Technology acquisition: sourcing technology from industry partners

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Acquiring technology by collaboration brings advantages in relation to pure internal development or purchase from external developers. Industry partners may provide support to identify and select the right technologies, to estimate development costs and to deploy new technologies amongst other advantages.

However, involving an industry partner in the technology acquisition process can be risky, particularly when firms work with a particular partner for the first time or possess limited prior experience in technology alliances.

Involving industry partners adds complexity to decision-making and development activities in technology acquisition projects. For example, the firm and its partner should agree on how costs and benefits of the outcomes will be shared; cultural differences might reduce the quality of coordination and communication; and the acquisition project may not be considered successful if the outcomes are not deployed. Therefore, managing technology acquisition by collaboration is not an easy task, in particular when the key activities and factors that affect the outcomes are not clear.

Although scholars have described how firms acquire technology and have identified the factors that affect the performance of technology collaborations, there is no comprehensive framework indicating how the technology acquisition process changes when an industry partner is involved and the particular factors that affect this process until now.

Recent research provided insights regarding the conditions that influence the acquisition of technology through collaboration by identifying and describing the relationship between key activities and influential factors

The case method was the main research approach. Candidate cases were technology driven collaborative projects, where the primary motive to collaborate of one of the partners was to acquire new technology.

CASE STUDY

Kaza Oil, a subsidiary of a large chemical company, was engaged in an R&D programme aimed at developing new solutions that may increase the safety and integrity of gas pipelines. At that time, the latest progress on fibre optic seemed to enable this technology for a new range of applications in industry.

Kaza Oil asked Erwin Optoelectronics, a firm specialised in fibre optic sensing technologies, to carry out a state of the art and technical feasibility study to use fibre optics to monitoring the integrity of gas pipelines. The results of the study pointed out that additional research work was needed to determine the technical and economic feasibility of the technology.

Kaza and Erwin pushed the formation of a consortium to develop new technical knowledge on this technology. After some months, the consortium provided such positive results that both firms became interested in developing technology concepts.

The concepts they developed worked so well that both companies signed a joint development agreement to develop products based on this technology for gas pipelines integrity surveillance. Erwin was in charge of laboratory tests and product development while Kaza provided the infrastructure to execute field trials and the operative specifications of the products.

Both companies jointly own all the intellectual property rights emerged from the partnership; however, Erwin is in charge of the commercialisation of the resulting products and services. Kaza, on the other hand, has a substantial discount on the public prices of the family of products and services based on this technology.

The research was carried out in four stages: practice review, framework development, refinement and verification. The first stage aimed to inform the research design by validating the relevance of the topic from the practitioners' perspective. The second stage aimed to explore the technology acquisition process by identifying key activities and influential factors. The following stage aimed at identifying and describing the relationship between factors and activities throughout a new set of case studies. Finally, the objectives of the last stage were to verify the terminology utilized in the resulting framework and to explore further practical implications of the research outcomes.

RESULTS

As a result of the analysis of 11 case studies, an integrated framework that describes technology acquisition by collaboration was built. The framework offers a comprehensive account of key activities and influential factors.

The case studies suggest that there are three conditions to achieve effective acquisition of technology by collaboration.

1. *Effective partnership management*. A stable partnership is required to keep the participating firms committed to the project.
2. *Effective execution of the co-development project*. The quality and performance of the outcomes greatly depend on the availability of appropriate technical resources and coordination between the technical teams.
3. *Effective transference of the collaboration outcome to the recipient system*. If the outcome of the project is not transferred to the value chain of the acquiring firm, the chances to obtain a return on the investment are severely reduced.

Figure 1 shows the link between the influential factors and key activities in technology acquisition projects. The upper part of the figure shows the business and acquisition related activities and the domains of impact of different categories of factors. The lower part lists influential factors covered in each category.

IMPLICATIONS FOR PRACTICE

The resulting framework provides a wide perspective on the factors that affect technology acquisition projects that involve industry partners. The framework indicates three key tasks that need to be effectively managed in order to achieve success. The development of a practical guidance to manage each of these three tasks was out of the scope of this research, however existing tools and literature can provide useful guidelines.

