing constitutes, most often, a pre-condition for promoting innovation capacity (Chesbrough, 2003a; Kogut and Zander, 1992; Sáenz and al., 2012). However, external knowledge sharing may be the origin of knowledge leakage. As a result, some questions have still remained open ended or rather unsatisfactorily answered, essentially with regard the effects of such leakages on inter-firm knowledge sharing as well as on firms’ innovation capacity.

In the present work, we examine empirically the external knowledge sharing effect on the innovative capacities, of the firms under the contingencies of unintentional business-knowledge leaking. Whereas, previous conducted studies tend to treat knowledge leakage as a general incident, the present work attempts to differentiate between unintentional and intentional knowledge leakage types, as two different phenomena. Indeed, unintentional knowledge leakage occurs when a company’s employee unintentionally, or coincidentally, releases business-critical knowledge not meant to be shared with external parties. Second, the effect of the unintentional knowledge leakage on the relationship between external knowledge sharing and the firm’s innovation capacity will be investigated.

This paper is structured as follows. The first section provides a discussion of the research overall undertaken methodology with those relationships' specific hypotheses being developed.

## 2. Research background and hypotheses

### 2.1. External knowledge sharing and innovation capability

It is a well-known fact that in most industries, firms are faced to a turbulent environment with remarkable changes in market, technology, and industrial organization. Hence, to respond to the various uncertainties, companies usually resort to increasing their externalized sources of knowledge through collaborative arrangement and strategic alliance. Thus, external-knowledge sharing firms usually appear to be more likely to engage in more inter-firm collaboration specifically targeted to enhance and promote innovative procedures.

Hence, once firms fail to exchange collaborative knowledge with others, they may never be able to achieve the strategic aims they intend to achieve. This could denote that a firm might not only miss the opportunity to gain access to valuable external knowledge but also that the firm's own knowledge might be wasted. Similarly, it could be implied that even though firms may refrain from diffusing knowledge share at an inter-firm level rising to a potential knowledge leakage risk (Gans and Stern, 2003; Silverman, 1999), they may, actually, achieve the opposite effect by cramping their innovative capabilities and performance in the process.

Adopting a strategic alliance may well pave the way for a knowledge share opportunity (Rivette and Kline, 2000; Teece, 2006) and foster knowledge diffusion at an inter-firm level (Fosfuri, 2006). External knowledge sharing represents an essential precondition for a firm's innovative prospects, as oriented innovation, by nature, implies a smooth and joint combination of the available and existing, often external, bodies of knowledge applied in novel oriented ways or trends (Chesbrough, 2003a; Crossan and Inkpen, 1995; Huizingh, 2011). As a matter of fact, acquiring either tacit knowledge (e.g., experiences, know how technique...) or explicit one might well help in further core competences necessary for the innovation process to take place, as the firm may not be able to develop them internationally or from within (in-house), which is likely to help in enhancing and facilitating the development of innovative capability (Quinn, 2000, Gupta and Polonsky, 2014). Therefore, we have formulated the following hypothesis:

**Hypothesis 1.** External knowledge sharing is positively associated with the firm's innovative capacity

### 2.2 Knowledge leakage in strategic alliance

According to the firm knowledge-based view (KBV) approach, knowledge constitutes the basic element for a firm's competitive advantage (Easterby-Smith and al., 2008; Grant, 1996a; Kogut and Zander, 1992; Spender, 1996). Consequently, a loss of critical knowledge would certainly be associated with a decreased firm performance (Day, 1994; Norman, 2002). In this regard, a number of previously elaborated studies have distinguished various negative effects associated with knowledge leaking, including, firm damaged reputation, productivity loss along with breached confidentiality

agreements incurred costs (Ahmad and al., 2014), in addition to emerging new competitors for the original knowledge owner (Baughn and al., 1997).

Most often, a firm does not want to share the entirety of knowledge it retains with its collaborative partners, as knowledge diffusion could well result in hindering the innovation benefits from being raped. At the strategic level, managers are generally likely to determine the rather knowledge sharing clear limits. Yet, such limits may not sound as clear to employees (e.g., R&D engineers), who are actually part of the collaborative interface and liable to make decisions about what to share. In fact, it is the individuals taking part in the collaborative interface are actually those who could predominantly affect the knowledge sharing activities success and, eventually, affect the firm's innovative capacity.

