

Industry Partnered PhD Projects: Impediments, Coping Strategies and Procedures

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***Abstract:** In the modern knowledge-based economy, industry is increasingly seeking to forge alliances with universities to generate innovative products and practices that may provide them with a competitive advantage. Simultaneously, universities are seeking to retain their relevance as the predominant providers of new knowledge, as many companies across a range of industries actively pursue their own research and development agenda, thus generating a greater proportion of all created intellectual capital than previously. There is a growing acceptance of more widespread research project linkages between universities and companies; traditional research training programs such as the PhD are not immune to this changing landscape. Whilst industry partnered PhD projects can potentially have a range of benefits to all concerned parties, particularly the student, current approaches and support mechanisms are far from ideal, presenting a range of impediments to be overcome through effective research project management functions. In an attempt to mitigate such impediments and leverage research training processes and outcomes, achievable from this partnered arrangement, this study explored a range of impediments and coping strategies associated with this form of partnered research training through both reported literature as well as a series of interviews with PhD candidates and their academic as well as industry supervisors. The exploratory study led to a priority list of impediments mapped to the most appropriate coping strategies to overcome them. Moreover, the mapping exercise led to the development of a structured procedure to guide industry partnered PhD projects, which aims to mitigate the various challenges of this style of partnered research arrangement whilst leveraging its benefits.*

Introduction

Traditionally, doctorate students work within their own units and may hardly seem affected by wider social, economic and cultural considerations (McAlpine and Norton, 2006). Nevertheless, it has been reported that this traditional doctoral training and research mode is facing some challenges in meeting the industry needs in this fast changing economy (Altbach, 2004; Pearson, 2005). In responding to the demands of the knowledge economy that continues to emphasise workers with more flexibility and interdisciplinary skills, in the past fifteen years, there has been a rapid diversification in doctoral degrees to encompass a range of provision (Boud and Tennant, 2006). In addition to the PhDs awarded for original research normally examined by thesis conducted over a duration of 3-3.5 years full time study (Wright and Cochrane, 2000), there is a growing trend toward tailored professional doctorates in such fields as management studies, education, law and engineering. Professional degrees bring together the academy and the workplace with an emphasis on professional practice: PsyD (Psychology), EdD (Education), DBA (Business), JD (Law) and Deng (Engineering). In recent years

in Australia there has been a growing shift in source of knowledge, away from the academic genre, as evidenced from the growth in professional doctorate programme (Maxwell, 2003; Pearson, 2005). The focus of attention of these programmes are not designed to produce ‘professional researchers’ but ‘scholar professionals’, who are capable of critical reflection upon their professional roles and experiences (Maxwell, 2003). Most of the programmes are featured as a partnership between a university and the employers of the candidates so that doctoral degree experiences are integrated with the needs of the employers; and the entry requirements include extensive professional experience together with access to workplaces (Maxwell, 2003). Therefore, Lee *et al.* (2000) described the programmes as ‘hybrid curriculum’ where the university, the candidate’s profession and the particular work-site of the research meet in specific and local ways, in the context of a specific organisation.

From an engineering education perspective, it has been suggested that today’s climate of rapid-fire change requires ‘innovative engineers’, that can go beyond one technical specialty to understand the broader implications of the technology he or she develops (Akay, 2008). In view of this, engineering doctorates in business or government must understand both specialised technical content and its broader context, in order to realise their potential as technology leaders (Akay, 2008). At present, the professional engineering doctorate (EngD) has been the most reported doctoral training and research mode to satisfy such a demand. The EngD fully integrates the technical requirements of a doctorate study with the needs and market drivers of the respective industrial sector, and offers a unique learning opportunity for experienced research engineers to develop subsequent careers in industry at a management level (Kerr and Ivey, 2003). The DTech at Deakin University serves as a good example in Australia that made strong use of links with industry, to create a technology-based professional award in the fields of science, architecture and engineering that is embedded in a particular professional situational context (Maxwell, 2003).

