



Creating New Knowledge while Solving a Relevant Practical Problem: Success Factors for an Action Research-Based PhD Thesis in Business and Management

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Accepted: 22 December 2022
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Abstract

This paper focuses on university–firm relationships in terms of individual interactions between researchers and practitioners. More specifically, we focus on *an analysis of the main factors that influence the use of the action research (AR) to achieve a successful doctoral thesis*. In order to achieve this, we developed a Delphi study with 15 panelists whose common characteristic is that they defended or supervised an AR-based thesis in the field of business and management. The primary contribution of the research is the development of a reference framework that should be considered in the design of a doctoral thesis for which an AR methodology is put into practice. Four dimensions were defined: profiles of both the PhD candidate and supervisor, PhD program/university, and firm/organization. Three main conclusions were reached. First, it is crucial to have a cooperative “eye-to-eye” relationship between the university and the company. Second, the AR process must respond unequivocally to its own dichotomous nature. Third, there must be a straightforward academic process for the PhD thesis. We believe that this study may impel the development of doctoral theses based on AR as a tool to potentiate collaborative university–firm relationships.

Introduction

“Nothing is so practical as a good theory” (Lewin 1945, p. 129).

Operations Management scholars have increasingly argued that researchers should develop valid and relevant knowledge to support practitioners in their real problem-solving efforts (Boyer and Swink 2008; Tang 2015; van Aken et al. 2016). In other words, managers have signaled the need for academia to increase the practical relevance of management

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research and to move away from the ivory tower syndrome (Van Mieghem 2013). Even when one could argue that publishing is, in fact, a contribution to society, research which has a management component and is published in top-rated journals is also considered to be irrelevant for practitioners (e.g., Bartunek 2011; MacLean et al. 2002; Zhang et al. 2015). This is a long-lasting discussion, for example, Swamidass (1991, p. 798) stated nearly 30 years ago that “practitioners consider most Operations Management research to be irrelevant.” Fortunately, there is a discussion in the academic world about the way in which researchers should interact with society and how to increase the social impact of academic research and, more specifically, research with firms. In the specific field of management, papers such as Toffel (2016) have highlighted that research needs to be more relevant to the world outside academia and have encouraged scholars to conduct research that is more helpful for the decisions faced by managers and policymakers. In the words of Van de Ven (1989, p. 486), “good theory is practical precisely because it advances knowledge in a scientific discipline, guides research toward crucial questions, and enlightens the profession of management.” This paper focuses on the development of a specific tool to bring researchers and practitioners closer: the use of an AR in a doctoral thesis.

We focus on *an analysis of the main factors that influence the use of the AR to achieve a successful doctoral thesis*. Thus, AR methodology and a doctoral thesis represent the support that may reinforce university–firm relationships, and we focus on four specific factors which influence the success of these two “tools”: PhD candidate; supervisor; firm/organization; and university. Recently, Shani and Coghlan (2021) reflected on action research in business and management and identified some factors to which closer attention should be paid in systematic and comprehensive reporting of the action research effort: better understanding of the context, phases, mechanisms, relationships, outcomes, and the impact that they have. Our study is targeted to complement the contributions of that study.

Figure 1 describes the research planning of this study. First, we review literature that combines AR and doctoral theses to determine how such projects are understood and to identify the main factors associated with the development of AR projects within the scope of a doctoral thesis. This allowed us to build a theoretical framework of success factors in the development of an AR-based thesis (Section “[Review and Development of a Theoretical Framework](#)”). Next, we carried out a Delphi study to validate this model in the specific

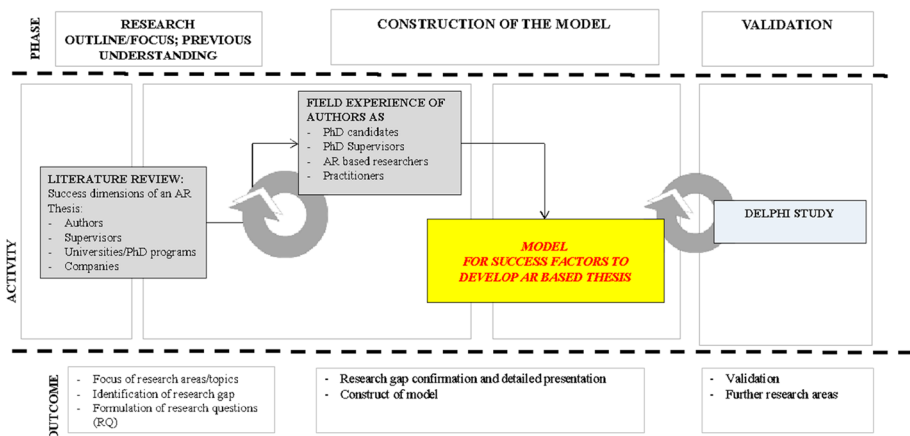


Fig. 1 Research planning

context of a doctoral thesis that developed an empirical AR project in the context of business and management in Spain (Section "[Materials and Methods](#)"). The results and discussion (Sections "[Materials and Methods](#)" and "[Results](#)") allowed us to validate the model and to determine how this project may impel the use of AR in the field of business and management.

