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Strategic technology partnering: A framework extension

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ABSTRACT

For many organizations, entering into a collaborative agreement such as strategic technology partnering (STP) with other firms is considered an indispensable step toward gaining competitive advantage. Therefore, the aim of the present systematic literature review (SLR) is to synthesize and cluster prior research in a way that it can assist both academics and practitioners. I cluster the various assets of STP and propose a *THIOMP*-Framework that groups the identified assets into Technoware, Humanware, Inforware, Orgaware, Manageware, and Partnerware. The findings call for greater agreement on specific terms and concepts concerning STP assets in the academic literature. The review concludes with discussing some promising avenues for future investigation.

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1. Introduction

R&D – and consequently, technology – have enormously improved the life quality of human beings over the last half century. The days are past when companies can develop new products on their own. Firms without partnerships are becoming rarer; the modern company has multiple ties (Ettlie & Pavlou, 2006; Fey & Birkinshaw, 2005; Powell, Koput, & Smith-Doerr, 1996). Researchers and others involved in knowledge production recognize the value of external networks in the innovation process (e.g., Chesbrough, 2003; Ketchen, Ireland, & Snow, 2007). Collaboration is believed to assist with environmental uncertainty due to globalization of business activities, increased time-to-market, increased customer expectations, etc. (Dogsen, 1993; Eden, Hitt, & Ireland, 2008; Vilkamo & Keil, 2003). For firms facing fast technological changes, inter-organizational collaborations have become increasingly important for them to enhance their competitiveness (Phelps, 2010; van de Vrande, Vanhaverbeke, & Duysters, 2011). Particularly, inter-organizational partnerships are critical for firm's innovation, when firms lack sufficient internal R&D

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**Table 1**

Lists of the most frequently mentioned assets classified into six dimensions.