Industry partnered PhD candidates are carried out partly within the context of an industrial partners’ organisation, however they are full-time research students, with no direct employment relationship with these organisations, which is contrary to the usual case for professional doctorates (Wellington and Sikes, 2006). Sharing the contextual environment of both the traditional PhD as well as work-based professional doctorates, it is expected that these candidates face the challenges associated with both forms of research learning provision. These barriers and associated coping strategies are explored in later sections.

Research Methodology

As a students’ learning experience is the focus of higher education, particularly doctoral research (McAlpine and Norton, 2006), this study aims to explore the impediments and coping strategies adopted by industry-based PhD candidates, and thus seeks to explore answers to the following questions: (1) What are the impediments faced by PhD candidates when partnering with industry?; (2) What are some coping strategies adopted by PhD candidates?; and (3) What would be an appropriate procedure to mitigate the indicated challenges whilst leveraging the benefits from these challenging research studies? Since this study was exploratory in nature, qualitative research methods were used to provide answers to these questions. Literature review and interviews with three industry-based PhD candidates at the Griffith School of Engineering, Griffith University, Australia, were firstly completed. This was followed by focus group discussions with both industry and academic supervisors. Based on the key factors collected from the literature and responses solicited from the interviewees, a compiled list of impediments and coping strategies to overcome them were obtained. These were linked together to identify those strategies which could mitigate industry-based PhD candidates barriers. This mapping exercise assisted in the formation of a structured procedure for industry partnered PhD projects. The procedure aims to help the candidates manage the challenges associated with this unique research study arrangement whilst extracting the most value possible from this type of research.

Impediments to Successful Industry Partnered PhD Projects

In general, the individualised nature of doctoral study and the need for greater responsibility and creativity on the part of the student are factors that may lead to much of the frustration involved in the doctoral process (Gardner, 2008). Specifically, it has been reported that a lack of supervision, isolation

and financial stress are the three primary challenges that are normally encountered by full-time Ph.D. candidates (Gardner, 2008; Haksever and Manisali, 2000; Wright and Cochrane, 2000). In the case of work-based professional doctorate, candidates might find difficulties in mastering knowledge and reconciling conflicting methodologies, locating an intellectual community, gaining sufficient supervision, and balancing roles and responsibilities (Walker, 2008; Wellington and Sikes, 2006).. Interviewing with the three PhD candidates provided elaborated accounts that revealed a number of impediments consistent with the cited literature. These impediments along with their associated evidence are summarised in Table 1.

Table 1: Impediments and evidence extracted from interviews

No.	Impediment	Evidence
1	Difficulty in balancing roles and responsibilities	<ul style="list-style-type: none"> “the management of ‘a project’ and ‘a PhD’ within the same timeframe of a traditional PhD student is the primary challenge.” (Interviewee 1) “meeting the requirements of both the university and the company requires the student to perform in two distinctively different mind frames, like ‘switching hats’ and ‘ensuring the switch happens can be difficult at times’.” (Interviewee 1) “being approached by others working within the company for assistance can eat into the student’s time.” (Interviewee 1) “the reason for the placement is not necessarily made apparent to all members of the workforce and this can create uncertainty; the student may be viewed as an extra head count to undertake menial tasks.” (Interviewee 2)
2	Tendency to be distracted	<ul style="list-style-type: none"> “it is easy to get distracted by other interesting projects within the organisation.” (Interviewee 1) “I began to put up my hand to undertake more and more projects during my dedicated PhD time. My PhD programme became a secondary objective and I deferred it to work overseas for six months to manage a major project.” (Interviewee 3)
3	Insufficient supervision and support	<ul style="list-style-type: none"> “there are other demands placed upon the workplace supervisor, and as such time is not available to the student which leaves them in isolation when attempting to anticipate the company’s requirements.” (Interviewee 2) “progress and issues are not always communicated to the wider organisation or senior management.” (Interviewee 2)
4	Lack of strong attachment with the university	<ul style="list-style-type: none"> “being primarily embedded in an organisation made it difficult to maintain a strong attachment to the university.” (Interviewee 1)

Strategies to Facilitate Improved Partnerships and Outcomes

The above identified barriers reflect the need for a set of strategies to support the individual candidate and facilitate improved partnerships between university and industry partners. Table 2 summarises several coping strategies extracted from the interviews.

