How do Intermediaries facilitate Patent Intelligence in innovative companies?

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SMEs try to keep abreast of all possible information in order respond to uncertainties and insecurities arising from development and appliance of new technologies. Patent Intelligence can be a robust tool for SMEs to mitigate this need. However, due to lack of resources, competences and time, SMEs have to look for semi-permanent or ad hoc assistance from external sources. Intermediaries play paramount importance in this process by closing the gap of companies' expertise in diffusing Technology intelligence or Patent intelligence practices with competences, resources and distinctive capabilities that are available in advance. Hitherto, the literature documented several process models for conducting Technology Intelligence. However, all of these models are designed from the companies' point of view. Furthermore, although there is a huge amount of literature on patents and their use in specific areas, our best of knowledge did not reveal any model that would emphasize on analysis and interpretation of the Patent Intelligence process. By employing action research methodology, this paper aims at bringing intermediaries perspective in operationalizing Patent Intelligence process in companies. For this (i) we revise the process of patent intelligence, as described in the literature, by taking explicitly into consideration that it is the intermediary who conducts the process, and not the company itself; (ii) we specify the set of critical competences and capabilities of intermediaries in providing Patent Intelligence services; (iii) we propose simplified but at the same time consistent model of Patent Intelligence process which may serve as a guideline for intermediaries and managers.

1. Introduction

In this ever changing and dynamic environment companies are compelled to stay abreast of all possible information which has a value for their business activities. They actively monitor external environment, exploit technological opportunities and ideas, keep track of their competitors and potential customers, search for future partners and collaborators. Given the rapid pace of radical technological changes and discontinuities (Lichtenthaler, 2004; 2007), Technology Intelligence (TI) can be helpful for companies to identify and deliver historical and contemporary information about technological trends, threats and opportunities, promising niches in a systematic way (Kerr et.al., 2006; Dang et al., 2010). Particularly, Small and medium-sized enterprises (SMEs) would greatly benefit from TI, as they have to respond to uncertainties and insecurities arising from development and appliance of new technologies dictated by Open Innovation (Diez, 2002; Zeng et al., 2010). SMEs need information to reduce these uncertainties and remain or become as much as successful in future markets (Nijssen et al., 2001). Hence, TI can be a robust tool for SMEs to mitigate this need. Usually this process is performed by analyzing huge amounts of technical/technological data gleaned from heterogeneous sources. In this respect, patents grant wealthy and well-organized information to exploit (Manzini et al., 2015; Fossati and Motta, 2016; Cesaroni and Baglieri, 2012). Being one of the methods of TI, patent analysis ensures information about emerging technologies (Daim et al., 2006; Trappey et al., 2011; Altuntas et al., 2015), technological opportunities (Yoon, 2008; Park et al., 2013); competitors, inventors, assignees