Technoware	Reference(s)	Frequency	Percentage
Cross-functional teams	Duysters, Kok, and Vaandrager (1999); Vilkamo and Keil (2003); Powell et al. (1996); Tidd (2014)	4	12.1%
Flexibility toward fast changing environment	Vilkamo and Keil (2003); Ettlé and Pavlou (2006); Bidault and Cummings (1994); Santangelo (2000); Farr and Fischer (1992)	5	15.2%
Joint technology roadmaps	Vilkamo and Keil (2003); Duysters et al. (1999); Steensma and Corley (2000); Kim and Lee (2003)	4	12.1%
Production and technological knowledge/capabilities	Lee, Lee, and Pennings (2001); Bidault and Cummings (1994); Hagedoorn and Schakenraad (1994); Lee et al. (2001)	4	12.1%
Strong patent portfolio	Fey and Birkinshaw (2005); Lee et al. (2001); Miotti and Sachwald (2003)	3	9.1%
Humanware	Reference(s)	Frequency	Percentage
Absorptive capacity/appropriation capability	Steensma and Corley (2000); Mowery et al. (1996); Duysters et al. (1999); Caloghirou, Kastelli, and Tsakanikas (2004); Schulze et al. (2014); Vilkamo and Keil (2003); Ingham and Mothe (2002)	7	11.7%
Competence-based assets (e.g. development and commercialisation skills)	Bidault and Cummings (1994); Tidd (2014); Carr (1999); Vilkamo and Keil (2003)	4	6.7%
Cohesion	Schilling and Phelps (2007); Mowery, Oxley, and Silverman (1996); Bonaccorsi and Lipparini (1994)	3	5.0%
Commitment and involvement	Saxton (1997); Vilkamo and Keil (2003); Farr and Fischer (1992); Dogsen (1993); Kim and Lee (2003); Ingham and Mothe (2002)	6	10.0%
Cooperative learning	Li, Eden, Hitt, and Ireland (2008); Santangelo (2000); Cui, Ball, and Coyne (2002); Ingham and Mothe (2002); Pennings and Harianto (1992); Hagedoorn et al. (2006)	6	10.0%
Disseminative capability	Carr (1999); Schulze et al. (2014); Kim and Lee (2003)	3	5.0%
Knowledge intensity (intellectual human capital)	Noseleit and de Faria (2013); Mukherjee, Gaur, Gaur, and Schmid (2013); Schilling and Phelps (2007); Mowery et al. (1996); Schulze et al. (2014); Rothaermel and Hess (2007)	6	10.0%
Openness to new ideas (and external organizations)	Fey and Birkinshaw (2005); Bayona, Garcia-Marco, and Huerta (2001); Chen, Chen, and Vanhaverbeke (2011)	3	5.0%
Powerful task forces (qualifications)	Powell et al. (1996); Caloghirou et al. (2004); Trott, Cordey-Hayes, and Seaton (1995); Mowery et al. (1996)	4	6.7%
Networking capabilities	Caloghirou et al. (2004); Trott et al. (1995); Pennings and Harianto (1992); Mukherjee et al. (2013); Mowery et al. (1996); Siu and Bao (2008); Vilkamo and Keil (2003); Sivasdas and Dwyer (2000)	8	13.3%
Inforware	Reference(s)	Frequency	Percentage
Open and fast communication/communication network	Häusler, Hohn and Lütz (1994); Schulze et al. (2014); Bonaccorsi and Lipparini (1994); Bidault and Cummings (1994); Bstieler and Hemmert (2008)	5	17.9%
Extensive information exchange and sharing	Bonaccorsi and Lipparini (1994); Trott et al. (1995); Kim and Lee (2003); Phene and Tallman (2010); Siu and Bao (2008); Sampson (2007)	6	21.4%
Ongoing informal and interpersonal communication	Siu and Bao (2008); Kim and Lee (2003); Trott et al. (1995); Forrest and Martin (1992)	4	14.3%
Integration of information and communication technology systems	Bonaccorsi and Lipparini (1994); Phene and Tallman (2010); Ettlé and Pavlou (2006)	3	10.7%
Proactive environmental scanning (commercial and technological)	Mowery et al. (1996); Trott et al. (1995); Mukherjee et al. (2013); Caloghirou et al. (2004); Ketchen et al. (2007)	5	17.9%
Orgaware	Reference(s)	Frequency	Percentage
Alliance portfolio diversity	Duysters et al. (1999); Ingham and Mothe (2002); Chen et al. (2011); Vilkamo and Keil (2003); Zollo et al. (2002); Noseleit and de Faria (2013)	5	5.81%
Alliance performance evaluation, feedback, monitoring, and control	Bidault and Cummings (1994); Zhou and Li (2008); Rothaermel and Hess (2007); Sivasdas and Dwyer (2000); Duysters et al. (1999); Mukherjee et al. (2013); Bonaccorsi and Lipparini (1994)	7	8.14%
Centrality-based network capabilities (e.g. regional clusters)	Tidd (2014); Hagedoorn et al. (2006); Zhang and Baden-Fuller (2010); Häusler et al. (1994); Phene and Tallman (2010); Bonaccorsi and Lipparini (1994); Zhou and Li (2008); Schilling and Phelps (2007)	8	9.30%
Coordination	Phene and Tallman (2010); Mukherjee et al. (2013); Schulze et al. (2014)	3	3.49%
Creating curricula for vocational training	Häusler et al. (1994); Caloghirou et al. (2004); Duysters et al. (1999); Cui et al. (2002)	4	4.65%
Dedicated alliance function and managers (internal accountability)	Kale and Singh (2007); Forrest and Martin (1992); Duysters et al. (1999)	3	3.49%
Financial resources	Lee et al. (2007); Phene and Tallman (2010); Ahuja (2000b)	3	3.49%
Interorganizational formalization of processes and routines	Sivasdas and Dwyer (2000); Powell et al. (1996); Zollo et al. (2002); Kim and Song (2007); Trott et al. (1995)	4	4.65%

Table 1 (continued)

