Systematic Literature Review in Management and Business Studies: A Case Study on University–Industry Collaboration

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Systematic Literature Review in Management and Business Studies: A Case Study on University–Industry Collaboration

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Abstract

Although it first appeared in the medical sciences, the systematic literature review has become an established methodology in reviewing the accumulated knowledge in different fields. It is useful for scrutinizing and synthesizing a large volume of research on a specific topic or phenomenon, seeking to generate new insights from integrating empirical evidence, identifying knowledge gaps and inconsistencies, and setting directions for future research. Accordingly, in this case study, we aim to illustrate the steps for developing a rigorous systematic review in business and management research. Specifically, we reflect on our experience in systematically reviewing the research produced on University–Industry Collaboration phenomenon. We show examples of the different steps, stages, and activities involved in this approach, and discuss the various decisions we made throughout our research journey. Moreover, we provide learned lessons, highlight caveats, and offer suggestions and guidance for enhancing the rigor of future systematic literature review research.

Learning Outcomes

By the end of this case, students should be able to

- Realize the value of adopting a systematic approach in reviewing the literature on business and management studies
- Identify the key steps and activities to conduct a systematic literature review
- Understand the systematic review process
- Appreciate a number of issues that can affect the quality and reliability of the systematic review outcomes

Project Overview and Context

The present case study illustrates how the systematic review approach can be used, as a rigorous methodology, to scrutinize and synthesize the literature pertaining to the university–industry collaboration (UIC) phenomenon. In the last few decades, the importance of technology to promote economic growth and to enhance firms' competitiveness in the globalized market has been clearly recognized. This orientation has driven firms constantly toward building knowledge stock and capabilities through three fundamental options: develop the technology independently in-house (i.e., organic development), obtain ready-made technology through acquisition, or engage into inter-organizational collaboration. However, the current competitive environment has made it increasingly difficult for organizations to advance their knowledge and technology by relying exclusively on in-house or readymade initiatives (the former demands extensive time to materialize, while the latter brings serious execution challenges due to difficulties of integration). At the same time,

technological development is becoming increasingly interdependent and complex, requiring firms to cross their boundaries and find collaboration partners for complementary and risk sharing purposes.

Therefore, inter-organizational relationships received a momentum, where UIC for technology transfer has become a prevailing example. Furthermore, the pressure on both universities (e.g., shortage of research funding, increased concern by governments toward the relevance of the abstract nature of knowledge produced by universities) and industry (e.g., rising of R&D cost, the increased demand for radical innovation and for companies to become more socially responsible) have made these relationships even more popular in recent years. The quantitative and qualitative expansion of UICs has attracted the attention of numerous researchers to examine this relationship from different perspectives which led to the development of a substantial body of literature. However, this literature has been perceived as fragmented and overlapped in many aspects, which would limit our potential to fully realizing the true nature of UIC as an organizational structure. As such, developing a comprehensive understanding of how the different variables of these collaborations are related can ultimately advance their success in enhancing innovation and economic competitiveness.

Accordingly, we conducted a systematic literature review to analyze all the research outputs produced during the period 1990–2014 that have focused on studying UIC. Specifically, we aimed to contribute to a greater understanding of UIC for technology transfer by examining the inputs, process, and outcomes of these relationships as addressed in the literature.

We conducted this review as part of a bigger study that sought to examine the process and outcomes of technology translation by collaborations between universities and industry in the Faraday Partnership Initiatives; a UK-based government-backed novel scheme for driving the interaction between university and industry sectors to enhance innovation and thereby advance the UK economic competitiveness.

Throughout this case study, we will outline the step-by-step approach taken in the systematic review, as well as considerations and processes that postgraduate students, early career researchers, or researchers new to systematic reviewing can employ in completing their own systematic reviews, or advancing their current review approaches.