Partnership management is one key task in technology acquisition by collaboration. Firms may increase their ability to manage partnerships by implementing systematic procedures to manage collaborative business relationships. A useful guide is the British Standard 11000, which provides a systematic approach to manage collaborative relationships. The aim of this standard is to provide a strategic framework to establish and improve collaborative relationships in organizations of all sizes. It addresses the processes that need to be incorporated into collaborative relationships to ensure that they are effective and optimized. This standard includes eight processes that reflect the overall lifecycle of a collaborative relationship: awareness, knowledge, internal assessment, partner selection, working together, value creation, staying together and exit strategy.

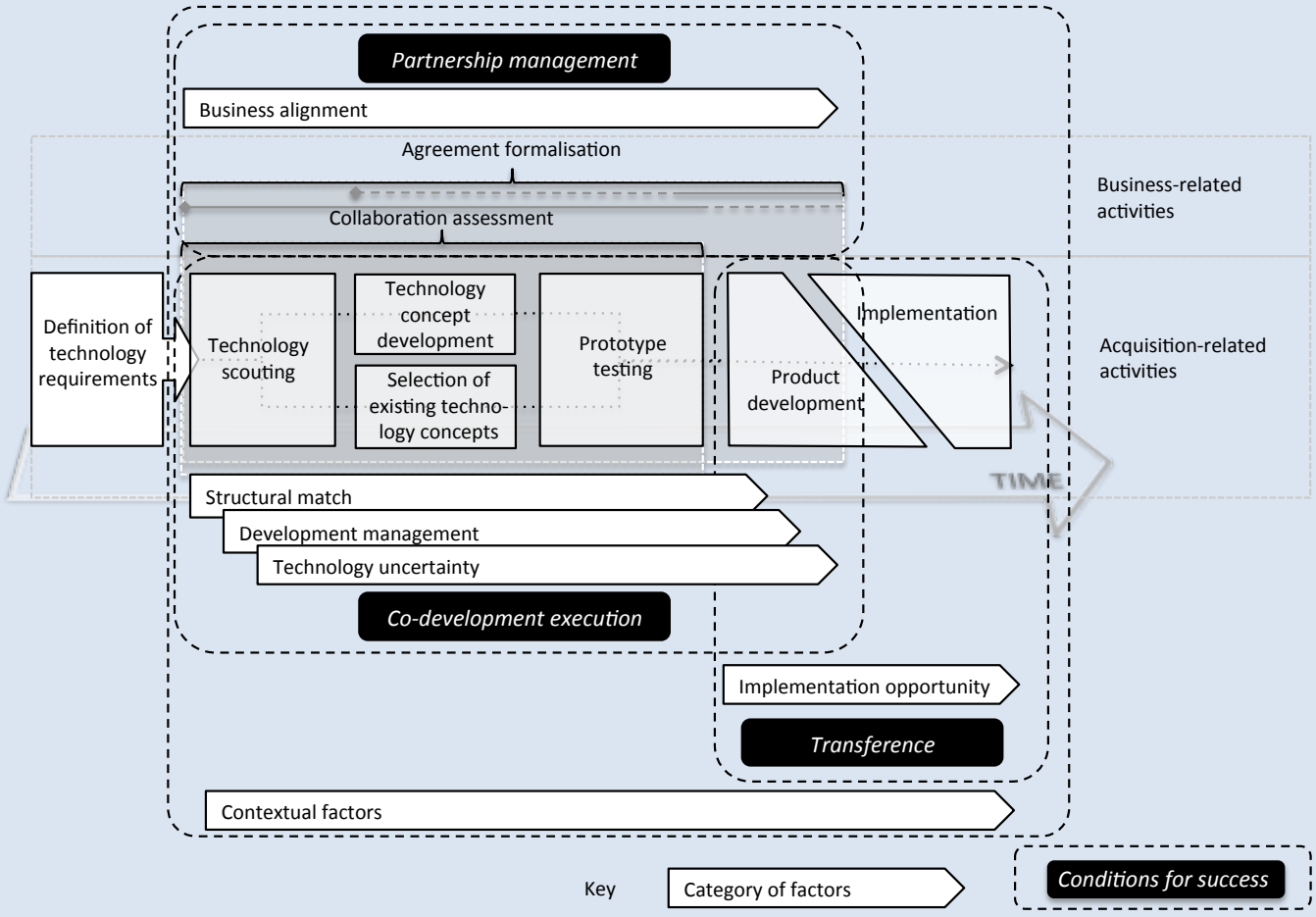
A second key task is managing the co-development project. Firms may increase their ability to perform co-development projects by implementing systematic procedures to develop new products. International organizations such as the Product Development Management Association (PDMA) and the Project Management Institute (PMI) have produced a number of guidelines to systematically manage new product development projects. In addition, many books provide generic frameworks to manage new product developments.