(Moehlre, 2005; Pilkington, 2009; Wang and Guan, 2012). As it was stated by Ernst (2003), patent analysis supports researchers and practitioners in all areas of technology management: technology creation, storage and use. Several studies suggest that due to the resource, competence and time constraints SMEs should treat patent information as strategic asset, turn it into the core element of company's TI and benefit from it in many aspects (Ernst, 1997; Lee et al., 2011). Accordingly, Patent intelligence (PI)—"the transformation of content found in patents into technical, business, and legal insight" (Park et al., 2013) — is becoming crucial for technology management and decision-making. There is an agreement in literature and practice that most of the companies tend to conduct TI, as well as PI spontaneously, haphazardly and in uncoordinated manner (Savioz, 2006; Lichtenthaler, 2007; Ranjbar and Tavakoli, 2015). Because successful operationalization of TI practices requires vigorous efforts, competences and resources that not all companies may possess. This is also true in the case of SMEs which often lack resources and time to look beyond their immediate short-term needs (Makimattila et al., 2012). They are more interested in discrete and concrete knowledge, while TI activities are usually built towards strategic and long-term purposes (Major and Cordey-Hayes, 2000). This enforces companies to search semi-permanent or ad hoc assistance with particular competences and capabilities from external sources (Mortara et al., 2010). Intermediaries play paramount importance in this process. They bridge research and knowledge on TI and the empirical implementation of TI within companies when the level of internal competences and the access to data and information is limited. Intermediaries close the gap of companies' expertise in diffusing TI practices with competences, resources and distinctive capabilities that are available in advance. Intermediaries with their "added value" can be helpful for companies to provide information in wide range of areas coherent with "beneficiary's" needs. Hitherto, the literature documented several process models for conducting TI (Ashton and Stacey, 1995; Reger, 2001; Lichtenthaler, 2006; Kerr et al., 2006). However, all of these models are designed from the company's point of view. What is more, considerable number of the available studies treated intermediaries as middleman who extends firm's internal resources and competences by leaving the management and coordination process to firms (Bessant and Rush, 1995; Howell, 2006), but not to Intermediaries (Katzy et al., 2013). Furthermore, although there is a huge amount of literature on patents and their use in specific areas, our best of knowledge did not reveal any model that would emphasize on analysis and interpretation of the Patent Intelligence process. This paper attempts to fill this lacuna by bringing intermediaries perspective in operationalizing PI process. More in detail, we try to answer research question how PI process should be conceived in order to be implemented by intermediaries and not directly by companies. For this we revise the TI model of Kerr et al. (2006) and demonstrate how it can be used by intermediaries for PI. Since the need for external assistance derived from the information and resource lack of the companies, we argue that this model should be modified and the activities in it should be specified and simplified unless it is accessible by the companies with different expertise and skills, especially by SMEs. Moreover, the model was adopted for intermediary "indirect" involvement in PI process. The second research question discusses capabilities, skill and competences needed for intermediaries in order to carry out the process in an appropriate way. The methodology adopted to answer these research questions is an action research design (Susman and Evered, 1978; Coughlan and Coghlan, 2002). The collaboration of Assocomaplast and Università Cattaneo (LIUC) in providing intermediary services in PI is chosen as a research setting. We start with a brief overview of theoretical background by delineating the process of PI in companies and the role of innovation intermediaries in facilitating "knowledge" in various areas, including TI and PI. Then we go to a specific case where the research issue is explained and synthesized. The last chapter of the paper presents the findings and discussion of the research questions.

2. Theoretical background

2.1 Patent Intelligence as a process in companies

As it was stated earlier, literature provides very rich and in-depth knowledge on patents and their application in diverse fields. Nevertheless, there is a lack of contributions which describe the PI as holistic process: in most contributions, the PI process is described only with reference to a specific methodology of analysis, such as SOA, or biblometric or morphology analysis. Therefore, we refer to TI process instead, as we consider PI as a type of TI process. Thus, TI is an activity that supports decision-makers in taking advantage of information related to technological trends, threats, opportunities in the environment of the company by the means of collection, analysis and communication (Savioz, 2002; Lichtenthaler, 2004). Usually it encompasses wide range of technology analysis activities which main purpose is to observe the technological changes in a systematic way and make the companies to benefit from them (Ker et al., 2006; Mortara et al., 2008). It should be already clear that, literature studied and described the process of TI in companies extensively. Discussions around this concept took root already from 1970's when the authors highlighted essence of searching technological signals in the environment, identifying possible consequences and impacts of them and presenting this information to decision-makers and managers in appropriate and timely manner (Bright, 1970; Utterback and Brown, 1972). Jain (1984) outlined four phases of environmental scanning in companies, namely 1) primitive phase where the environment is accepted as it is and no effort is made to intelligence impetus; 2) ad-hoc phase where the company realizes the importance of scanning but there is no active search; 3) reactive phase where the company deals with environment however the scanning process is carried out randomly and in unstructured way; 4) in proactive phase company predicts the environment for future needs and puts structured and deliberate effort. Ashton et al. (1991) presented a structured approach for technology monitoring activities that is comprised of acquisition,

valuation and dissemination of technology related information. Ashton and Stacey (1995) shed in light business technical intelligence process in six steps: planning, collection, analysis, delivery, use and evaluation. Reger (2001) put forward a process model for technology foresight in which activities and players are brought as core elements. Norling et al. (2000) and Bucher et al. (2003) also portrayed different stages of TI process which can be summarized as initiation of the process, information collection, information evaluation and analysis & dissemination. More comprehensive and in-depth synthesis of the TI process is provided by Kerr et al. (2006). According to the authors TI process is an operating cycle which interacts with decision-makers in two ways: from one side the decision-makers input their specific need and lead the process; from other side they receive back the information through intelligence cycle (Mortara et al., 2010). The model is composed of following stages: 1) coordinate – planning intelligence activities based on the companies needs for information, allocating resources and assigning tasks to individuals; 2) search – finding, selecting and processing sources of information; 3) filter – determining if the information found is still pertinent or not; 4) analyze – analysis of information in line with intelligence purposes and user needs; 5) document – storing and warehousing collected knowledge; 6) disseminate – communication and provision of intelligence results to users/interested individuals. Arman and Foden (2010) argued that "due to its exploratory nature process steps of TI are often difficult to formalize such that TI can be explicitly used within an organization to support technology managers in decision making". It already became apparent that all of aforementioned models complement each other. Since the TI model provided by Kerr et al. (2006) is the latest and the most extensive one, this paper is explicitly based on it.