Orgaware	Reference(s)	Frequency	Percentage
Institutional support	Sivadas and Dwyer (2000); Häusler et al. (1994); Schulze et al. (2014)	3	3.49%
Integrating activities (e.g. R&D with production and commercial functions)	Häusler et al. (1994); Ingham and Mothe (2002); Carr (1999)	3	3.49%
Network-level strategy (integrated with corporate strategy)	Rothaermel (2001); Vilkmam and Keil (2003); Cassiman, Di Guardo, and Valentini (2006))	3	3.49%
Right partner selection	Li et al. (2008); Un et al. (2010); Hagedoorn et al. (2006); Forrest and Martin (1992); Mukherjee et al. (2013); Duysters et al. (1999); Vilkmam and Keil (2003)	7	8.14%
Manageware	Reference(s)	Frequency	Percentage
Active role in alliance portfolio management	Vilkmam and Keil (2003); Duysters et al. (1999); Bidault and Cummings (1994); Bstieler and Hemmert (2008)	4	14.3%
Good leadership and motivation	Dogsen (1993); Forrest and Martin (1992); Trott et al. (1995)	3	10.7%
Managerial competence	Cui et al. (2002); Forrest and Martin (1992); Mukherjee et al. (2013)	3	10.7%
Open and informal style of management	Forrest and Martin (1992); Trott et al. (1995); Mukherjee et al. (2013); Duysters et al. (1999)	4	14.3%
Top management involvement	Häusler et al. (1994); Forrest and Martin (1992); Dogsen (1993)	3	10.7%
Top management decision-making and control	Nueno and Oosterveld (1988); Forrest and Martin (1992); Mukherjee et al. (2013)	3	10.7%
Partnerware	Reference(s)	Frequency	Percentage
Alliance experience	Bidault and Cummings (1994); Mukherjee et al. (2013); Schulze et al. (2014); Kalaighnam et al. (2007); Zhou and Li (2008); Saxton (1997); Kim and Song (2007); Mukherjee et al. (2013)	8	6.3%
Clarity of agreement	Steensma and Corley (2000); Sivadas and Dwyer (2000); Phene and Tallman (2010); Vilkmam and Keil (2003)	4	3.1%
Close cooperation/ collaborative linkages	Siu and Bao (2008); Kim and Lee (2003); Ahuja (2000a); Bonaccorsi and Lipparini (1994); Dogsen (1993); Chen et al. (2011); Phene and Tallman (2012); Ahuja (2000b)	8	6.3%
Compatibility of goals and expectations	Kim and Lee (2003); Häusler et al. (1994); Bonaccorsi and Lipparini (1994); Forrest and Martin (1992); Farr and Fischer (1992); Dogsen (1993); Duysters et al. (1999); Vilkmam and Keil (2003); Chang (2003); Bidault and Cummings (1994)	10	7.9%
(Constant) mutual interaction	Bonaccorsi and Lipparini (1994); Caloghirou et al. (2004); Santangelo (2000); Häusler et al. (1994); Siu and Bao (2008)	5	3.9%
High commitment to collaboration-based relationship	Siu and Bao (2008); Carr (1999); Bonaccorsi and Lipparini (1994)	3	2.4%
Interdependence	Siu and Bao (2008); Steensma and Corley (2000); Schulze et al. (2014); Kim and Song (2007); Sivadas and Dwyer (2000); Schilling and Phelps (2007)	6	4.7%
Interfirm-trust	Li et al. (2008); Mukherjee et al. (2013); Saxton (1997); Zhou and Li (2008); Zollo et al. (2002); Bstieler and Hemmert (2008); Kim and Song (2007); Häusler et al. (1994); Dogsen (1993); Bonaccorsi and Lipparini (1994); Vilkmam and Keil (2003); Siu and Bao (2008); Mukherjee et al. (2013); Duysters et al. (1999); Kim and Lee (2003); Ingham and Mothe (2002); Forrest and Martin (1992)	17	13.4%
Mutual benefit and support	Siu and Bao (2008); Vilkmam and Keil (2003); Duysters et al. (1999); Bonaccorsi and Lipparini (1994); Ketchen et al. (2007)	5	3.9%
Partner's similarity/ complementarity of partner competencies	Santangelo (2000); Un et al. (2010); Sivadas and Dwyer (2000); Mowery et al. (1996); Nueno and Oosterveld (1988); Noseleit and de Faria (2013); Sampson (2007); Steensma and Corley (2000); Schulze et al. (2014); Carr (1999); Häusler et al. (1994); Ingham and Mothe (2002); Ahuja (2000a); Miotti and Sachwald (2003); Forrest and Martin (1992)	15	11.8%
Mutual respect and fairness	Duysters et al. (1999); Trott et al. (1995); Bstieler and Hemmert (2008)	3	2.4%
Combining of intangible and physical assets	Ketchen et al. (2007); Sampson (2007); Santangelo (2000); Ahuja (2000b); Kim and Song (2007); Mukherjee et al. (2013); Schulze et al. (2014); Ahuja (2000a); Rothaermel and Hess (2007)	9	7.1%
Sharing of risks	Duysters et al. (1999); Bidault and Cummings (1994); Schulze et al. (2014); Forrest and Martin (1992)	4	3.1%
Sharing of the development & innovation costs	Schulze et al. (2014); Forrest and Martin (1992); Bonaccorsi and Lipparini (1994)	3	2.4%

resources (Un, Cuervo-Cazurra, & Asakawa, 2010). Increased competition in numerous industries (e.g., automotive, information and communication technology (ICT), electronics, etc.) has obliged global enterprises to increase their adaptability and flexibility to meet the requirements of a more rapidly changing business environment (Asakawa, 1996; Lanctot & Swan, 2000). These challenges are about making appropriate decisions: how to set up processes, structures, and foster mechanisms