Research Design

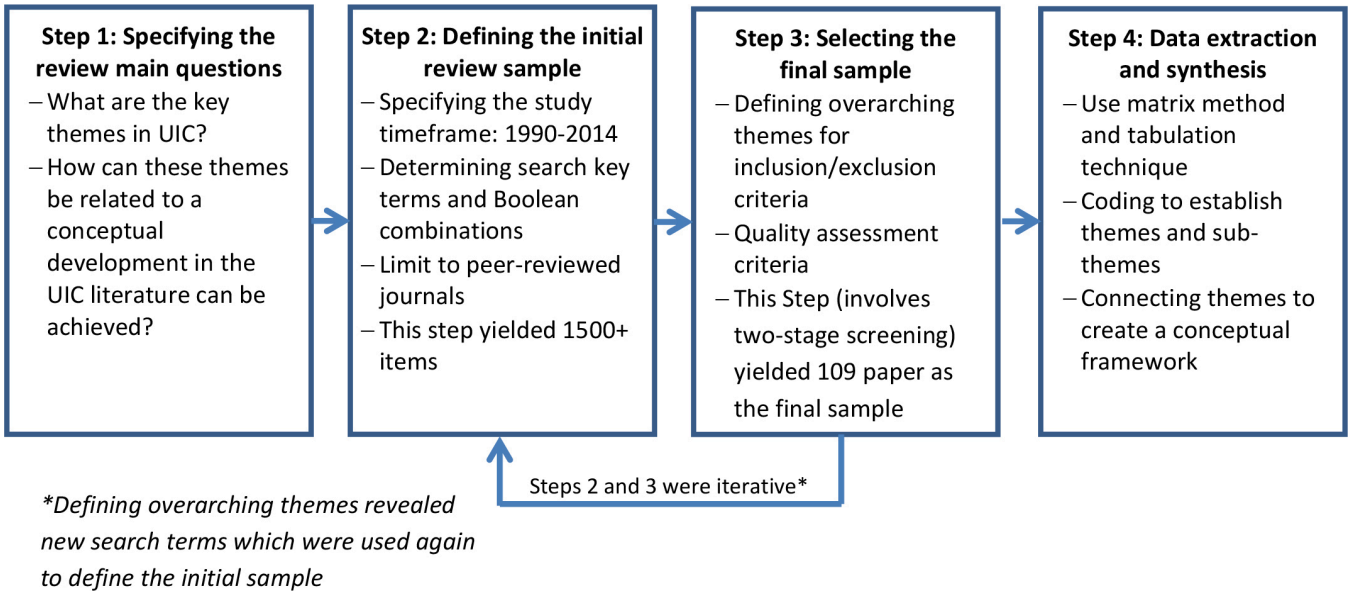
Systematic reviews refer to studies that seek to answer a clear question or questions by finding, describing, and evaluating all published, and if possible, unpublished research on a topic. Systematic reviews are different from the traditional literature reviews, often referred to as narrative reviews (see Davies, 2000), in the sense that in traditional reviews there is often no attempt to seek generalization or cumulative knowledge from what is reviewed. Rather the task is typically to identify the range and diversity of the available literature, much of which will be inconclusive, and to find a gap which new research might fill. In fact, such reviews have been described as opportunistic, selective, haphazard, and lacking rigor due to the non-exhaustive search

process for all relevant literature. In contrast, systematic reviews suggest best evidence synthesis whereby reviewers apply consistent clearly stated prior inclusion criteria for studies to be reviewed. The systematic literature review approach was first pioneered in medical research, but now this approach is widely applied in science and social science domains alike (Ankrah and Al-Tabbaa, 2015).

The Review Process

As our review process, we followed four key steps as outlined in Figure 1.

Figure 1. The process of the systematic review.



Source: Adapted from Tranfield et al. (2003)

Step 1: Specifying the Review Main Questions

We started the review by trying to identify our main question. UIC referred to the interaction between all parts of the higher education system and Industry (Al-Tabbaa & Ankrah, 2018). So far, the extant literature on UIC has provided various insights on the antecedents, micro-processes, moderators, and outcome of these relationships in different settings. However, the literature proved fragmented and lacked a comprehensive view. Therefore, we sought to address this gap and set the main question of this review as: What are the key themes in UIC, and how these themes may be related to a conceptual development in understanding UIC literature can be achieved?

Step 2: Defining the Initial Review Sample

We started this step by defining the timeframe of our study. We opted to limit our range to literature produced from 1990 to 2014. Research prior to 1990 was excluded because the collaboration between universities and industry is perceived as less important before that date (Howells & Nedeva, 2003). Moreover, the UIC is still an evolving phenomenon, therefore the risk of omitting earlier major contributions will be mitigated by recent

papers that capture and build upon the findings of earlier ones.