The paper is structured as follows. Section "[Review and Development of a Theoretical Framework](#)" shows previous studies about AR and theses and the theoretical framework. Section "[Materials and Methods](#)" describes the Delphi methodology to collect data and to describe where the empirical study was conducted. In Section "[Results](#)", we describe the main findings, and we build a reference framework that can serve both researchers and practitioners in improving the performance of AR in a doctoral thesis. In conclusions, we highlight both the academic and managerial implications of this study and also limitations and further research.

Review and Development of a Theoretical Framework

This section describes those papers that have analyzed the specific characteristics of the implementation of AR methodology into a doctoral thesis. This will allow us to determine the specific contribution of our study to the AR literature. Second, we develop a theoretical framework that shows the main variables that influence in a relevant way the development of AR methodology in a specific context, namely a doctoral thesis.

Review

A determination of the specific contexts in which AR can be put into practice is crucial to the promotion of its use among researchers. This is especially important in the field of management because this methodology is of secondary importance compared to other methodologies (Erro-Garcés and Alfaro-Tanco 2020). Alfaro-Tanco et al. (2021) emphasized that one of the main goals of “action researchers” in the field of management should be to focus on offering AR methodology courses for PhD candidates and, in this way, promoting its use in doctoral theses. It is crucial that young researchers know the relevance and advantages of AR as a methodology which helps to fill the gap that exists between universities and practitioners (Westbrook 1995).

Inside AR literature, there are authors that have analyzed the use of different dimensions of AR in a doctoral thesis. Table 1 shows the papers we found and their main objectives. We then developed the main findings and determined how our study could contribute to the development of AR in the research community.

This list of studies permits us to conclude that an analysis of AR in the specific context of a doctoral thesis is a relevant topic in AR literature and that it has been studied from different dimensions. In this way, we show that there are studies which focus on an analysis of how to write a thesis when using AR. This is important because one of the risks of this type of thesis is that it is more oriented to practitioners than to academics. In this context, the concepts of “core action research” and “thesis action research” appear (Zuber-Skerritt and Perry 2002) as well as “first, second, and third person inquiries” (Coghlan 2007) which help researchers conducting an AR-based thesis. The quality and processes are two other factors that have been studied in the previous literature: Zuber-Skerritt and Fletcher (2007) and Nogeste (2008) explained

Table 1 Papers that analyze the role of AR in a doctoral thesis

Year	Reference	Objective	Field	Main findings
2002	Zuber-Skerritt and Perry (2002)	To help postgraduates to understand the difference between core action research and thesis action research	Social and Human Sciences	Action research is instrumental in a social science thesis and is gaining recognition but relevant issues have to be considered
2007	Coghlan (2007)	To understand the issue raised when executives use AR in their organization for doctorates	Management	It develops the concepts of "first, second, and third" person inquiry to reflect on the executive AR doctorate in terms of engagement
2007	Zuber-Skerritt and Fletcher (2007)	To identify the quality characteristics of critical AR and AR theses compared to traditional ones	Social Sciences	Definitions and checklists for quality action research
2008	Nogeste (2008)	To provide researchers and practitioners knowledge of how a dual cycle AR model can be used. The empirical analysis is done in the context of a doctoral thesis	Management	A thesis is an adequate context in which to develop dual cycle AR projects
2012	Klocker (2012)	To explore the potential for successful participatory AR PhDs	Geographical education	The balance of the pros and cons of doing a participatory AR-based thesis imply that the impact and richness of this type of thesis makes it worthwhile
2017	Mejía-Villa and Alfaro-Tanco (2017)	To highlight the usefulness of the development of AR projects. The empirical analysis is done in the context of a doctoral thesis	Management	A thesis is an adequate context in which to develop AR projects
2019	Coghlan et al. (2019)	To develop the main challenges in an insider AR thesis	Management	Preunderstanding to manage role duality and organizational politics and the actual formation are the identified key challenges
2021	Alfaro-Tanco et al. (2021)	To analyze the dual contribution of action research (AR) to research and business practice	Management	It is necessary to promote the use of AR in doctoral theses as a way to make AR a relevant methodology in the management field

that an AR thesis has to be rigorous as one of the objectives of a doctoral thesis is that the PhD candidate demonstrate the ability to put different research methodologies into practice. Herr and Anderson (2015) dedicate a full chapter to develop quality criteria for AR. Studies such as those of Klocker (2012) and Mejía-Villa and Alfaro-Tanco (2017) have also emphasized the usefulness of an AR thesis to explore issues that have a dual interest (academic and business).