to ensure well-timed solutions pertaining to new technologies, new knowledge, and new products (Von Zedtwitz, Gassmann, & Boutellier, 2004). Cooperation is viewed as a mechanism to recognize and tackle uncertainty (Spekman, Forbes, Isabella, & MacAvoy, 1998; Vilkamo & Keil, 2003). Learning how to deal with interfirm partnerships will assist firms in establishing new associations with different organizations (Powell et al., 1996; Ring & van de Ven, 1992) and enhance the probability of achievement of these future relationships (Anand & Khanna, 2000; Dyer & Singh, 1998; Gulati, 1999). The ability to shape and manage partnerships is pertinent in all businesses yet especially in high technology industries. Notably in high-tech industries, research and development (R&D) collaborations with other organizations have been held as means of competitive advantage (Huang & Yu, 2011; Kalaiganam, Shankar, & Varadarajan, 2007). In industries populated by high technology companies, the speedy development of new product offerings is a critical determining factor of success (Faems, De Visser, Andries, & Van Looy, 2010; Schoonhoven, Eisenhardt, & Lyman, 1990). As a result, strategic technology partnering (STP) has become a common instrument for securing and leveraging technological competencies (Kim & Inkpen, 2005; Oxley & Sampson, 2004; Schulze, Brojerdi, & von Krogh, 2014) (see Table 1). The more firms cultivate cooperating assets, the more these are relied upon to be valuable in rapidly reacting to favorable new technological chances through various partnerships (Hagedoorn, Roijackers, & van Kranenburg, 2006). However, currently, there exist various assets with several terms and meanings, resulting in a high consistency in the literature. To address this gap I aim to synthesize the various STP assets into a coherent framework. Note, for the purpose of the present study we will use the word strategic technology partnering/ partnership (STP) to replace other terms such as alliance, collaboration or joint venture.

STPs represent an enormous managerial task given the complexities related to managing partnerships crosswise over organizational borders (Rothaermel & Deeds, 2006). Interestingly, it has been revealed that STP performance varies considerably among organizations (Anand & Khanna, 2000), indicating that organizations hold specific competitive assets and that these assets differ across organizations (Kale et al., 2002; Reuer & Ragozzino, 2006). Consequently, a research stream has risen that is intended to illuminate and to clarify what these qualities are and why some firms achieve superior STP performance compared to others. The analysis of the present study is guided through the overall main question: what are the different assets required to manage strategic technology partnering effectively? Briefly speaking, the present study is concerned with the question of what STPs require to be successful. Thus, the purpose of the present systematic literature review (SLR) is a conceptual amalgamation through a heterogeneous field. The organization of the present paper is as follows. The proceeding section deals with the elucidation of the SLR method adopted. Literature is then analyzed and synthesized, succeeded by the description of the findings. Finally, I highlight the implications for practitioners and offer guidance for possible future research directions.

## 2. Methodology of the reviewed literature

I conducted an extensive search of scholarly peer-reviewed journal articles in English. The execution phase in the present study review process consists of five steps as proposed by Tranfield, David Denyer, & Smart, 2003: (1) identifying initial search criteria, keywords and search string identification; (2) article identification; (3) compiling a consideration set and data extraction; (4) classification and typology of the results; and (5) data synthesis. The first three steps concern the assembly and organization of relevant data, whereas the last two steps encompass data processing, synthesis and analysis. The search strategy aimed at removing potential bias and being broad by using several database searches such as the EBSCO and Scopus, as well as by checking cross-referencing between authors and adopting inclusion criteria at each stage. Fig. 1 displays the SLR analysis process of the present study.

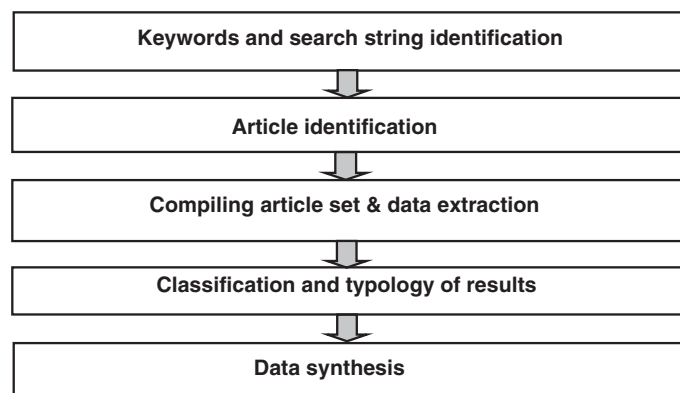


Fig. 1. SLR analysis process.  
Source: According to Tranfield et al. (2003).