2.2 From Innovation intermediaries to TI Intermediaries

An existing and growing body of literature approaches to Innovation intermediaries from different perspectives. Primarily, they are seen as important nodes in inter-organizational networks to overcome various challenges and gaps among innovation system stakeholders (Klerkx and Leeuwis, 2009; Hermann et al., 2016). However, their role is more than linking different organizations, as they also assist in searching and transforming the knowledge, providing solutions to the clients with new combinations of existing ideas (Hargadon and Sutton, 1997). Howells (2006) defines Innovation intermediaries as "an organization or body that acts an agent or broker in any aspect of the innovation process between two or more parties" in order to fulfill wide range of activities. This definition is congruent with Chesbrough's (2006) two forms of Innovation intermediaries: (1) agents, representing only one side of technology transactions and (2) brokers, shaping the technology transaction and commercialization. Indeed, in the era of Open Innovation the role of intermediaries is becoming decisive for companies in gaining competitive advantage. For instance, Xiaoyuan and Yanning (2011) argue that, the role of Innovation intermediaries in national level can be viewed from three angles: they influence on technology transfer and evolution of the technology, they effect on enterprise development and they have an impact on R&D paradigm of the firm. Intermediaries also improve innovative performance of the firms by enlarging scope of firm's external search and reducing firm's external search costs (Lin et al., 2016). Several authors posit that, intermediary services may help firms to solve internal limitations by observing firm's environment, searching and marketing technologies, identifying potential technology partners, customers, technology commercialization opportunities and information sources (Bessant and Rush, 1995; Morgan and Crawford, 1996; Bryant and Reenstra Bryant, 1998; Rivette and Kline, 2000; Lichtenthaler and Ernst, 2008). This articulates specialization of intermediaries in TI services usually with a set of concrete functions. For example, Malik (2012) explores the operationalization of TI brokering by industrial firms using active searching and scanning of the external environment. Howells (2006) in the range of different functions highlights foresight, forecasting and technology roadmapping, scanning and TI as well as Intellectual property management activities of the Innovation intermediaries. Both Malik (2012) and Howells (2006) agree that intermediaries provide "much more varied and holistic role for their clients than has generally been acknowledged". Bessant and Rush (1995) delineate the role of Innovation intermediaries in "bridging the gap between technological opportunity and (often poorly articulated) user needs". Mortara et al. (2009) also pinpoint another trait of them in assisting companies to access and acquire information on new technologies. One stream of the literature implies service of intermediaries directed at broadening internal TI competence of the companies where coordination and management of the process is left to company, not to intermediary (Bessant and Rush, 1995; Howells, 2006; Lichtenthaler and Ernst, 2008; Katzy et al., 2013). This is in line with Mortara's (2010) developing in-house TI capability approach in which intermediaries provide a semi-permanent resource for intelligence gathering. The second approach, outsourcing TI capability assumes contracting with intermediary on ad-hoc and not permanent basis to solve specific problems. However, intermediaries by themselves lead and coordinate the process with or without involvement of the company.

Another strand of the research focuses on question how SMEs can benefit from Innovation intermediaries to exploit TI or PI. The studies state that due to resource and competence constraints SMEs are enforced to tailor their competences with capabilities proposed by intermediaries (Lawson and Samson, 2001; Lee et al., 2010; Gredel et al., 2012). Collaboration with intermediaries enables SMEs to locate, obtain and utilize external knowledge and to supplement their scarce resources, such as time, financial, human (Klewitz et al., 2012). According to Rinkinen and Makimattila (2015), SMEs are more interested in close-to-practice and concrete information about markets, new technologies, customers and competitors. Since collecting and using foresight information is challenging for them, intermediaries may have an overriding role in dissemination of foresight knowledge. The authors argue that in order to facilitate enhanced process of information processing intermediaries should provide platforms for

communicating, sharing opinions and interpret future oriented information. It is also necessary to understand SMEs' context and their foresight culture. Major and Cordey-Hayes (2000) also affirm that, instead of emphasizing on SMEs by themselves, foresight policy-making should put more effort into encouraging a foresight culture in intermediaries. In its turn, SMEs also should interact with intermediaries and organizations like trade associations, chamber of commerce, Universities which enhance involvement of SMEs by spreading foresight culture.