Next, we needed to establish the searching terms and combinations. First, we identified three overarching terms to act as umbrella terms namely University, Industry, and Collaboration. Second, we identified various keywords that can be used to describe any of the umbral terms. For example, for "collaboration," we identified the following keywords: "inter-organizational relationship"; "interaction"; "alliance"; "cooperation"; and "partnership." Finally, we used the Boolean operators "odds ratio (OR)" and "AND" to combine the various keywords and establish our combinations of searching terms that include the following:

> "university" OR "academia" OR "higher educational institution" AND;
> "business" OR "industry" OR "firm" AND;
> "alliance"; OR "bridge"; OR "collaboration"; OR "cooperation"; OR "inter-organizational relationship"; OR "interaction"; OR "link"; OR "partnership"; OR "research and development"; OR "technology transfer"; OR "knowledge transfer"; OR "scheme".

For example, one combination was "university"AND "business"AND "alliance."

After defining the *combinations of searching terms*, we sought to identify literature databases (that store and archive the literature as publication items). We only included electronic databases (to ensure access). We also limit ourselves to peer-reviewed journal articles published in electronic databases. This decision was made to ensure that all studies included have been subject to validation process (i.e., through the double-blind review process). Moreover, most cutting-edge research is likely to appear first in peer-reviewed journals. In total, seven electronic databases were used, including: ABI Global, Applied Social Sciences Index and Abstracts, Elsevier (Science Direct), International Bibliography of the Social Sciences, Ingenta, NetEc, and Social Science Citation Index (Web of Science). These particular databases have been selected because they provide a wide coverage of the literature in the area under study. They also involve almost all Business and Management journals that typically publish high-quality research on university–industry collaboration. Using the search engine of these databases, we systematically applied all the combinations of searching terms listed earlier (that were made by combining the keywords with the Boolean operators). This search produced an initial sample of 1500^{+} potentially relevant items (i.e., journal article).

Step 3: Selecting the Final Sample

At this step, we read the title and abstracts (and the introduction in a few cases) of each article in the initial sample to identify its main objectives and contributions.[1] We categorized these objectives and contributions into a number of themes. After iterative discussions, we defined five overarching themes as dominating aspects of UIC. These include the following: forms, motivations, formation and operationalization, enablers and inhibitors, and outcomes. We used these themes to set out inclusion/exclusion criteria. Specifically, we set six questions which we used to include studies in the final sample:

1. Does the study address the collaboration between Universities and Industry for technology

exchange as a main inquiry?
2. Does the study address UIC motivations?
3. Does the study examine UIC forms?
4. Does the study provide information on the formation and operationalization of UIC?
5. Does the study include factors that facilitate or inhibit UIC?
6. Does the study mention the outcomes (benefits or drawbacks) of UIC?

A study was included in the final review if the answer to Question 1 and any one of the following questions (2, 3, 4, 5, or 6) was "yes." This screening process resulted in 327 articles.

In addition to the screening above, we did a quality assessment following Farrington's methodological quality scale (Farrington, 2003),which comprises four criteria to assess the methodological quality of a study, as illustrated in Table 1. However, we were mindful of the differences between quantitative and qualitative studies when considering the quality criteria, see Table 1 for examples. We examined each study (of the 327 articles) against these criteria, whereby each paper was classified as "Quality Acceptable" if it fulfills the criteria in Table 1; otherwise, it is classified as "Quality Unacceptable." Only studies tagged as "Quality Acceptable" were included in the review. Eventually, our final sample comprised of 109 articles which we used to perform the analysis.