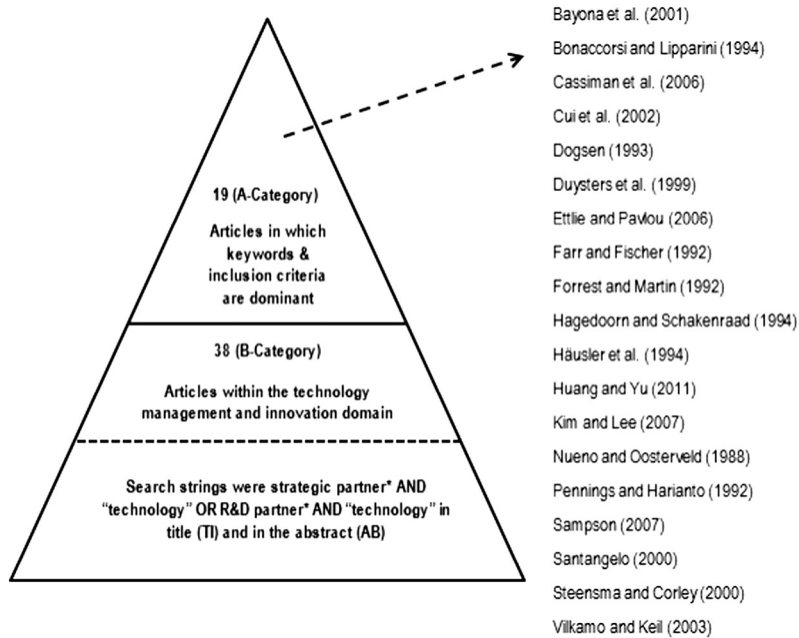


Fig. 2. Search string results through database search.

First, I devised a two-tier review scheme for systematic evaluation, in order to reduce subjective bias and enhance the validity (Keupp, Palmié, & Gassmann, 2012). Next, a narrative synthesis of the review documents was conducted. In a narrative synthesis, the interactions between studies with different theories, foci, and methodologies are thematically explored; whereby primarily relying on the use of words and text to collect and explain the findings of the synthesis (Mays, Pope, & Popay, 2005; Popay et al., 2006). I performed keyword searches using the term \*strategic partner\* OR \*R&D partner\* AND \*technology\*. Using predefined inclusion and exclusion criteria (available upon request) the articles were grouped into the categories (A), (B) and (C) (see Fig. 2). I read the abstracts of these documents and established their inclusion in the review on the basis of the fit with the subject under study. The A list represented articles of particular relevance that had interesting methodological approaches, whereas B list represented documents of some relevance, and the C list described articles that were of little till no relevance.



Fig. 3. THIOMP-Framework for STP.

Through manual checking of the reference list of each included article I further identified ten items for consideration. The final result was a total list of 57 peer-reviewed articles in 22 key journal publications, spanning from the beginning of 1988 till the beginning of 2014.

In analyzing the features that constitute successful STP, I identified an inconsistent body of terminologies in the academic literature. I came across expressions such as competencies, capabilities, enablers, or resources. I follow Sharif (1995, 1999) and use the term assets.

### 3. Study findings

Next, I consolidated the assets of STP that emerged from the literature into relevant categories. Sharif (1995, 1999) advocates that the flows of technology referred to by Prahalad and Hamel (1990) all fall into four broad categories, namely *Humanware*, *Technoware*, *Inforware*, and *Orgaware*, and that mastering these technological assets is crucial for the competitive positioning of companies. These assets comprise the “THIO Framework”: While examining the various assets, I identified two further categories, namely *Partnerware* (25%) and *Manageware* (10%), extending the THIO framework as proposed by Smith and Sharif (2007), and Sharif (1995, 1999) to the THIOMP-Framework. Most of the reviewed articles dealt with *Orgaware* (30%) and *Partnerware* (25%) assets (as shown in Fig. 3). Overall, the analysis led to the fact that STP assets can compromise six categories:

- 1) *Technoware*,
- 2) *Humanware*,
- 3) *Inforware*,
- 4) *Manageware*,
- 5) *Orgaware*, and
- 6) *Partnerware*.

*Technoware*: object-embodied physical facilities, e.g. equipments and artifacts. Technoware intensifies human power for the production of goods and services. The five most commonly mentioned *Technoware* assets were: cross-functional teams, flexibility toward changing environments, joint technology roadmaps, production and technological knowledge/capabilities, and strong patent portfolio.