In this context, some existing studies (Baughn and al., 1997; Hannah, 2005, Alberti and al., 2017) have managed to provide evidence as to knowledge leakage effects as engendered by alliance relationships. They proved that firms collaborating with external partners are faced with the risk of losing certain knowledge which often stand as being too critical for the company, such as trade secrets, core technologies and other types of strategically important knowledge. So, leakage of confidential knowledge could sometimes be harmful for an innovation seeking firm, as it might well lead to lost competitive advantages.

In turn Quinn and Hilmer (1994) have noted the possibility of vital knowhow loss, particularly regarding core competences, as a major risk factor affecting alliance firms. In this respect, and through a case analyses study nine international alliances, Hamel (1991) has been led to demonstrate that collaboration provides the opportunity for a single partner to gain the skills of the other. In effect, exposure to such risks could well result in the alliance to fail, and may even threaten the survival of a vulnerable new firm (Alvarez and Barney, 2001).

The more strategic the partnership is, the greater the knowledge leakage related risks could turn out to be (Hoecht and Trott, 2006). If collaborative partners manage to have access to firm-specific critical knowledge, they might well apply it to their benefit, to the detriment of the original owner (Hannah, 2005). This idea has also been highlighted by Alvarez and Barney (2001) who also this and emphasize that entrepreneurial technology-based firms are particularly vulnerable to knowledge-loss risks associated, as these risks could threaten their sustainability. Evidence of such risk is further provided by Littler and al., (1995), who have conducted an investigation on British producers of information and communication technology products. The survey reached results have revealed that on being asked about the risks of collaborative product development, most respondents have stressed that the information leakage risk constitutes the major influential risk type.

Furthermore, the extent of a partner's ability or disposition to take advantage of the gained knowledge appears to be highly dependent upon the partner's absorbing capacity (Lane and Lubatkin, 1998), as well as on the firm's specific appropriability conditions (Hurmelinna-Laukkane and Olander, 2014; Teece, 1986). In fact, a partner's or rival's noticeable capability level of absorbing knowledge assets turns out to have a remarkable effect on the leakage seriousness degree.

Regarding the case of dealing with a high level absorptive capacity alliance partner, the innovation issuing firm risks losing its core knowledge assets and innovation capability once if its partner starts to take advantage of a knowledge leakage (Hurmelinna-Laukkanen and Olander, 2014). In turn, Liebeskind (1996) has argued that the competitor's threat of an imitating firm's discovered

innovation results in restricting investments in R&D and innovation capability. We propose dividing knowledge leakage into two distinct types: intentional and unintentional. With respect to unintentional knowledge leakage, it usually takes place accidentally. For instance, when the company employees unwillingly expose critical business knowledge, considered to be preserved from any declaration to any external parties. Actually such a phenomenon may well occur mainly due to a lack of organizational control over collaborative environments, in which knowledge appears to be too readily available to partners, or by employees unconsciously ceding or diffusing different information about products, skills, and creative processes likely to bring about new added-value products, services, or technological procedures (Lumpkin and Dess, 1996). Although greater centrality improves access to knowledge for the focal firm, it could also facilitate knowledge leakage. Besides, the over-enthusiasm about novel ideas or innovative prospect could well result in temporary negligence of protection responsibility, especially in the case when the other party is perceived as trust worthy.

Thus, high trust is likely to bring about blind faith that may expose the trusting party to malfeasance (Gargiulo and Ertug, 2006). As a matter of fact, employee emanating leakage of business-critical knowledge confines the employee's firm in the unfavorable situation of losing its knowledge benefits outcomes or the value of its innovations. This fact leads us to argue that unintentional leaks to collaborative partners' result in negatively moderating the positive effect of external knowledge sharing on innovation capability.

**Hypothesis 2.** Unintentional knowledge leakage negatively moderates the positive effect of external knowledge sharing on relative firm innovative capacity. The higher the unintentional knowledge leakage is the lower the positive effect of external knowledge sharing will be.

As for intentional knowledge leakage, it lies in an employee's purposeful action to willingly expose her/his firm's critical knowledge to other firms or any external party. Many studies (e.g., Jap and al., 2013, Creese and al., 2015) underscore the fact that firms do intentionally leak some knowledge to create interest in the markets (e.g. leaking certain information about some product to be launched soon), so they help in launching further publicity. In the present work we assume a targeted strategic decision. With the focus being laid on non-strategical such an act would constitute choice, i.e., employee-level knowledge leakage. This would refer to employees' intentional knowledge leakage due to misbehavior, denouncement, or in extreme cases, to betrayal and frustration (Hoecht and Trott, 2006).