Table 1. Quality assessment: Criteria and examples.[a]

Criteria	Description of the criteria	Examples of how a criterion was checked:	
		In a qualitative study	**In a quantitative study**
Descriptive validity	The factual accuracy of the account as reported by the researchers (i.e., the extent to which the gathered information are accurate and objective)	*Did the authors record and transcribe the statements accurately?* *Did the authors explain how data was collected and reported?*	Not applicable
Statistical conclusion validity	Whether the presumed cause and the presumed effect are related	Not applicable	*Does the paper use the right statistical tests? Does the paper involve adequate sample size that*

			represents the population?
Construct validity	For qualitative studies: Examines the objectivity of the researcher (i.e., the findings are derived from the data itself and not influenced by the researcher's assumptions or beliefs) For quantitative studies: Refers to the adequacy of the operational definitions, and measurements of theoretical constructs.	*Did the researchers use data triangulation (i.e., use of multiple sources of evidence)?*	*Does the paper provide a detailed description of the scales used in data collection?*
External validity/ transferability	For qualitative studies: The extent to which the results obtained from the study can be generalized beyond the setting of this study. For quantitative: The extent to which the results obtained from the sample can be generalized to the population it was drawn from.	*Does the study compare and contrast multiple case studies to enable theoretical generalizability?* *Does the study provide "thick description" of the research setting?*	*Was the sample randomly selected? if not, what measures were taken to reduce selection bias?*

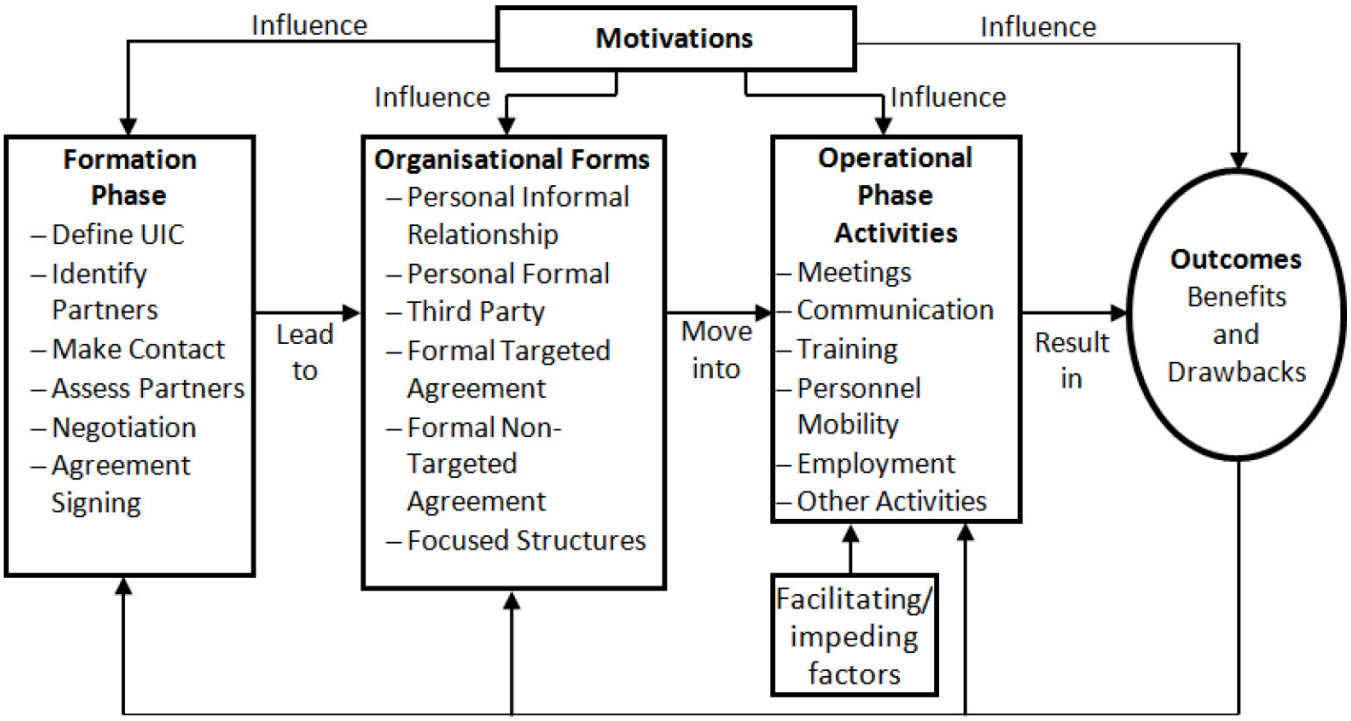
[a] See Al-Tabbaa and Ankrah (2016, 2018) for more examples