*Humanware*: person-embodied human talents and tacit skills. Without appropriate humanware, technoware is simply non-efficient or impractical (Sharif, 1999). The most frequently mentioned *Humanware* assets were: absorptive capacity/appropriation capability, competence-based assets (e.g. development and commercialisation skills), cohesion, commitment and involvement, cooperative learning, disseminative capability, knowledge intensity (intellectual human capital), openness to new ideas (and external organizations), powerful task forces (qualifications), and networking capabilities.

*Inforware*: record-embodied codified knowledge, e.g. facts and figures in archives. *Inforware* permits speedier learning and savings in rapports with time and resources. The most frequently mentioned *Inforware* assets were: open and fast communication/communication network, extensive information exchange and sharing, ongoing informal and interpersonal communication, integration of information and communication technology systems, and proactive environmental scanning (commercial and technological).

*Orgaware*: organization-embodied operational schemes, e.g. methods and practices. *Orgaware* is for the synchronization of activities and resources in achieving desired goals (Sharif, 1999; Smith & Sharif, 2007). The most frequently mentioned *Orgaware* assets were: alliance portfolio diversity, alliance performance evaluation, feedback, monitoring, and control, centrality-based network capabilities (e.g. regional clusters), coordination, creating curricula for vocational training, dedicated alliance function and managers, inter-organizational formalization of processes and routines, and right partner selection.

*Manageware*: managerial competencies and leadership skills – without relevant governance and senior management support STP may not have the appropriate attention and focus it requires to be successful. The most frequently mentioned *Manageware* assets were: active role in alliance portfolio management, good leadership and motivation, managerial competence, open and informal style of management, top management involvement, and top management decision-making and control.

*Partnerware*: resources and empathy abilities among the B2B-partners, e.g. required to leverage STP benefits – the most frequently mentioned *Partnerware* assets were, alliance experience, clarity of agreement, close cooperation/collaborative linkages, compatibility of goals and expectations, (constant) mutual interaction, high commitment to collaboration-based relationship, interdependence, inter-firm trust, mutual benefit and support, partner's similarity/complementarity of partner competencies, mutual respect and fairness, combining of intangible and physical assets, sharing of risks, and sharing of the development & innovation costs.

### 4. Conclusion

#### 4.1. Managerial implications

The significant contribution of this SLR is to synthesize this multidisciplinary literature to provide an enhanced understanding of the interrelated assets of STP. As the study at hand pointed out, STP is not only characterized by one single resource but

rather a set of different assets. Different sectors and companies may need the categories of STP assets in various extents, but few if any sectors can totally neglect any one dimension (Smith & Sharif, 2007). Such knowledge should help companies better to manage technological partnerships in a world of ever-changing technology, decrease the probability of STP failure, and improve the allocation of scarce corporate resources. Organizations have to ensure that their structures and processes can foster successful STP. In fact, managers must leverage the power of *Technoware*, *Humanware*, *Inforware*, *Orgaware*, *Manageware*, and *Partnerware* as described in this paper. Therefore, it is paramount to a firm's success that a manager can not only weigh the strengths and weaknesses of the available innovation assets, but also understand and predict how these assets will interact when used in tandem. Challenged with the daunting task of acclimating to a new technological paradigm, managers often choose to employ a multiplicity of accessible assets without proper understanding of the possible harmful interaction effects. However, since much more work is required to understand how companies can enhance collaborative benefits, this paper does one step toward a greater appreciation.

Practicing managers and executives should bear in mind that STPs can provide organizations with tangible and intangible resources compulsory to remain globally competitive (Capaldo, 2007). Thus, managers of strategic partnerships should make efforts in learning about their partners not only from a commercial point of view but also from an organizational view (Zollo, Jeffrey, Reuer, & Singh, 2002). The present study pinpoints specific STP assets that are crucial to the achievement of organizations engaged in STPs (Schilke & Görzen, 2010). It takes systematic managerial approach to engender the maximum value in strategic partnering. Taking everything into account, the findings of this study may function as a valuable premise for reaching decisions as to which asset management should center its focus onto enhancing the performance of its firm's STPs. Creating a knowledge base within the organization on how STPs can be managed most successfully considerably helps to boost the performance outcomes of the company (Lavie, Haunschild, & Khanna, 2012). As a final point, it is essential to get the top management involved and to ensure that they are committed to the company's strategic partnerships and flag this dedication all through the organization. They should be involved in critical decision-making and devote an adequate amount of resources to the STP (Sluys, Matthyssens, Martens, & Streukens, 2011).