Based on these studies, we conclude that a doctoral thesis offers an adequate framework for the development of an AR project. We consider the next points as key reasons to undertake a thesis as an AR project. First, a doctoral thesis is a rigorous space of long-term learning and research in which there are at least two researchers, the doctoral candidate and his thesis supervisor, who must present periodic reports and results. Second, this type of study has a similar structure to AR cycles, as diagnosis, action planning, action taking, evaluation, specification of learning, and dissemination are natural steps of a thesis. Third, it permits the integration of managers (the practitioners) into the research project. Hence, they participate, interact, and have a better understanding of the research benefits. Furthermore, their attitudes are more proactive and they provide continuous feedback during the process (Näslund et al. 2010). It is necessary to promote the use of AR in doctoral thesis as a way to make AR a relevant methodology in the management field. Fourth, a doctoral thesis as an AR project does not only offer a specific case study in a company but also a long-term research space which could become a research line with further projects. Fifth, the use of AR in doctoral theses is a source of different products, such as papers, conference papers, reports, books, and workshops. Therefore, it is necessary to promote the use of AR in doctoral theses as a way to make AR a relevant methodology in the management field (Alfaro-Tanco et al. 2021).

From the studies that appear in Table 1, Coghlan et al. (2019) is the most similar to ours in that they focused on identifying the main challenges in an insider AR thesis. However, our study focuses on analyzing the main factors that influence the success of doctoral thesis that uses an AR methodology. In this way, the scope of our study is much wider than that of Coghlan et al. (2019), which focused on those situations in which the PhD candidate worked in the company that is the practitioner (i.e., insider action research). It is relevant to show how Herr and Anderson (2005) develop a typology of AR studies in terms of the positionality of the researcher, which is specially relevant AR dissertations. The role of insider is developed in a detailed way in Coghlan (2019). Both references can serve as guides for students and researchers.

Theoretical Framework

In order to achieve the aim of this study, we built a theoretical framework which serves as a reference for the analysis of the main factors that influence the success of the AR methodology in a thesis. As AR implies a relationship at two levels (individual and institutional), we have defined four main factors as a reference: PhD candidate; PhD supervisor; firm/organization, and university. We cover in this way the four dimensions of the different interactions that exist when putting an AR project into practice. Figure 2 shows the theoretical framework we intend to develop in our empirical study (details regarding the operational deployment of the model can be found in the annex).

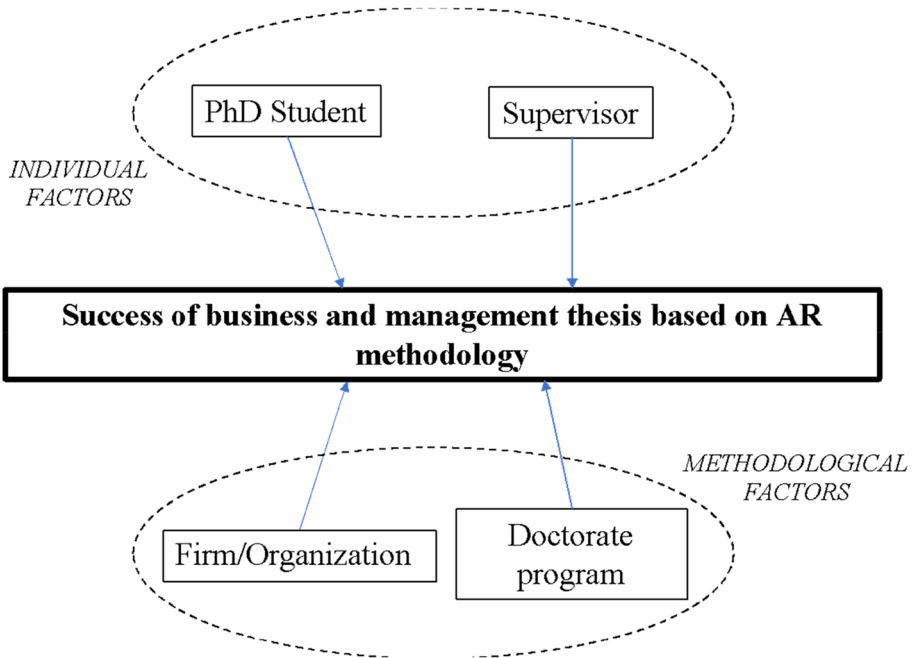


Fig. 2 Theoretical framework

Materials and Methods

In order to achieve the objectives of the research, a Delphi questionnaire about AR factors was conducted.

The Delphi Methodology

The Delphi study is a technique with the objective of obtaining the consensus of a group of experts (Dalke and Helmer 1963; Turoff 1971). Therefore, it can be considered a group decision technique. The Delphi study is an iterative process that gathers the anonymous judgments of experts using data collection and analysis techniques interspersed with feedback intervals (Skulmoski et al. 2007). A Delphi study can be used for both validation and construction of models, thereby contributing in a relevant way to the scientific and practical fields (Okoli and Pawlowski 2004). Depending on this targeted usage, one or more rounds of responses are required. Consequently, both companies and researchers benefit from the contributions of experts and are able to adapt them to their particular situations.

This method avoids direct confrontations between experts, thus avoiding the imposition of some ideas on others simply because of the reputation of the person who raises them or because of the force with which they are defended (Dalke and Helmer 1963). In addition, the size of the sample does not depend on statistical rules but on the dynamics of the group of experts in order to reach a consensus. Normally, in a general population, there may not be enough knowledge to answer the questions adequately. However, a group of between 10

and 15 experts is adequate to compose the panel if the sample is homogeneous (Okoli and Pawlowski 2004).