Indeed, intentional leakage could well emanate from an employee's frustration with the firm in terms of politics, centralization, lack of trust (Casimir and al., 2012 as well as Holste and Fields, 2010), or from self-aligning with an external partner rather than with one's own firm for the take of being rewarded by the rival firm. (e.g., the famous Coca-Cola firm case, in which a secretary has stolen the recipe secret of the famous drink for the purpose of selling it to its rival competitor Pepsi Cola).

Moreover, intentional leakages could relate to employees' offensive reaction due to the high level of staff turnover and hence, willingness would be kindled to take self-decided risks in sharing confidential business knowledge externally. As intentional leakage is but a deliberate act of negligence, one might well argue that such a harmful behavior could negatively moderate the positive effect of external knowledge sharing on the firm's innovative capacities. This would certainly imply that firms in which employees deliberately leak business knowledge could not enjoy or

maintain as much innovation stemming benefits from external knowledge sharing as had already been intended. So, the following hypotheses could be put forward:

**Hypothesis 3.** Intentional knowledge leakage negatively moderates the positive effect of external knowledge sharing on the firm's relative innovation capability.

### 3. Methodology

For the purpose of testing the hypotheses, a survey has been conducted across a number of Tunisian firms already engaged in strategic alliances. To ensure the undertaken measures content and face validity, 20 in-depth interviews have been administrated with senior managers and executives of ten locally-based firms. On the basis of the respondents' feedback, several items have been rephrased and for clarity and comprehensiveness to be achieved, in such a way as no ambiguous items would be left in the questionnaire. Actually, 1500 firms have been randomly selected, belonging to three regions of the country, namely, the eastern coast, the center as well as the western area. Regarding the sample constitution, it includes firms belonging to various manufacturing industries, such as, chemicals, electronics, IT and textile, among others. To reduce the method common bias, data has been collected from the part of two key informants in each firm (such as CEO, executives' chairmen, General Manager, and Vice General Manager responsible for alliance affairs), enjoying adequate knowledge about the survey-covered issues. The survey has been administrated, on site interview basis with each firms' two major informants. Respondents have been instructed to fill out the same questionnaire independently. As a matter of fact, the final sample that has actually been obtained turns out to consist of 205 partner firms (410 informants). To note the dependent variable, relative innovation capability has been measured by means of a composite scale. Furthermore, our pursued approach has been basically relative as respondents have been requested to assess their firm's innovation capability in respect of their alliance partner firm.

**Table1** : Descriptive statistics and correlations

Variable	Mean	S.D.	1	2	3	4	5
1. Innovation capability	4.37	0.89					
External knowledge sharing	3.98	1.49	0.52**	-0.12			
Unintentional knowledge leakage	2.39	1.37	-0.10	-0.04	0.57**		
Intentional knowledge leakage	1.86	1.28	0.08	0.06	0.13	0.15	
Firm age	17.91	14.71	-0.05	0.04	0.003	0.02	0.01
Size age	41.09	169.80	0.17**	0.27**	0.04	0.01	0.05

S.D.= Standard deviation

\* P < 0.05; \*\*P < 0.01.

The reliability examination checks, executed via Cronbach's alpha has appeared to validate and sustain our belief, as the inter-item correlation score has been equal to 0.74, a rate considered

to be satisfactory enough for reflective measures (e.g., by Hair and al., 2006). Moreover, the dependent variable has been examined (the mean individual items, mean values and standard deviations have also been separately examined). They have been discovered to be quite close to each other, which actually supports their use as part of the composite measure. The standard deviations reached have appeared to range between 1.13 and 1.38, and the mean values between 3.19 (Our company frequently tries out new ideas) and 3.68 (products and services for customers). External knowledge sharing has been measured through a composite measure which involves the items relating to the firms' employees sharing different knowledge types with the firms' external partners (adapted from Choi and al., 2010). Such a measure has been selected because it contained different types of knowledge it includes, which may be shared beyond institutional boundaries. As can be noted, the original measure, as adopted, (Choi and al., 2010) has been initially used to intra-firm type of knowledge sharing, while the measure has been adapted to our study case to fit for evaluating an inter-firm knowledge based context. Actually, the Cronbach's alpha applied to the new measure has been rather high (0.82), implying that the individual items do help effectively well in reflecting the underlying phenomenon. In fact, such an achieved result proves to support well our conviction assuming that knowledge-sharing firms usually appeal to such across different knowledge categories. Due to the lack of validated measures fit for knowledge leakage, the latter will be measured, in our context via two distinct constructs, namely, unintentional knowledge leakage framework, along with an intentional leakage fit one. On setting the necessary items, our attention has been focused on the fact that respondents can well distinguish between a strategically desired knowledge sharing and undesired one (i.e. If knowledge is shared or leaked) and between an employee's unintentional knowledge leakages or intentional ones. To further clarify this understanding, "business knowledge" has been defined for the surveyed as being "the type of knowledge that significantly affects the firms' possibilities to run competitively". In what follows, the business knowledge concept has been used as part of intentional as well as unintentional knowledge leakage items.