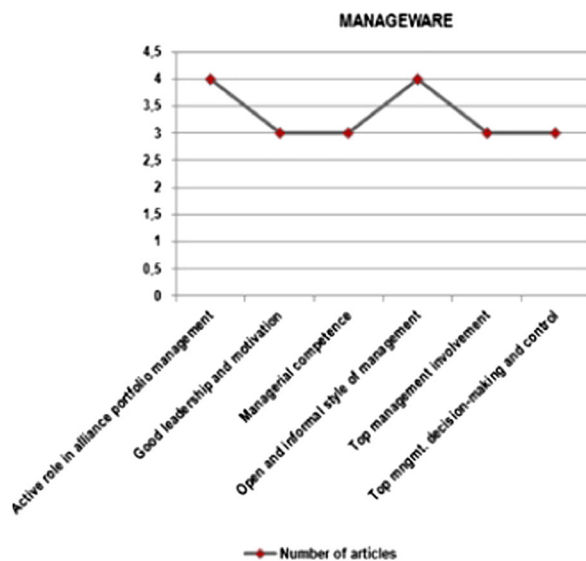
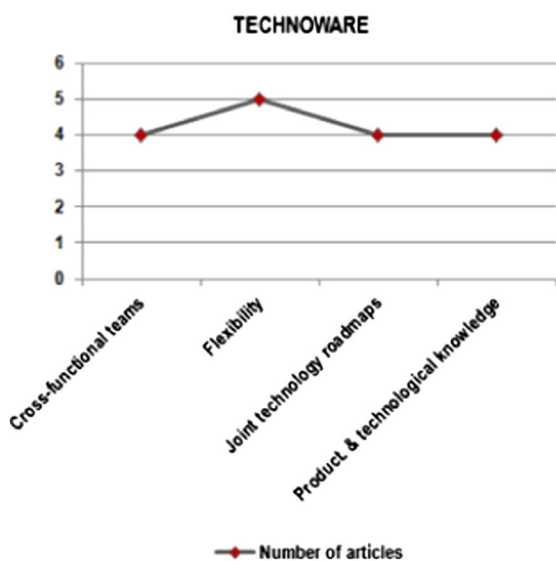
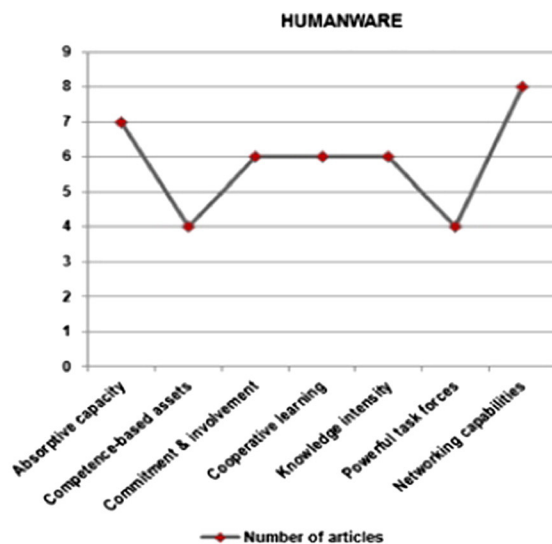
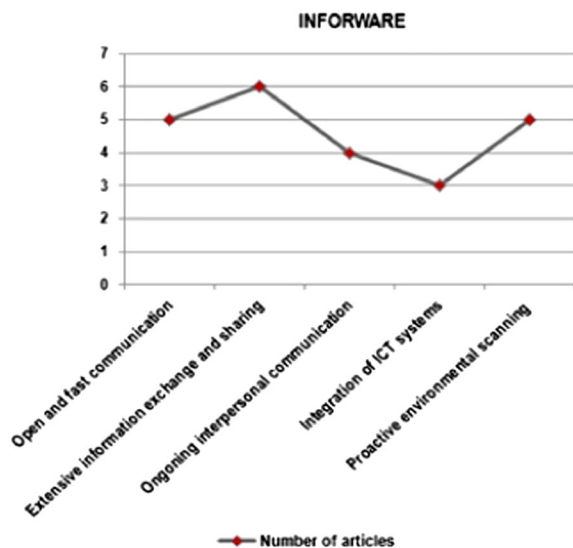
#### 4.2. Theoretical implications