Step 4: Data Extraction and Synthesis

Once we defined our final sample (i.e., the 109 papers), we started the analysis process. Using the Excel spreadsheet, we applied the matrix method and tabulation techniques on the full texts of the final selected articles, which are widely used in qualitative data analysis (see Miles & Huberman, 2008). We started the coding by reading through each paper, word-by-word, to detect parts in the text and attach them to any of the primary themes identified earlier in Step 3 (forms, motivations, formation and operationalization, enablers and inhibitors, and outcomes). The next task was to review the content of each theme, which has been produced as a separate (or a summary) document for each of the key themes. Then, we moved to the second and third levels of coding by clustering relevant chunks of information together under specific titles, which later constituted the sub-themes under each of the primary themes. We used these themes and sub-themes and the relations between them, as revealed by the analysis, to build our conceptual model that captures the

complexity of UIC and explicates its nature and dynamic. For instance, through our analysis of UIC forms, we realized that each organizational form of UIC would demand certain types of activities, thus we connected these two themes together. Figure 2 illustrates how all the themes identified in our study were connected to establish a conceptual framework for UIC.

Figure 2. Conceptual process framework for UIC: An integrative view Adopted from Ankrah and Al-Tabbaa (2015).



Research Practicalities

Despite the comprehensive nature and transparent process of systematic review (Dorn, Schweiger, & Albers, 2016; Voorberg, Bekkers, & Tummers, 2015), in comparison to traditional narrative review methods, it has some limitations. The first issue relates to the study's boundaries. The current research reports and discusses articles that have been included in academic journals during the period 1990 and 2014. This indicates the potential of some relevant studies (e.g., books, book chapters, conference papers) to be excluded from the review. Nonetheless, this is an acceptable practice in systematic review (Pittaway & Cope, 2007), as all important contributions in a given research field would usually appear continuously in subsequent journal papers. The second limitation concerns the selection of keywords which were applied to control the inclusion criteria of the papers. However, to mitigate the consequences of this issue, a careful approach has been followed in the inspection process that incorporates three levels: title, abstract, and full text. Importantly, this would ensure that all relevant studies have been consulted adequately.

Practical Lessons Learned

"For the things we have to learn before we can do them, we learn by doing them" (Aristotle)

In this section, we reflect upon our experience in doing the systematic review study. While we spent a considerable time planning and preparing before embarking on the study, we learned a lot from this experience, and also from our mistakes, which we summarize in a form of tips and best practices as follows.

1. Learn how to do qualitative analysis.

Typically, the type of data collected and processed in any systematic review research comprises texts in different formats (journal articles, books, blogs, reports, etc.). This demands qualitative analysis to scrutinize and synthesizing the literature in order to extract new insights. Therefore, the review team, or at least part of it, should be familiar with some of the techniques used in the qualitative analysis, such as thematic analysis, content analysis, discourse analysis, template analysis, and formwork analysis. While each one of these techniques has advantages and disadvantages, the decision to use a particular technique depends on the experience of the researchers involved (e.g., discourse analysis is more advanced in comparison to content analysis), and the nature of the literature under examination (e.g., template analysis technique can only be used if the themes can be deductively defined prior to the analysis). For those who are new to qualitative analysis techniques, we recommend Miles and Huberman (2008) as a starting point.

2. Follow a systematic approach, but do not be rigid.

It is notable these days that the amount of research produced on any topic is massive, even after applying any screening criteria (e.g., timeframe, quality, and relevance). This means that the review team will be collecting and managing a large amount of data and text. Therefore, the team must be systematic in every step (as explained in the four steps outlined previously), whereby all decisions made during the course of study should be reported in detail which is necessary to enhance the transparency of the review. However, this systematic approach (or the review protocol) should be revised and updated regularly so that the team can refine and improve their approach when new issues emerge during the course of the study. For instance, we did not adopt a linear approach in doing our review (as illustrated in Figure 1), rather the relationship between Activity 2 (defining the initial review sample) and Activity 3 (selecting the final sample) was iterative in nature because we wanted to ensure that all key search terms used in UIC literature were captured. As such, when we started Activity 2, the word "scheme" was not considered as a key search term; after moving to activity 3, we realized that some studies were using this term when referencing to the UIC; thus, we returned back and repeated Activity 2 after developing a new search string to ensure that we are not omitting any relevant article in the final sample.