As a First step, unintentional knowledge leakage has been measured with composite measure items, including mainly a focal firm's employees, accidentally leaking business knowledge to external party. The inter-item correlation has been equal to 0.92. So, the reliability of the unintentional knowledge leakages' construct has been satisfied, implying a strong support for such a composite measure. Concerning the intentional-knowledge leakage process, the construct has been measured via a two-item composite measure the employee's deliberate action to expose his or her firm's critical knowledge to external parties. Similarly, the Cronbach's alpha applied to this case has also had a high value (0.86), consolidating the composite measure's internal reliability. Afterwards, a logarithmic transformation has been undergone on this variable to ensure that it fit well for the regression analysis normality assumptions. Or the purpose of further consolidating our empirical examination regarding the difference between both knowledge leakage types, an exploratory factor analysis has been conducted. The achieved result has revealed that both of the related items appear to load clearly to two different factors, without major side-loadings.

After, examining the correlations persistent between knowledge-sharing and knowledge-leaking (see Table 1), it has been noticed that the correlations turn out to be insignificant, confirming well our advanced suggestion that the interviewees did perceive each of the knowledge sharing and the leakage entities as two separate phenomena. In a second step, some of the organizations pertaining characteristics have been applied as control variables in the analysis, in order to ensure that the independent variables have actually served to reflect an appropriate explanatory power. For

this sake, some firm related control variables have been introduced including mainly firm size and firm age. Noteworthy, in this respect, Kenedy, (1983) and Roxas and al. (2013) have documented that firm size proves to affect well the innovative undertaking, while Adinoyi and al. (2014) have published that firm age does appear to affect the innovation practices. After that, a logarithmic transformation has been implemented to the variables for the purpose of ensuring the distributions normality.

#### 4. Result and discussion

Table 1 reports the variables corresponding descriptive statistics and correlations, as used in the present study. For the sake of examining our set hypotheses, some five-step linear regressions have been undertaken analyses (See Table 2).

**Table 2:** Results of the hierarchical linear regression analysis (standard errors in parentheses).

Dependent variable: Innovation capability	Model 1 (R <sup>2</sup> = 0.10)	Model 2 (R <sup>2</sup> = 0.18)	Model 3 (R <sup>2</sup> =0.22)	Model 4 (R <sup>2</sup> = 0.19)	Model 5 (R <sup>2</sup> = 0.22)
Control variables					
Firm age	0.03 (0.10)	0.15 (0.05)	0.23* (0.05)	0.15 (0.05)	0.16 (0.05)
Firm size	0.19* (0.05)	0.14 (0.04)	0.17(0.04)	0.13 (0.04)	0.15(0.04)
Focus variables					
External knowledge sharing		0.28** (0.08)	0.25 (0.08)	0.30** (0.08)	0.27** (0.08)
Unintentional knowledge leakage		0.07 (0.09)	-0.14(0.08)		
External knowledge sharing XUnintentional knowledge leakage				-0.24* (0.08)	
External knowledge sharing X Intentional knowledge leakage					-0.21* (0.07)
Model F	2.17	3.22**	3.56**	3.48**	3.83**
Change in F		5.89**	6.92**	6.58**	5.53*

\*P <0.05 / \*\*P<0.01

As can be tested, external sharing proves to expose a firm to the risk of losing, strategically important core knowledge. In terms of inter-organizational relationships, scholars have predominantly recognized the dilemma associated with knowledge sharing and leakage (Hamel, 1991; Heiman and Nickerson, 2004; Ritala and Hurmelinna-Laukkanen, 2013). Such a phenomenon is particularly perceived in the case of knowledge sharing with alliance parties, in which the risk of

unintended knowledge spillovers appears to be persistently existent besides, the possibility for a predominating knowledge leak might largely result in hampering knowledge share efforts within the inter-firm collaboration processes (Baughn and al., 1997; Hamel, 1991; Martinez-Noya and al., 2013). Such a situation proves to result in exposing firms to face substantial knowledge-sharing dilemmas as perceived in innovation strategy. As a matter of fact, even though a firm is usually obliged to share relevant knowledge on an external basis for the sake of acquiring an advantageous benefit from another party's knowledge, the potentially fatal effects of losing business confidential knowledge need also be highly considered.