Since the experts remain anonymous with respect to each other but never to the researcher, it is possible to contrast the interpretation of the variables with the person who answered the questionnaire. This allows the monitoring, clarification, and determination of quality of the information used in the study (Okoli and Pawlowski 2004).

The most critical point in a Delphi study is the selection of experts. They need to be qualified and have a deep understanding of the problem to be analyzed. First, the specific skills & knowledge that a person should possess should be listed, as well as which organizations may be relevant. Second, the appropriate experts to participate must be identified, & they must be ranked based on their suitability. There are four requirements to consider a person an expert in a subject (Adler and Ziglio 1996): (1) knowledge and experience in the subject studied; (2) ability and willingness to participate; (3) enough time to dedicate to the study; and (4) communication skills. Finally, the experts are invited to participate and the questionnaire is sent to them by email, fax, or via the web.

The Delphi Study

To conduct the analysis, the first step was the definition of the questionnaire. Our literature review served as a basis to create the questionnaire. Thus, the different barriers and drivers of AR were considered in the creation of the sections in the questionnaire.

Selection of Thesis and Panelists

As described previously, the theoretical model was created based on the analysis of previous literature. Just one round of responses was required because the Delphi study was used just for validation. Furthermore, Gordon and Pease (2006) highlighted the need to reduce the rounds to improve the efficiency of the process in Delphi studies.

As shown in Fig. 2, the following areas were included in the questionnaire:

- PhD candidate's profile.
- Thesis supervisor's profile.
- Type of company in which the AR project was developed.
- Type of university and the PhD program.

Once the four areas were defined, the authors discussed the main attributes of interest in each area. Table 2 shows these main attributes as defined for each of the factors. The questionnaire was designed to relate to the attributes where all factors are pondered in a Likert scale from 1 (low importance) to 5 (high importance). After this, it was submitted to three experts for validation. In Annex 1, the questionnaire that was sent to each participant can be found.

Panelists were recruited from ten AR thesis candidates and supervisors. These thesis parties and panelists were selected as follows:

First Step: Preliminary identification of thesis developed or managed in a Spanish company and/or developed by a Spanish researcher in the management field. Thirteen theses were identified. These were obtained from public thesis databases (e.g., the Networked Digital Library of Theses and Dissertations; the ProQuest Theses and Dissertations;

Table 2 Main attributes to be analyzed

Factor	Attributes of interest
PhD Candidate and Supervisor	<ul style="list-style-type: none"> • Age • Youth versus oldness • Professional experience (besides the university) • Previous experience in the company in which AR was enacted • Opportunity to realize professional potential • Previous experience regarding PhD thesis supervision – only for supervisor • Previous experience working with AR (papers, thesis, etc.) – only for supervisor • Performing a continuous follow-up of the PhD thesis supervision – only for supervisor • Knowing how to cope with formal academic requirements—only for PhD candidate • Formal training in AR/qualitative research methodologies – only for PhD candidate • Cognitive distance between the candidate and the company where AR was enacted – only for PhD candidate • Being a current employee in the company during the PhD process period – only for PhD Candidate • Other attributes
Firm/Organization	<ul style="list-style-type: none"> • Type of company (SME–MNE) • "Origin" (nationality) • Previous experience with university research projects • AR base problem: priority • How the cost of the project has been funded • AR base problem: has company pulled researchers (PULL) or have researchers pushed the issue (PUSH)? • Other attributes
University	<ul style="list-style-type: none"> • University type (public–private) • Strategic approach • Department encompassed in faculty/social science, technical science, business school • Department does advisory projects with companies • Doctoral program offers AR aspects (training, talks, support) • There have been other theses with AR in the past • Thesis tribunal with sensitivity on qualitative methodologies, case-study, and AR • Formal process for the follow-up of the PhD thesis evolution • Other attributes

the OATD – Open Access Theses and Dissertations, etc.) and were completed with the experience of authors in the field.

Second Step: Contacting candidates and supervisor/s to invite them to participate in the Delphi study. A total of 30 researchers were contacted and 15 of them agreed to participate in the study. These 15 experts represented 10 of the 13 doctoral theses identified in the first stage.

Main Characteristics of AR Theses Related to the Study

Table 3 describes the summary statistics from the 10 AR these whose supervisors or directors were included in the Delphi study.

As can be observed in Table 3, the AR theses from the databases analyzed different topics, and AR projects were conducted in companies of diverse sizes from diverse sectors. The questionnaire that was developed was revised before presenting it to the experts. More concretely, we asked two experts who had previously provided a response and adapted the questionnaire to ensure that the questions were correctly understood.