Finally, a third key task is transferring the technology to the recipient system. In contrast to the other two key aspects, technology transfer seems to be a process that cannot be easily systematized. This is because the recipient system may not be an internal area of the acquiring firm. The technology could be deployed into an external firm, which would offer services or products based on the technology and give preferential prices to the acquiring firm. The external firm can be either a newly established firm or the technology supplier. Thus, achieving success in technology transfer seems to be context dependent and the required skills to manage the process usually are developed by means of practice. Typical problems and barriers in technology transfer are described in technology management literature[1].

These three tasks seem to be critical to success in technology acquisition projects. Effective partnership management becomes particularly critical when an industry partner is involved.

[1] See for instance Cetindamar, Probert and Phaal (2010), Technology Management: activities and tools, Palgrave McMillan, Hampshire, UK.

KEY ACTIVITIES



INFLUENTIAL FACTORS

Business alignment

- Partners' motivations compatibility
- Contract issues
- Agreement on risks and rewards
- Vision alignment
- Management of emerging IPR
- Trust

Structural match

- Expertise complementarity
- Access to relevant equipment and infrastructure
- Access to IP exploitation rights
- Partners' organisational stability
- Funding

Development management

- Communication
- Ease of decision-making
- Product development management practices
- Project scope definition
- Enthusiasm of the dev. team
- Involvement of the project manager

Technology uncertainty

- Partners' familiarity with the technology
- Product novelty
- Ease of scaling up
- Technology performance
- Technology maturity

Implementation opportunity

- Performance of the project
- Project champion
- Project relevance
- Implementation plan
- Participation of the end user
- Product familiarity

Contextual factors

- Partners' affinity
- Project's characteristics
- Previous relationship
- Partners' characteristics
- Market and industry uncertainty

Figure 1 Key activities and influential factors in technology acquisition by collaboration.

In addition, the results provide insights on particular issues such as how to select the right technology, how to align partners' businesses interests and how to identify and select technology partners.

Technology selection. The results do not provide a straightforward guide to select the right technology, but do gives some valuable insights. For example, if the firm decides to develop a new product from scratch and it is not familiar with the required technologies, the firm may hire a third party (e.g. an independent R&D centre or a consultancy firm) to identify and select the technologies that can be incorporated into the product. In this case, it is important to evaluate the technical skills and expertise of the third party, which may become a key agent to get access to the technology later in the acquisition process.

On the other hand, if the firm decides to acquire an externally developed technology concept, the technology selection process should not be driven only by the performance of the technology for the intended application. In this case there are three critical issues: 1) having a clear definition of the application and expected performance of the technology concept, 2) performing preliminary tests to verify whether the technology concept could produce the expected outcomes, and 3) evaluating whether the technology supplier is capable of providing the required support to integrate the technology into the final product or process.

Business alignment between partners. The results indicate that motivation compatibility and trust seem to be key factors for setting up a collaborative agreement and maintaining a stable relationship. They also suggest that estimating the likelihood of reaching business alignment with a technology supplier is as important as evaluating the performance of the technology before formalizing a co-development agreement. The framework denotes that the acquiring firm should evaluate from the start whether the technology supplier is willing to collaborate in further stages of the project and whether their business interests and culture are compatible. Performing these evaluations as early as possible in the acquisition project may reduce the risk of joining a collaborative venture that would not provide the expected outcomes. The assessment of business alignment between potential partners seems to be particularly important when firms collaborate for the first time.

Partner selection. Partner selection has been pointed out as a critical and problematic step in technology collaborations. The final framework does not provide a direct guide for selecting a partner, but it offers some relevant insights.

For instance, the framework indicates that companies looking for technology suppliers may have different evaluation and selection criteria. On the one hand, if the acquiring firm participates in the development of the technology concept, then criteria related to the quality of technical resources of the supplier and ease of work coordination between the development teams could be extremely important in the selection process. On the other hand, if the firm is acquiring an externally developed technology concept, then criteria related to supplier willingness to collaborate in the project and functional performance of the technology concept could be more important than other aspects.

If you have any comment or question regarding this research please contact Victor Ortiz (vgo20@cam.ac.uk). In addition, if interested in executive courses on technology acquisition please contact David Probert (drp1001@cam.ac.uk), Head of The Centre for Technology Management.

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