2.3 Capabilities needed for TI/PI Intermediation

The studies which predominantly deal with capabilities, skills and competences of Intermediaries in providing TI/PI services are quite limited. However, it is possible to observe some presumptions from function and service providing perspective of the intermediaries. For example, Mortara (2010) highlight innovation management services, such as technology roadmapping exercises, scenario planning techniques, IP portfolio reviews by employing matchmaking and crowdsourcing approaches as capabilities of intermediaries that should be taken into account by companies while selecting intermediaries. Intermediaries can also offer additional services such as access to databases, application of special techniques and tools, skill training, workshops and newsletter promoting services. Major part of the literature concentrates on general competences and capabilities of Innovation intermediaries. Alexander and Martin (2013) distinguish four types of competences of technology transfer offices: 1) ability to facilitate management activity among different stakeholders; 2) to promote and develop knowledge-based support services for enterprise and share best practices; 3) to establish knowledge-based boundary-spanning activities through the effective mobilization of people; 4) to enable the transfer of intellectual property (IP) from public research teams to private firms and to facilitate entrepreneurial activity. Knowledge creation and exploration, knowledge storage and knowledge transfer capacities are stated as key capabilities of intermediaries by Mount et al. (2015) that are enabled by access to the network database. Janssens et al. (2014) discuss four competences in ICT driven Innovation partnerships: physical systems (supporting communication technologies), managerial systems (collaboration and networking), skills and knowledge (social networking capabilities), values (collaboration, openness and appreciation of diversity). Tran et al. (2011) propose a framework that combines four types of intermediary capabilities, namely best-cost, timing, market-response and product solution capabilities to enhance client's new product development processes. By summarizing discussed three streams of the literature we can say that no model was developed that considers operationalization of PI process by intermediaries including the issue of the capabilities and competencies needed by them.

3. The research question and the empirical study

With the aim to make a first step in filling the gap found in literature, this paper investigates the following research questions:

- How should intermediaries tailor the process of PI in order to bring it to companies successfully (coordinate - search – filter – analyze – document – disseminate)?
- How should intermediaries develop resource and competences that would contribute to the successful implementation of PI in companies (managerial skills & knowledge, social networking, technical expertise, values)?

In order to answer to the research question, we adopted an action research methodology (Susman and Evered, 1978) where the researcher becomes a participant of the process (Westbrook, 1994). Coughlan and Coghlan (2002) note that, action research is a sequence of actions followed by iterative cycles which helps to develop a holistic understanding of the identified problem. We found out that, this type of research design is fully coherent with TI process as one can observe overlapping characteristics. Thus, action research was conducted in collaboration with an intermediary: Assocomaplast (Italian Plastics and Rubber Processing Machinery and Molds Manufacturers' Association). Hence, the LIUC-Assocomaplast collaboration became the research setting for this paper. LIUC and Assocomaplast designed and implemented a PI process for the associated companies, following the Kerr et al. (2006) model for TI, applied specifically to PI. By taking into consideration the evidence emerged from this empirical study, some suggestions emerged to modify the model for an "indirect" use of PI by an intermediary. This framework also specified competences and skills to be put in place by the intermediary to successfully lead the process. Then this tentative model was checked and discussed with another intermediary, operating specifically in the field of TI: Strategie & Innovazione, which indeed operates in this field since the '90s. After this check, a proposal of a framework for PI for intermediaries was put forward and discussed according to the most recent literature on the topic.