Table 3 Main features of analyzed AR theses and the 15 experts related to each thesis participating in the Delphi study

PhD thesis	Thesis title*	Research area	No. of publications derived from the PhD thesis	No. companies involved in the AR cycles	Country	Sector	Type of company	Delphi panel participant?	
								PHD candidate	PHD Supervisor 1 Supervisor 2
Mendibill (2003)	Designing Effective Team-based Performance Measurement Systems: An Integrated Approach	Industrial Organisation	2	1	Scotland	Bottled water supplier	SME	✓	X
Durán (2005)	Analysis of the process of elaboration and implementation of corporate social responsibility instruments.	Corporate Social Responsibility	1	2	Spain	Certification Bodies	MNE	✓	X
Fernández-Martínez (2009)	Analysis, planning and governance of IT in universities	IT Management	-	1	Spain	Education	Universities	✓	X
Rodríguez-Donaire (2011)	Social media, interactive tools that change business model dynamics	Business Model Management	1	5	Spain	Small retailers	SME	✓	X
Mediavilla (2013)	Model of analysis and improvement of global production and logistics networks based on the evaluation of the strategic factory role	Operations Management	3	1	Germany	Home Appliances	MNE	✓	X
Mejía-Villa (2017)	The role of Business Associations as drivers of strategic management of innovation	Innovation Management	1	21	Spain	Regional Business Associations	Business Associations	✓	X
García Navarro (2020)	Improving the efficiency of administrative processes in local government: a case of action research in Madrid City Council	Operations Management	1	1	Spain	Public Administration	Public Administration	✓	X
Lizarralde (2020)	Application of TOC-DBR to Make-To-Order manufacturing contexts: systematic process for bottleneck identification and exploitation based on action research	Operations Management	3	4	Spain	Steel tube manufacturer, aeronautical, Wind-energy towers producer, Machining solutions	SME	✓	Paper author
Mediavilla (2020)	Integrating game-theory in the supplier selection process for complex items: an action research program to develop a systematic process for practical application	Operations Management	3	2	Spain	Automotive, Harbour Crane Engineering	SME	✓	-
Unzueta (2020)	Development and deployment of a continuous improvement maturity model adapted to an industrial SME of capital goods in the basque country.	Operations Management	2	1	Spain	Capital Goods	SME	✓	-

*The non-english PhD thesis titles have been translated by the paper authors

Supervisors and PhD candidates have published a large number of articles based on AR. Nevertheless, nearly half of the PhD candidates did not have a conventional academic career. Either they were juggling an academic position with a consultancy role or were part of universities that have a very strong relationship with the industry. Also, four other PhD candidates did not expect to have an academic career at all. Table 4 summarizes the journals in which the articles related to the AR theses were published.

It is important to highlight that several of the mentioned journals published more than one article from the AR theses. In addition, these journals published several articles in which the methodology of AR was used.

Data Collection

Data was gathered in the June–September 2021 period. First, data from PhD candidates and supervisors were collected. Then we sent an email to present the project and phoned experts to ensure their participation. Results were collected by means of an online survey developed with Google forms (lowest score: 1; highest score: 5). Table 3 shows the people that were interviewed for each analyzed thesis.

Results

The respondents (i.e., PhD candidates and the supervisors) were asked about the relevance of age and maturity in conducting an AR thesis (Table 5). According to the results, maturity is more important than age to succeed in an AR project.

It is important to highlight that the age of the PhD candidates conducting an AR thesis was older than the conventional age of PhD candidates. The youngest respondent was 41 and the oldest 63, whereas the median age at entry to doctoral programmes is 29 on average across OECD and many business schools report average age at admission from 25 to 27. Several PhD candidates confirmed that they started their thesis after gaining several years of experience in a company. As a result, most PhD candidates had enough maturity and previous business experience to face the goals of an AR project.

Respondent #5 specified the role of age and maturity in an AR thesis:

I found difficult to answer this section. AR requires the mastery of very diverse and complex competences: conceptualization and theorization, practical application, experimentation, contextualization (ability to reduce cognitive distance in different contexts), which are not normally used in the environment of a doctoral Thesis. Actually, RA involves covering the entire Kolb (1984) circle. Being able to develop them properly at a young age is impossible; but just maturity alone does not guarantee your success. Therefore, both age and conceptual distance seem to me variables resulting from others, which are the ones that really should be measured. Ultimately, those of learning capacity through experience, and – once that and – of using the appropriate methodologies to externalize that learning and communicate it in a way that can be socialized. Again, the questions have been difficult for me to answer because age and maturity always help thesis supervisors to perform their function more adequately, regardless of the research paradigm, or the methodology. So, I think that what is really important is the degree of mastery of the research paradigm used by the thesis supervisor or his/her ability to use different paradigms, and its compatibility with AR.