Supplementary research in this research discipline is needed to progress our understanding of STP. The present SLR reveals that STP is a complex phenomenon, whose antecedents have multiple origins. Taking into account the findings of the present analysis, I am able to offer a couple of proposals for future studies on STP. First, future investigation should attempt to empirically test and validate the impact of each category of STP reported herein on performance systematically. Second, future studies may likewise report the effect of underexplored assets, such as trust, or complementary assets on STP (Bertrand & Meschi, 2005; Jolink & Niesten, 2012). Third, regarding the phenomena of STP, exploratory and qualitative research is valuable in understanding the complex linkage between STPs and their underlying assets, providing wealthier comprehension. Equally, I recommend researchers to evaluate the assets in terms of different partnership types and levels of analysis to investigate their respective effects and impacts on the performance of STP. For example, I propose to exploit methodological tools such as case studies in combination with quantitative methods. Hence, offering valuable clues to the influence of different STP assets, for instance, to identify core assets to remain globally competitive. Longitudinal examination can make a significant contribution of the advancement of STP by emphasizing how organizations that implement STP structures, processes and tools improve knowledge diffusion and assimilation in the STP and foster both a comprehension and an emphasis on joint objectives over the long run (Niesten and Jolink, 2014). Future research can work up these ideas and study in greater depth the characteristics and assets that facilitate STPs.

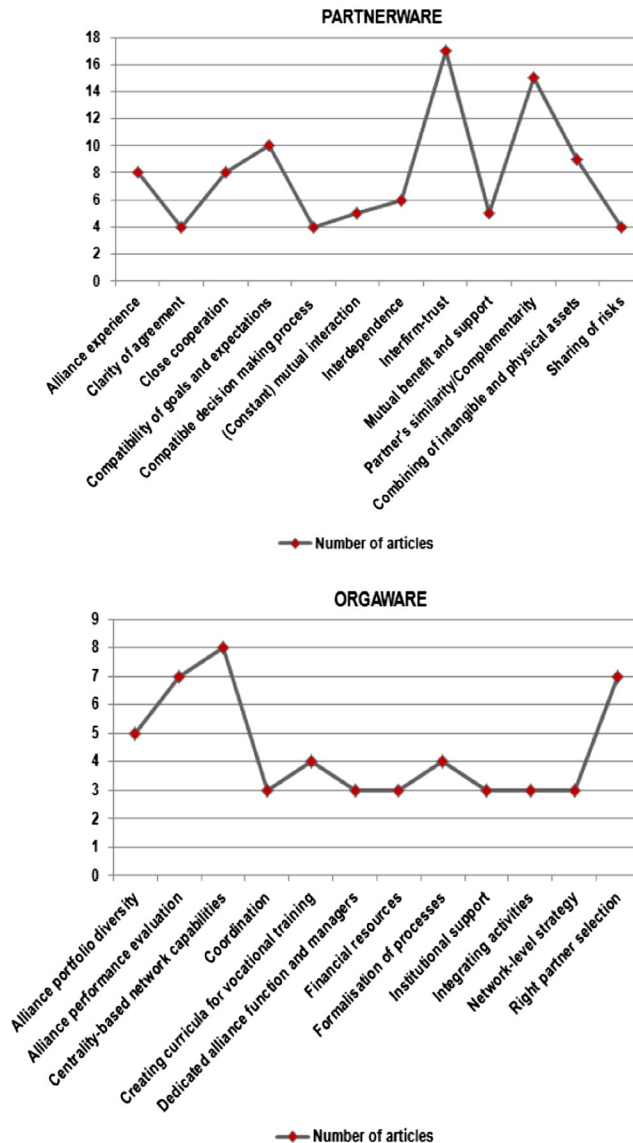
#### 4.3. Final remarks

The analysis of the present systematic review hints at a lack of consistency that might impede the consideration of necessary assets to create effective STP. Indeed, there is a high number of researchers in the discipline of STP who state different core assets. In this systematic review, 131 STP assets were identified out of which four were deemed to be crucial by a high number of researchers, namely, interfirm trust, partner's similarity/complementarity, compatibility of goals and expectations, and combining of intangible and physical assets. The main objective of the paper at hand was to add to extant knowledge about strategic technology partnering. I submit that the contribution of this analysis lies upon three areas: (a) the adoption of a robust and structured systematic review, (b) the extension of a conceptual framework on STP comprising six categories of assets including their sub-level assets, (c) a review of the current STP assets and the advancement of a motivation for future exploration. Such matter results in the value for new academics of strategic management seeking to come to terms with the diversity and scope of the research area. But also recognized scientists benefit, whose dedicated research undertakings have made it challenging to keep well-informed of developments in other subfields. Generally speaking, STPs represent a stimulating and promising area of managerial science that is rich of future research prospects. The paper at hand has the potential to contribute considerably to the current literature both in appraising the current state of STP and in providing a platform for future developments of the research field. Moreover, in view of the fast growth in interfirm collaborations, hopefully, this study will help guide managers in using collaborative strategies more efficiently. I further hope that the SLR at hand will motivate for further investigation of the interrelationships of assets associated with positive STP outcomes.

## Appendix A. Top STP assets among the reviewed documents







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