The following table synthesizes the research process:

Table 1. Research process

Period	People involved	Topics
May-Oct 2015	LIUC: senior + junior researchers; Assocomaplast: general director + head of marketing department	Identification of the aim and scope of the PI process; identification of the IPC classes of investigation; definition of the sources and of the analysis framework; definition of a first dissemination (report) format
Oct-Dec 2015	LIUC: senior + junior researchers; Assocomaplast: general director + head of marketing department + IT department	Realization of the first analysis, according to the guidelines identified; dissemination of the first report
Jan-Dec 2016	LIUC: senior + junior researchers; Assocomaplast: general director + head of marketing department + IT dep.	Refining of the analysis and reporting framework; Realization of three PI analyses reports, according to the revised framework; analysis of use of the reports
Jan-Feb 2017	LIUC: senior + junior researchers; Assocomaplast: general director + head of marketing department	Revision of the PI aim and scope; definition of new types of analysis; definition of new ways for reporting and dissemination
Mar-May 2017	LIUC: senior + junior researchers; Assocomaplast: general director + head of marketing department + IT	Realization of the analysis following the new framework; analysis of the use of the new reports
Mar-May 2017	LIUC: senior + junior researchers; Strategie & Innovazione researchers	Discussion about the PI process framework for intermediaries; analysis of the competences needed along the process; definition of the final tentative framework

3.1 The use of Patent Intelligence by intermediaries: the case of Assocomaplast

Assocomaplast is a private trade association of most important Italian manufacturers of machines, auxiliary and molds for plastics and rubber. SMEs constitute around 70% of Association's members. Assocomaplast has the aim to make aware its member companies on latest technological trends and on technology players, by means of patents. LIUC Università Cattaneo supported Assocomaplast in this process. The design process required two rounds in order to find a satisfactory configuration for the PI.

In the first round, the aim identified for the PI process was to provide all member companies with an overview of the patenting activity and trends in the technology area of Rubber Processing Machinery and Molds Manufacturers'. The patent IPC classes to be included in the analysis were thus defined, (B29B, B29C, B29D), and the interval of the periodic analysis (three months). The patent data source used was the one available for LIUC and Assocomaplast, (the Questel software Orbit). The patent fields to be included in the analysis and the type of elaboration of data were identified in order to focus the intelligence only on those information actually understandable and useful for the associated companies. In terms of reporting and disseminating, considering the limited competences on patents of the member companies, a subset of information drawn from the patent analysis were made available to companies on the association website. More detailed information were kept form the intermediary, available to the companies upon request. After one year of use of this PI process, it emerged that it was not useful for companies as Assocomaplast wished: the very limited access by companies and the lack of understanding of some of the reported information made clear to Assocomaplast and LIUC that something more was necessary. In particular, it emerged that probably companies did not understand the value of the information embedded in the PI report, because of the limited competences on both Intellectual Property and PI. Hence, the goals and scope of the PI process became wider: not only providing an overview of the patenting activity concerning the technology areas of interest, but also stimulating the interest of companies on the topic and, at the same time, improving the level of competences. In coherence with this revision of the goals, two other types of periodic analysis were added: one concerning the main technology players (i.e. relevant companies patenting in the technology field) and one concerning specific technologies (i.e. specific subsets of technologies within the main area of interest, corresponding to IPC sub-classes within the investigated main classes B29B, B29C and B29D). These two types of analysis were mainly aimed at stimulating the attention of companies, making it more clear the added value of the PI process as a tool for a better knowledge of the competitive and technology environment. Furthermore, a new way of dissemination was adopted: each month, a synthesis was prepared of the PI process results concerning one specific player (competitor) or one specific technology and it was presented in a video with audio comments aimed at clarifying the meaning of the results from a business perspective. This form of dissemination allowed companies a better understanding of both the meaning of the PI results and the related value for supporting strategic analysis and decisions. This second type of PI process is still ongoing and feedbacks are being collected by companies in order to further refine the goals of the process, in coherence with the companies needs and with the intermediary scope.

At the end of this second PI process with Assocomaplast, we drew a first tentative framework for representing the PI process from the point of view of an intermediary, bringing into evidence the differences with respect to a process directly implemented by a single company. The set of competences critical in each phases of this process were also investigated. Then, this tentative framework, together with the discussion concerning the competences, was discussed with Strategie e Innovazione, the intermediary specialized in technology intelligence. The final framework proposed in the paper is the result of this last research step.