Featuring these major problems, an empirical examination of the natural link persisting between a firm's external knowledge sharing, knowledge leakage and innovation capability has been undertaken. Our findings appear to simultaneously highlight both the harms and benefits associated with knowledge sharing, as an innovation capability governance mechanism, thus providing a rather refined analysis of a widespread phenomenon in respect of earlier elaborated studies conducted on this study area.

More particularly, our attained results have appeared to indicate that although firms sound to benefit remarkably from external knowledge sharing in terms of innovation capability promotion, a firm's employees who, either intentionally or unintentionally, undertakes to leak knowledge may well result in noticeably curbing such efforts, resulting in thorny challenges to be imposed (i.e. a negatively moderating effect).

In other words, leaking and losing some business crucial knowledge with regard to alliance firms seems to culminate in fostering the partners' opportunistic behavior. Thus, the focal firm's proprietary knowledge would certainly be transferred to the alliance partners, and the acquired knowledge value could well be fully implemented and converted into competitiveness.

Contrary to the inter-firm organizational learning perspective (Hamel, 1991), mutual learning exchange among alliance partners could certainly pose decision challenges as to the focal firm's knowledge protection. Still, should the focal firms' employees lose valuable and critical business knowledge, their partner might well turn to act opportunistically.

On the basis of such findings, it has been discovered that the most innovative of firms turn out to be those that safeguard and maintain high-level external knowledge sharing, while prohibiting all possibilities of business confidential knowledge leakage.

As a matter of fact, acknowledging the challenges attached to implementing such a procedure constitutes a first step to be undertaken towards achieving successful results under such conditions.

## **5 Implications**

### *5.1. Theoretical implications*

The research findings are intended to provide a modest contribution to the innovation management literature in two major ways. At a first place, the study maintains supports for the argument highlighting that knowledge sharing stands as a beneficial undertaking for firms' innovative outcomes which externally share more knowledge sound to simultaneously take advantageous in acquiring relatively improved innovative capacity. In fact, such an effect may take place through reciprocal

sharing for the more knowledge firm shares, the more advantage it is expected to acquire in return. In a second place, the study could help empirically contributing to the long standing discussion regarding knowledge leakage harmful impacts (e.g. Ahmad and al., 2014; Baughnand al., 1997; Hamel, 1991). Although the issue of knowledge leakage has been exhaustively treated in the literature, very little are the empirical research works which has undertaken to study the links persistent between knowledge sharing, knowledge leakage and the firms' innovation capacity.

We can cite, in this regard, the study conducted by Zhou and al. (2014), which is based on a recent systematic reviews procedure calling for more research, which has underlined the persistence of noticeable noxious effects relating to knowledge sharing undertakings. So, the present work is conceived as a response to such a call and is designed to provide further, though modest, enrichment to the ongoing academic discussions, by proposing a more thorough and clean differentiation between unintentional and intentional knowledge leakages. For this sake, certain adequate measures have been developed while attempting to empirically demonstrate that both leakage types do potentially stand as a jeopardizing harm to the external-knowledge sharing firms.

### *5.2. Practical implications*

The links persisting between knowledge sharing, knowledge leaking and relative innovation capability constitutes a relevant study are not only in the knowledge management field but also in innovation practice studies. It is actually in this context that the present studies major important implications could be set, especially with respect to firms, operating within partnership context.

Firstly, our findings have helped demonstrate that firms reciprocally sharing knowledge with alliance partners have to be consciously aware of the potential harm likely to be engendered by knowledge leakage and remarkable the harm such leakage might well bring about. Indeed, on undertaking to share external knowledge, focal firms most often increase the risk for confidential and useful knowledge to be either unintentionally or intentionally leaked to their partners. Besides, a high knowledge sharing level helps greatly not only in facilitating acquisition of knowledge from partners, but also in encouraging opportunistic appropriation of critical knowledge by partners, which might in turn hurt the firms' innovative capacity.