Table 4 Journals in which articles from AR theses were published

Journals	Impact factor and quartile	Articles	Thesis
Systemic Practice in Action Research	SJR IF 2018: 0.347 (Q3) JCR IF 2020 1.701 (Q4)	García-Navarro et al. (2019)	García Navarro (2020)
TQM Journal	SJR IF 2020: 0.537 (Q2)	Unzueta et al. (2020a)	Unzueta (2020)
Journal of Industrial Engineering and Management	SJR IF 2020: 0.29 (Q3)	Lizarralde et al. (2020)	Lizarralde (2020)
Working Papers on Operations Management	Emerging Sources Citation Index	Mejía-Villa and Alfaro-Tanco (2017)	Mejía-Villa (2017)
Production Planning and Control	JCR IF 2020: 7.044 (Q1)	Mediavilla et al. (2015)	Mediavilla (2013, 2020)
	JCR IF 2015: 1.532 (Q2)	Mediavilla et al. (2020b)	Mendibil (2003)
	JCR IF 2005: 0.404 (Q3)	Mendibil and MacBryde (2005)	
DYNA Journal	JCR IF 2020: 1.352 (Q3)	Mediavilla et al. (2011)	Lizarralde (2020)
	JCR IF 2019: 0.978 (Q4)	Lizarralde et al. (2019)	Mediavilla (2013, 2020)
	JCR IF 2011: 0.179 (Q4)	Mediavilla et al. (2020a)	
International Journal of Business Performance Management	SJR IF 2002: 0.134 (Q3)	Mendibil Telleria et al. (2002)	Mendibil (2003)
Dirección y Organización	SJR IF 2019: 0.128 (Q4)	Mediavilla et al. (2012)	Mediavilla (2013, 2020)
	SJR IF 2018: 0.181 (Q4)	Mediavilla et al. (2019)	Lizarralde et al. (2020)
	SJR IF 2012: 0.163 (Q4)		
Quality Innovation	JCR IF 2020: 0.43 (Q3)	Unzueta et al. (2020b)	Unzueta (2020)
Business Process Management Journal	SJR IF 2002: 0.347 (Q2)	Mendibil et al. (2002)	

Table 5 Responses related to age and maturity for the PhD candidate and the supervisor(s)

		Age	Maturity
Regarding the PhD candidate	Mean	2.80	3.40
	SD	1.21	1.18
Regarding the Supervisors	Mean	2.86	3.21
	SD	1.23	0.97

Concerning the previous experience of PhD candidates, both groups of respondents (PhD candidates and supervisors) thought that previous experience outside the University was important to achieve the goals of a thesis. Nevertheless, working in the company in which the AR was conducted is not as relevant as having the mentioned previous professional experience (Previous experience outside the university: $M_{\text{PhD Candidate}}=4.14$; $SD_{\text{PhD Candidate}}=0.90$ and $M_{\text{Supervisor}}=4.44$; $SD_{\text{Supervisor}}=0.53$. Previous experience working in the company: $M_{\text{PhD Candidate}}=3.57$; $SD_{\text{PhD Candidate}}=0.79$ and $M_{\text{Supervisor}}=3.88$; $SD_{\text{Supervisor}}=1.17$, and, finally, being a current employee at the company in which AR is enacted, i.e., “insider action researcher”: $M_{\text{PhD Candidate}}=3.28$; $SD_{\text{PhD Candidate}}=1.25$ and $M_{\text{Supervisor}}=3.88$; $SD_{\text{Supervisor}}=0.93$) (Table 6). Nevertheless, an interesting perspective arise from three respondents that were in fact “insider action researchers”, since it showed a higher evaluation for the importance of being a current employee in the company in which AR is enacted: $M_{\text{Insider Action Researcher}}=4.3$; $SD_{\text{Insider Action Researcher}}=0.57$. This aspect is surely an interesting research path if the sample (and population of the study) can be enlarged.

Respondents showed the relevance of specific training in AR and in other qualitative methodologies ($M=4.13$; $SD=1.06$). Time for reflection was also important. Respondents suggested the role of the PhD program in facilitating this training as follows:

I think that these factors have finally come out in the questionnaire: doctoral programs should expressly contemplate this methodology in their previous courses; the relevance of working in a Faculty that is comfortable with this methodology, the collaboration with companies in a structured and sophisticated way, and receiving doctoral candidates with previous experience and objectives of undertaking a line that is normally more complex than other types of research. (Respondent #5)

Both PhD candidates and supervisors were asked about the role of funding in the success of an AR thesis. That the company takes over a high percentage of the funding seemed initially as a non-highly relevant factor in the development of an AR thesis ($M=3.62$; $SD=1.19$), but this topics needs further research since the answers from the 15 participants vary from a minimum of 2 and up to a maximum of 5 (Median: 4). Nevertheless,

Table 6 Responses related to previous experience

Subgroup of respondents		PhD candidate working in the company where AR is conducted	Previous experience of the PhD candidate
Subgroup of PhD candidates	Mean	4.14	3.57
	SD	0.90	0.79
Subgroup of Supervisors	Mean	4.44	3.88
	SD	0.53	1.17

the relevance of the problem that the AR thesis is aimed to resolve for the company was considered a relevant factor of success ($M=4.85$; $SD=0.38$). In addition, companies with previous experiences in cooperating with universities and researchers were highly valued ($M=4.15$; $SD=0.69$).