3. Justify the choice of the review time boundaries.

The timeframe is a fundamental element in the dichotomous (yes/no) decision to whether each potentially relevant paper will be included or, alternatively rejected. However, a common criticism of systematic review research is the failure to provide a plausible justification for the selected time boundaries, in particular: where

to start from (typically we are less concerned with the closing point as reviewers ideally select the same year of the study). While there are no specific rules for determining the cutting point for the review starting point, there are a number of suggestions that can be considered. First, you can choose the year of which the first relevant publication to the review topic emerged. Second, you may start from where others have finished (e.g., select the starting point as one year after the latest systematic review on the same topic of interest was published). Finally, you can select a year that marks a transformational change in the literature. For instance, a review team can decide to start from the date of publishing a paper/book that became a seminal work in the sense that it has driven the field into a new direction (e.g., Teece's, 2007) work on dynamic capabilities.

4. Focus on academic journals rather than everything.

When we started the review, we initially sought to include all types of publications on UIC to maximize the comprehensiveness of our study. However, we quickly realized two issues (actually difficulties) in pursuing this ambitious aim. First, by widening our search scope, the screening process yielded thousands of publications, which was very challenging for the team to scrutinize within the project time plan. Second, we could not get access to all publications identified in the initial sample (e.g., unpublished manuscripts, books that are not available in national libraries and conference proceedings with restricted online access). Accordingly, we adapted our criterion to involve only peer-reviewed academic journals that are available online. Despite the risk of this decision (i.e., the chance of omitting important non-article sources), we think that this risk is mitigated by the fact that academics and researchers are more likely to publish their cutting-edge research in peer-reviewed journals first. On the other hand, considering articles published only in peer-reviewed journals can enhance the validity of the review as all these articles have been subject to necessary rigorous process prior to publication, thus reducing the risk of contaminating our final conclusion by invalid findings.

5. Avoid chaotic review practices

As we were processing a large number of documents, we found the below practices/routines to significantly improve the efficiency of the review process.

- Document insufficient details all the steps and micro-steps followed in the review process (do not rely on memory!). This will be useful when updating the review protocol and also when writing the review methodology section for publication purpose.
- Use a reference management software package (e.g., Endnote, Mendeley, RefWorks) to manage electronically all of your bibliographies and references. Otherwise, creating a references list will become a painstaking job.
- Pay careful attention to cite correctly all referencing quotes and figures as taken from the paper, otherwise, you will end up with a complete chaos when writing the review report (i.e., not sure who said what!).
- Create a systematic order to store and archive electronic version or hard copies of the papers. By doing so, finding the full text of any item will be done in seconds.

Conclusion

Systematic literature review becomes popular in business and management studies. It demands significant planning, learning, coordinating, and organizing given the volume of documents and texts involved. However, the aim of doing a systematic review should not be limited to the collection and integration of empirical evidence. Rather, the reviewer(s) should seek to make a theoretical contribution by synthesizing the different aspects of the literature (e.g., as in Figure 2), identify important gaps and limitations in the extant knowledge, and provide suggestions for new research directions. In short, when developing a systematic review, the researcher first acts as a detective who seeks to find evidence, and then he becomes a lawyer who builds and argues the case.

Note

1 At this step, we were alert to new keywords that we discovered while scanning the papers but were not initially captured in Step 2. After finding a number of new keywords, we repeated Step 2 which provided few additional papers to consider in Step 3.

Exercises and Discussion Questions

1. Think about a phenomenon in the business and management field. To what extent do you think that the systematic review approach can add new insights to that field, and why?
2. The case identifies a number of key activities and steps for doing a systematic review; do you think that all these activities and steps are necessary for any topic/field? Or they can be setting-dependent?
3. Can you think of a situation that doing a systematic literature review approach can be unnecessary/inappropriate?
4. As discussed in the case, the review team should follow a systematic approach, but they should not be rigid. Why?
5. In the case, “learning how to do qualitative analysis” is listed as one of the key recommendations. Do you agree/disagree? Justify your answer.
6. As discussed in the case, qualitative and quantitative studies have different quality criteria, but how findings from both types of studies can be integrated in systematic review?

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