In so far as strategic alliances are concerned, firms usually have a strong motivation to learn and internalize critical knowledge from their partners, to which the competitors' knowledge can well be readily applied with high efficiency. For this reason, managers should increase the employees' awareness as to confidential knowledge (both explicit and tacit) to be highly shielded against any opportunistic loss likely to emanate from any form of knowledge leakage, mainly by through social arranging training programs designed to reduce the potential for any knowledge leakage risks. Secondly, the present study has managed leaking know to reveal that knowledge leaking associated loss might well appear to outweigh the benefits to be yielded from getting access to external knowledge. So, firms and above all executives, should be well aware of the fact that external knowledge sharing is likely to increase the risk associated with knowledge leaks, and should therefore carefully such hazard to that end.

In fact, for knowledge leakage opportunities to be effectively minimized, firms should by no mean, not harbor a blind faith when maintaining alliance relationships with trustworthy partners; instead, they have to be rather externally cautious and vigilant about trustworthiness dark side. Regarding conventional wisdom formal contracts and inter-firm trust should stand as effective safeguards against any form of knowledge leakage in strategic alliance (Dyer and Singh, 1998; Li and

al., 2010). Consequently, it is suggested that some forms of major protective measures need be urgently devised.

The firm should strive to create an intra-firm climate of confidence. As a result, the employee ought to be regarded not only as a simple worker but, rather, as a partner of his firm and an owner of its resources, who takes part in achieving success for his company. So, establishing good wills and a trustworthy environment among the firms' actors (including employees and managers) may well help in mitigating knowledge loss either intentional or unintentional. In this way, employees could be sensitized so as to distinguished between the firms' to critical knowledge, and knowledge which can be legally shared and exchanged with other partners for instance on a point venture basis.

## 6. Conclusion

In a collaborative innovation oriented context, firms often undertake to share knowledge on an external basis with their partners in a bid to achieve their targeted innovation capability-related goals. In the present study, it has been suggested that firms engaged in an inter-collaborative strategies are face the risk of potentially harmful confidential knowledge leakage. In particular, we have empirically examined the effects of an alliance firm's external knowledge sharing on its innovation capability under the contingencies of business knowledge unintentional and intentional leakage. Our attained results highlight that firms engaged in alliance partnerships are likely to benefit from external knowledge sharing in terms of relative innovative competences despite the prevalence of a negative moderating effect closely associated with knowledge leakage. This implies that a focal firms' employees' intent, either willing or unwilling, to leak critical-business knowledge would favor expropriating such knowledge for private ends, an affair which may remarkably threaten corporate innovative capacities. In this regard, the study findings will help in providing new understanding of the dynamic relationship between external knowledge sharing and particularly leakage predominant in strategic alliances, by stressing the persistence of underlying complexities that need to be carefully accounted for.

So, once engaged into an alliance venture or bid with a certain partner, the firm strategy and knowledge sharing would stand as a key decisive issue for developing its innovation skills, and policy. In doing so, both managerial and employee judgment would be imposed on an equal basis in a bid to specify the appropriate knowledge sharing mechanism. At this level, a number of questions are seen worth raising, namely: What kind of knowledge has been shared? When and how could it be shared? and with whom? At this juncture, some issues seem worth to be considered in order to protect the firm's proprietary knowledge from being leaked.

On the basis of the study reached findings, one could well suggest that in addition to knowledge sharing, knowledge leakage management should also be incorporated within the innovation undertaken project.

### *6.1. Limitations and scope for future research*

The present work has a number of limitations, which pave the way for potential research.

Firstly, our major information source has exclusively relied on the interviews undertaken with senior-level managers. As such, leakage-related behaviors have not been explored at the operational level in terms of day-to-day routines. Naturally, this constitutes the background on which much of the

leakage actually proves to occur, which highlights the need for further studies to be elaborated on the theme of actual employee behavior.

Secondly, as knowledge leakage may remarkably damage the firm's innovative capability, investigating the main determinants lying behind knowledge leakages would constitute a potentially promising step for further enriching the current relevant literature. Thus, researchers could undertake to conduct new studies likely to generate in-depth qualitative data focusing mainly on such lines of interest as the reasons, determinants and mechanisms lying behind the knowledge leakage related phenomena that might lead to effective understanding such an issue.

Finally, firm innovative capability could be possibly influenced by a number of factors other than knowledge flow among the two associated partners, as firms tend to form multiple alliance ventures. Future research projects should mainly examine determinants beyond the dyadic level, such as overall knowledge flow in a firms' alliance portfolio.

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