Table 2: Coping strategy and evidence extracted from interviews

No.	Coping Strategy	Evidence
1	Creating a Charter for industry partnered PhD students	<ul style="list-style-type: none"> “a Charter for industry-based PhD students to clearly indicate the role of the candidate as well as the requirements from both the university and the industrial partner/s.” (Interviewee 2)
2	Organising training sessions	<ul style="list-style-type: none"> “managed these challenges through improving project management skills, especially time management and the prioritising of tasks.” (Interviewee 1) “training sessions for all concerned parties at the beginning of the project to explain some key concepts for a successful industry-based PhD programme, such as the difference between research and consulting work.” (Interviewee 2)

3	Clearly defining project responsibilities	<ul style="list-style-type: none"> • “the importance of agreed values and conditions of project conduct right at the very commencement of the PhD project. (Interviewee 3) • “agreed principles need to be laid out at the very commencement of project initiation and that a formalised communication and reporting structure would ensure that PhD candidates do not stray too far from established project deliverable milestones.” (Interviewee 3)
4	Maintaining strong relationships and regular contact with the university and industry supervisors	<ul style="list-style-type: none"> • “regular contact and guidance from supervisors, web access to appropriate university systems and resources externally, and ongoing communications between the industry, university and student.” (Interviewee 1) • “establishing relationships with people identified as key to her research. These people provided time outside of their normal duties and assumed the role of work supervisors.” (Interviewee 2) • “Just as important has been the maintenance of a strong relationship between the two sets of supervisors.” (Interviewee 3) • “regular communication between both the University and industry supervisor and me is paramount to successfully completing my PhD.” (Interviewee 3)

Linking Impediments to Coping Strategies

The impediments uncovered from the interviews implied the challenge of the complex contexts in which the industry partnered PhD programme operates. The industry-based PhD candidates’ learning process involves both academic and industry supervisors, and is occurring within multiple nested contexts of both the university and the industry dimensions. Therefore, the candidates’ learning is social and complex in nature, being positioned in the nested tiers of department/discipline, University/Organisation, and societal/supra-societal contexts (McAlpine and Norton, 2006). Therefore, any efforts to enhance doctoral completion and facilitate programme’s outcomes must take into account the balance of these contexts (McAlpine and Norton, 2006). Figure 1 illustrates how each of the coping strategies (Table 2) could be link to the impediments (Table 1).