Other relevant factors have been the following:

- PhD supervisor with previous professional experience besides the academia ($M=4.00$; $SD=0.96$)
- PhD supervisor with previous experience as PhD supervisor ($M=4.14$; $SD: 0,66$) and working in AR ($M=4,43$; $SD=0,65$)
- PhD supervisor who does a close follow-up of the PhD thesis progress ($M=4.64$; $SD=0.50$)
- Company which has previous experience cooperating with universities ($M=4.15$; $SD=0.69$)
- University which has a strategic target to promote the linkage with companies ($M=4.40$; $SD=0.91$)
- PhD programs which have a clear orientation to practice oriented research and cooperation with companies ($M=4.13$; $SD=1.13$)
- PhD thesis committee with previous experience in qualitative methodologies ($M=4.40$; $SD=0.51$)

Discussion

Based on the extensive results that have been presented in Section "Results", it could be concluded that there are three main factors that could leverage a successful execution of a PhD thesis based on AR (see Fig. 3).

The first aspect is to achieve a cooperative *eye-to-eye relation between the university and the company* in which the PhD thesis is carried out. Specifically, our results highlight that the practical problem that the PhD thesis aims to solve must be highly relevant for the company in order to assure its success. The role of personal relationships

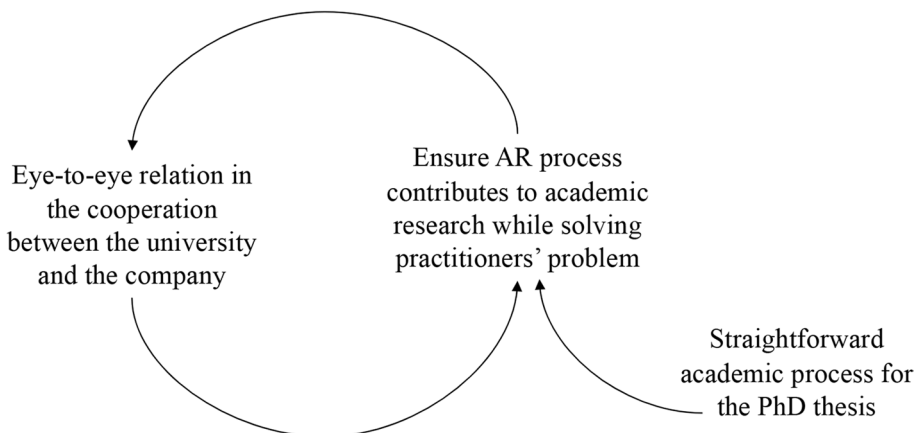


Fig. 3 Main factors in the successful execution of a PhD thesis based on AR

is highlighted in Herr and Anderson (2005) as a relevant factor in the quality process. On the other hand, the Delphi study also shows that if a university/PhD program has a clear strategic mandate to cooperate with the industry, then the success of an AR-based PhD thesis increases. In other words, both parties may need to increase their mutual empathy and admit that the cooperation needs to be mutually beneficial. On the one hand, a university/PhD program may concede that the relationship with the industry could be beneficial by not only the knowledge transfer but also as a knowledge creation process. On the other hand, the industry would need to recognize that researchers at universities (in our case, PhD candidates and PhD supervisors) are able to add value and contribute to the resolution of relevant problems in practice. If both sides admit that there is a common space in which all parties are benefitted, then the relationship may transform to an eye-to-eye one. If that is the case, a fully transparent relationship could be established in which everyone admits the value added by the other party. Nevertheless, these conditions are usually not met in academia nor in the business environments. Therefore, the ongoing work to enable this recognition is a key aspect to promote from agents in the two sides.

Second, there is a need *to contribute to academic research while contributing to solving practitioner problems through the active involvement of the research in the process of change*. Our results have emphasized, for example, the importance of previous experience and/or formal training in AR of the PhD supervisor and the candidate. These requirements have been highlighted in the Delphi study to make sure that the research will also “solve problems” and that the “change will be lasting”—in contrast to regular research that successfully finishes once new knowledge has been created. Additionally, a dissertation committee that has previous experience in qualitative research is considered relevant in order to rigorously assess the PhD thesis and whether or not the research has successfully fulfilled the dichotomous nature of AR. Moreover, the results also show that the company needs to have previous experience working with researchers to know that AR does not finish once the practical problem has been solved, but only once that is understood and new knowledge has been created. This is important since the knowledge creation process within AR can never end after the practical solution: it is necessary that the reflection process enables knowledge creation. Moreover, the results also remarked on the need for a continuous follow-up of the PhD thesis, which may be utilized for ensuring that all interests are being successfully fulfilled. In this sense, Coughlan and Coghlan (2002) refer to AR as an ongoing process. They believe the AR project does not finish with the publication of an article. It goes beyond.

Finally, there is a third aspect, which is to *ensure a straight forwarded academic process for the PhD thesis*. The AR-based *thesis* has an underlying risk due to its nature of *research in action*. This means that action itself is so demanding (and emotional, since the reaction to changes are nearly immediate) that it can be a trap for the PhD researcher – which could distract him or her from the PhD thesis process itself. Our Delphi study has shown the crucial role of a strict and continuous follower (from the PhD supervisor, PhD program, and the company itself). PhD candidates need to divide up the process into the dissertation phase and post-dissertation phase in order to differ between practical determinations that can be included in the thesis and what extends beyond it in time and perhaps in space that will not be part of the PhD research. That control could help the PhD candidate to put equal effort into the practice and into the research itself, thereby avoiding being consumed by only one of the aspects.