4. Discussion of results and conclusions: the proposed framework

The present study was designed to determine the process of PI to be implemented by intermediaries for supporting SMEs, which are indirectly involved in the process. In fact, it became clear that collecting, communicating and using the knowledge on technology intelligence can be challenging for SMEs as they often lack resources, time, skills, and personal characteristics (Makimattila and Salminen, 2012; Rinkinen and Makimattila, 2015). Although patents are considered as an ample tool for TI, their value is barely recognized by SMEs because of knowledge and skill incompetence (Schmoch, 1990; Ernst, 1997; Gredel et al., 2012). To overcome this limitation SMEs search for assistance from external actors, such as trade associations, chambers of commerce, innovation and technology centers, consultancies and Universities, on the whole labeled as intermediaries. SMEs can benefit from intermediaries in many ways as they offer a bundle of resource and competences to conduct TI and PI. In this paper we illustrated the process where intermediary – Assocomaplast in collaboration with LIUC provided services and knowledge on patent intelligence to raise the awareness of its member companies on technologies and players of their interest area. The action involvement was performed by following a TI model proposed by Kerr et al. (2006). This model is portrayed as an iterative cycle of six phases: coordinate, search, filter, analyze, document and disseminate with input of intelligence need from one end and output of intelligence information from the other end. However, during the process we detected that there are some activities in the model that do not correspond to our practical experience or not fully interpret/embrace it. We decided to revise and modify the model of Kerr et al. (2006) for intermediary use as the model originally was designed from the company point of view. Since Assocomaplast and LIUC represented a certain type of intermediary which worked in tandem to bring PI into beneficiary companies, we elaborated some activities for the cases when the intelligence process is operationalized and coordinated fully by intermediary, in other words

when PI is outsourced. As a matter of fact, we found a support from the literature presenting different types of intermediaries and various scenarios of intermediary interactions (Howells,2006; Mortara 2009; 2010; Katzy et al., 2013), but very limited investigations were conducted to describe the intermediary role in facilitating technology/patent intelligence to be delivered in companies. Thus, we eliminated some irrelevant activities and introduced complementary ones to the model of Kerr (2006) which eventually was sent for verification and feedback to another intermediary, Innovazione & Strategie. Consequently, after collecting suggestions from experts and introducing changes, a tentative model has emerged, that is generalized in Table 2.

Table 2. The revised Technology Intelligence process for intermediaries, (revised from Kerr et al. 2006).

Coordinate	Search	Filter	Analyze	Document	Disseminate
-Determining the (set of) companies that would benefit from the activities *-determining what information is needed* *-Planning of intelligence activities* ~~-Alerting the technology intelligence system to the new intelligence requirements (getting the system sensitive or switching on the radar to new signals)~~ *- Clarify search objectives, Identify critical areas to investigate* ~~-Refine the search goals with decision makers~~ **- Understanding the level of competences of the beneficiaries and coherently refine the TI goals** ~~-Allocating resources~~ **- Defining the TI budget, finding appropriate resources** ~~-Briefing agents and gatekeepers~~ **- Identifying and briefing key contact persons among the beneficiaries** ~~- If there are multiple searchers, assign individual tasks~~ **- Increase awareness inside the companies about the opportunity to monitor the technological environment by means of TI process**	~~- Finding sources of information~~ **- Selecting the sources of information, in coherence with the budget and resources available** *-Going to sources and acquiring information* *- Connecting to information* *- Searching the repositories* ~~- Mine, trawl, target and scan~~ **- Mine and/or trawl and/or target and/or monitor and/or scan, in coherence with the TI goals** *-Storing the information* *-Coordinating TI activity*	*-Determine if the information gathered thus far is pertinent* *-Determine if the information is useful or not* **-Foster feedback exchange about the TI results between companies and intermediary**	*- Analysis of the materials and sources to interpret their meaning in light of intelligence objectives or user needs* *-Interpret the information and relating its relevance to the organization's particular context and intelligence provision requirements.* *-Consider the relationship of information to search goals and its impact on business* **-Foster feedback exchange about the TI results between companies and intermediary**	**- Identifying the appropriate form(s) of reporting, in coherence with the level of competencies of the beneficiaries** *-Create the necessary reporting documentation,* ~~structuring the information content of the intelligence and embedding the new knowledge into the organizational memory~~. *-Information warehousing and knowledge management for accessing and retrieving.* *-Record the information and analysis* **- Allowing multiple ways for accessing reporting and the related data and information, in coherence with the multiple typologies of possible use**	**- Identify multiple forms for dissemination: newsletters, presentations, videos, searchable databases** *-Inform the* **beneficiaries** ~~intelligence consumers~~ *to the existence of new/updated intelligence and alerts.* *-Communicate the information to* **companies** ~~interested individuals~~ **- Supporting beneficiaries in the access and use of the TI results** **- Foster feedback exchange about the TI results between companies and intermediary** **- Facilitate multi-company discussion about technological trends in periodical wrap up events**