Table 7 Main conclusions related to each factor

Factor	Success factor	Key comments and alternatives if success factor not available
PhD candidate	Previous professional experience Formal training in AR/qualitative research methods	Make sure that all of the PhD supervisors have relevant professional experience Propose the organization of workshops/training within the PhD program or identify potential AR training offered in other PhD programs
PhD supervisor	Previous professional experience Previous experience with PhD thesis supervision Previous experience with AR	Consider involving a PhD co-supervisor who has relevant professional experience (either with the company in which AR is enacted or other companies) Consider involving a PhD co-supervisor who has relevant experience with PhD thesis supervision Consider involving a PhD co-supervisor who has relevant experience working with AR
Company	Previous experience cooperating with universities/researchers PhD thesis focused on solving a relevant problem of the company	Clear communication beforehand that the PhD thesis has two key objectives: contribute by creating new knowledge while solving a real relevant problem in practice Develop a transparent cooperation atmosphere in which both sides (company and researchers) have a clear picture of what is and is not an AR-based PhD thesis Develop a constant relationship and communication with the company in which managers identify the most relevant problems in the company
PhD program / university	Strategic target to cooperate with companies PhD program used to develop PhD thesis with companies Offer formal training in AR/qualitative research methods Dissertation committee with previous experience in qualitative research	At least the PhD supervisor must have a clear strategic target to cooperate with companies Gather the necessary commitment from decision makers to accept a PhD thesis developed with a company to avoid ulterior problems Organize workshops/training within the PhD program or identify potential AR training offered in other PhD programs Make sure that the proposed candidates for the dissertation committee have relevant experience in qualitative research. If not, the PhD thesis defense should provide an introduction which sets the main aspects of an AR-based thesis
PhD supervisor, PhD program / university, and company	Constant follow up to evaluate the progress of the PhD thesis	Make sure that – in addition to a formal PhD thesis progress evaluation – a more informal follow-up process is setup among the company, the PhD supervisor, and the PhD candidate

Conclusions

The present article seeks to shed light on the role of AR theses in the improvement of the relationships between the university system and the firms/organizations. In this sense, it can be concluded that AR theses can help to develop a closer cooperation between the university and the company in which the PhD thesis is conducted.

Accordingly, our research shows that there are rigorous and qualified AR theses, as can also be shown by the number of analyzed publications which are derived from AR theses.

In order to achieve a doctoral thesis with rigor and quality, our work formulates several recommendations for practitioners, namely PhD candidates, thesis supervisors, and PhD programs, who are responsible for the dissertation and, eventually, directors at upper levels in the universities. The fieldwork has enabled us to identify factors for the successful execution of a PhD thesis based on AR. We found support for the importance of these factors. Therefore, we have developed the checklist depicted in Table 7 with the aim of supporting future practitioners.

Consequently, AR theses can fulfill the gap mentioned by Shani and Coghlan (2021) and facilitate a deeper explanation of the context or the AR. In this sense, AR-based research in a PhD thesis ensures meticulous, profound, and precise work.

This review presents some limitations. First, we are conscious that there are other factors that can also be relevant, including the social environment and other intermediary actors that usually have a relevant role, such as funders (public, private organizations) or public institutions. Second, including a sample from multiple countries could improve our conclusions. AR research is increasing progressively but usually AR based PhD theses are more scarce than research that academics may carry out in more mature stages in their careers. Therefore, in our eyes the available population of AR based PhD thesis is so scarce and quantitative conclusions are sometimes based on “low” amounts.

Further research should aim to overcome these limitations. By increasing the sample of AR theses from different countries, the role of cultural factors and comparisons across countries can be analyzed, thereby expanding our vision of AR theses. In addition, following the professional careers of PhD candidates would allow us to contribute to the research question formulated by Shmatko et al. (2020) about the main factors that determine academic and non-academic research career patterns. Furthermore, this work responds to the question suggested by Larrea (2018) about how to transform universities through action research. As already mentioned, also the importance of being an “insider action research” could be further studied. Finally, including other areas of knowledge and new methods (such as focus groups) will complement the present research. Another research line to be developed in the future is related to the use of AR by researchers in the field of management, i.e., as a research methodology, a meta-methodology or as a research culture.

Authors' Contributions José Antonio Alfaro-Tanco, Miguel Mediavilla and Amaya Erro-Garcés wrote the main manuscript text, prepared figures and tables. José Antonio Alfaro-Tanco, Miguel Mediavilla and Amaya Erro-Garcés reviewed the manuscript.

Funding Open Access funding provided by Universidad Pública de Navarra. This work was supported by the Ministerio de Ciencia e Innovación under Grant PID2020-115018RB-C31.

Data Availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Competing Interests The authors have no relevant financial or non-financial interests to disclose.

The authors have no competing interests to declare that are relevant to the content of this article.

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