(***Activities in bold are introduced by the authors,** *activities in italic are kept from original model,* ~~activities in strikethrough are eliminated from original model~~)

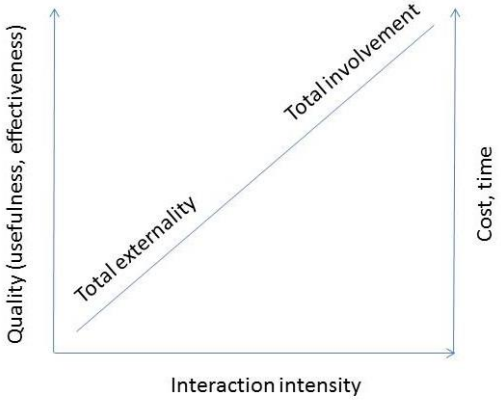
The most obvious finding to depict from the tentative model is that it manifests a holistic view of the TI process purposefully designed for intermediaries to satisfy intelligence need of the companies through six phases. The coordination phase comprises a set of activities directed to the determination of beneficiary company (ies), their information needs and critical areas to investigate. In this phase intermediaries also plan their intelligence activities by clarifying "what to search" and "how to search". Answers to these questions arise when the intermediaries become aware of the beneficiaries' needs and competences after what they can refine the intelligence goals coherently. This phase also encompasses definition of budget, appropriate resources and key contact person in beneficiary company. It is essential to note that, the coordination of TI activities in structural/hybrid/informal forms (Lichtenthaler, 2004) is not relevant anymore, as they are emanate from the organization's perspective. One more important point should be mentioned here is that intermediaries in this phase provide intelligence services not only for single companies, but also a set of beneficiaries organized for common goals and objectives. The coordination phase is followed by search phase which embraces the activities, such as selecting information sources in coherence with budget and resources, going to source and acquiring the information, storing the information. Unlike the intelligence process lead by companies, intermediaries do not need to find the sources of information, whereas they enter the process with competences, skills and knowledge developed in advance. It is enough for them to select appropriate sources of information derived from the beneficiaries' need and available budget.

The questions"what to search" and "how to search" are still actual and intermediaries have also to deal with the question: "where to search". In the next "filter" phase intermediaries verify appropriateness, relevance and usefulness of the gathered information. The negative answer compels the intermediary to make a step back and collect the data again. The problem in the filtering phase is that it is difficult to filter without a feedback by the beneficiaries. The filter phase is followed by "Analyze". In this phase intermediaries interpret collected data in line with intelligence goals and company needs, as well as define if the information is still relevant with intelligence requirements and organization's particular context. In the document phase intermediaries are advised to determine suitable form (mean) of reporting relying on the beneficiaries' competence and expertise. Creation of appropriate form of documentation, warehousing and multiple ways for accessing to related information entitles intermediaries to map and sort the information before

dissemination. Accordingly, in the dissemination phase intermediaries select the modes and means of communication again in congruence with beneficiary competences. Knowing beneficiary competences becomes more crucial and sometimes challenging when the intermediary disseminates the intelligence information to a set of companies. The forms of dissemination depend on the budget as well. Intermediaries inform companies about the existence of new or updated intelligence alerts time by time and support them in the access and use of technology intelligence results.

Another interesting finding that emerged from this tentative model is that effectiveness of the intermediary services in provision knowledge on technology intelligence is largely dependent on the interaction between intermediary and beneficiary. As Major et al. (2001) discussed, the companies with the most heterogeneous intermediary interactions were found to have high foresight knowledge comparing to companies with homogeneous intermediary interactions. Major and Cordey-Hayes (2000) distinguished three types of SMEs with respect to the managerial culture: uninvolved (reactive), open (responsive) and involved (strategic). They pointed out that "moving from uninvolved, through open, to involved attitudes, SMEs exhibit higher Foresight knowledge and more heterogeneous intermediary use". However, both of these studies referred to the "interaction" in terms of number of contacts that SMEs make with intermediaries, but not in terms of SMEs' direct involvement in the foresight process. In our action study with Assocomaplast we observed low interaction of companies with intermediary (Assocomaplast) and collaborator (LIUC). Despite this fact, Assocomaplast interacted with LIUC on behalf of its associated companies mainly in coordinate, search, document and disseminate phases. Therefore, we argue that intermediaries should engage companies in the intelligence process and companies should also initiate interaction with intermediaries as higher intensity of interaction leads to higher quality and effectiveness of the intelligence results. Figure 1 below better explains this statement:

Figure 1. Interaction framework



Thus, interaction between intermediary and beneficiary is important for both sides: it enables companies to understand the ongoing process and absorb the intelligence knowledge easier and faster. Intermediaries may benefit from this involvement to grasp organization's foresight culture and tailor their skills and competences according to it. Indeed, the second research question of this paper is sought to investigate resources and competences of intermediaries required to implement the TI process in companies. As it happened in our action study, Assocomaplast and LIUC matched their competences at the initial phase of the collaboration. Obviously, both of the sides had some skills and expertise on specific areas of TI/PI in advance. For instance, Assocomaplast had understanding about beneficiaries, competitive and technological context. LIUC possessed both theoretical and empirical knowledge on TI and PI processes, patent intelligence tools and methods. During the action research it became evident that besides intermediaries are required to have general physical and managerial capabilities (Janssens et al., 2014) they are also obliged to possess specific competences to be successful in each single phase. These competences are summarized in Table 3. In particular, general understanding about PI process, tools, and sources came out as versatile competences that are required in all phases. Intermediaries plan their activities based on available budget and sources. In coordination phase intermediaries are advised to have knowledge about beneficiaries, their needs, competitors, technology areas of their interest, culture and language of the beneficiary companies. In the search phase ability to identify relevant tools and methods of patent search is crucial for intermediaries. It is not possible to filter and analyze intelligence information without having profound knowledge on technology context. Intermediaries also need managerial and organizational competences in filter and analyze phases in order to engage the beneficiaries and interact with them effectively and efficiently. Creating appropriate ways and sources of gathered intelligence information derives from the correct perception of beneficiary culture and language in documenting phase. Dissemination phase compels intermediaries to develop communication and networking skills as these competences are usually recognized to be the most critical skills in PI process. Mortara (2015) pointed out barriers to effective TI communication in companies specifying issues such as cognitive distance, anchoring and adjustment, intelligence distortion in information recipients and lack of kudos, repercussions for the managers in information messenger. The question if all of these barriers are also observed between intermediary and beneficiary should be further investigated. However, we argue that each phase of the revised model should encompass intermediary-beneficiary interaction through effective communication and networking skills.

Table 3. Competences and resources required by intermediaries in PI process

Competences and resources needed by intermediaries in the PI process					
Coordinate	**Search**	**Filter**	**Analyze**	**Document**	**Disseminate**
-Knowledge about the beneficiaries / users: competitive context, technological context, culture, language… -Understanding of the proper time horizon -Ability of effectively and efficiently interact with the beneficiaries / users -Communication skills (in order to interact ..)	-Knowledge about the tools and methods of patent search	-Deep understanding of the technological context -Managerial and organizational skills for interacting directly or indirectly with the beneficiaries -Ability of effectively and efficiently interact with the beneficiaries / users -Communication skills (in order to interact ..)		-Knowledge about the beneficiaries / users: culture, language…	-Communication skills Networking… -Ability of effectively and efficiently interact with the beneficiaries / users -Communication skills (in order to interact ..)
-Knowledge about the PI process; knowledge about patent intelligence tools….; availability of sources; budget					

We also believe that, high levels of interaction can be expensive and time consuming for companies as shown in Figure 1 above. Therefore, the framework for competence and resources suggests presence of effective and efficient interaction at least in phases coordinate, filter and analyze and document.

The main aim of this study was to investigate intermediary effort and role in tailoring PI to be implemented in companies that are in need of such kind of knowledge. We presented step by step process of PI conducted by intermediaries in the example of action study that has both theoretical and managerial values. In fact, the results of this study provide both for practitioners and researchers some interesting standpoints. For Intermediaries, the paper may serve as a guideline for organizing intermediary activities in technology and patent intelligence with companies and delivering services in collaboration with other entities, such as Universities. For managers it brings insights about how to implement PI in collaboration with other companies through intermediary assistance when the resource and competences are limited. Particularly, the study provides some useful insights for SMEs bearing in mind their context and capabilities. For researchers, the study contributes with knowledge about the role and expertise of intermediaries in promoting the culture of TI and especially the practice of PI.

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