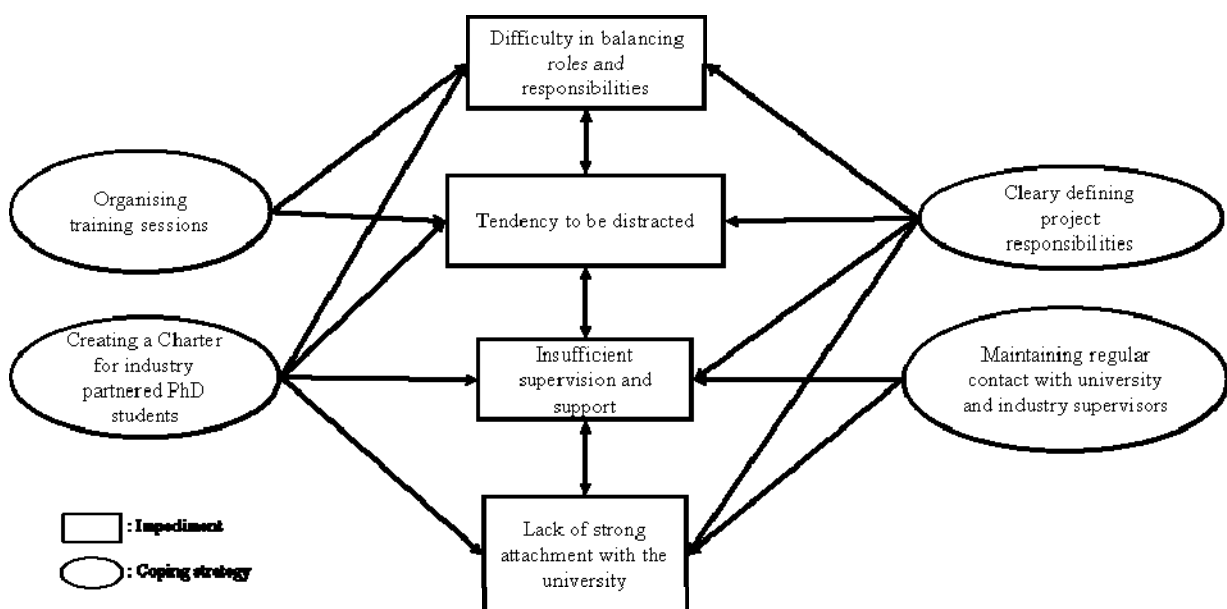


Figure 1: Linking coping strategies to impediments

The two identified impediments, namely, *difficulty in balancing roles and responsibilities* and *tendency to be distracted*, reflect the issues related to the unclear roles of candidates as expected from the industry partners and the university, and the ambiguity of the industry part scopes and outcomes.

Therefore, clearly defining project responsibilities at the commencement of the programme could help clarify the roles of, and the expectation from, each concerned party. As an industry partnered PhD programme is a long term process, establishing a charter for PhD candidates would assist in maintaining the agreed roles and focus throughout the programme. Training sessions would also help both candidates and supervisors to better cope with these impediments.

Being embedded in the partner organisations could inevitably detach the candidates from the intellectual community (i.e. “lack of strong attachment with the university”). This is also associated with the lack of sufficient supervision and support from the academic supervisors. Although the candidates may be assigned industry supervisors, other demands placed upon these supervisors usually resulted in limited contact with the candidates. These issues could be initially addressed through the clarification of project responsibilities in the early stage of the programme. Any efforts made by the students to maintain regular contact with university and industry supervisors should also be encouraged. The established student charter would also play an important role in this respect.

Proposed Procedure

Based on the focus group discussions, a proposed procedure for delivering an improved industry partnered PhD programme was formulated around the above identified barriers and coping strategies. It is of note that this proposed procedure was concerned with creating and maintaining a network and community of cooperating academics and practitioners, rather than the rearrangement of the existing departmental or faculty structures, as recommended by Boud and Tennant (2006). The proposed procedure consists of seven major stages briefly described below:

- Stage 1: Draft commercial agreement and project plan
- Stage 2: Draft PhD project partnering charter
- Stage 3: Recruitment of appropriate PhD candidate
- Stage 4: Finalise project plan, partnering charter and commercial agreement
- Stage 5: Project induction workshop
- Stage 6: Operational management systems
- Stage 7: Annual review symposium

Readers should refer to Stewart and Chen (2009) for a comprehensive description of the procedure proposed.

Conclusion

The industry partnered PhD program can be both a rewarding and challenging journey for its candidates. These candidates need to engage with the knowledge-in-use that thinking practitioners develop and use in the course of their work whilst also meeting an academic requirement that normally rests on notions of advanced scholarship and extending the boundaries of knowledge. Nonetheless, graduates have potential to develop their career as ‘professional researchers’ or ‘research professionals’ depending on their focus of attention during their research process, in particular their personal career development interests. This study explored a range of impediments and strategies to the industry-based PhD through a critical review of literature and in-depth interviews. In summary, the study determined that strong skills in project management, interpersonal communication and time management are essential for successful industry-based PhD students. The outcomes of the analysis and linking of barriers and coping strategies resulted in a procedure to manage industry-based PhD project that included a total of seven steps which served to better manage this distinctive research process. It is expected that the procedure would build the necessary infrastructure to formalise the research-based learning experience of industry-based PhD candidates. Through this infrastructure university and industry partners could communicate and co-operate more effectively and efficiently, and consequently develop a stronger partnership. These work integrated research projects would offer the students a wealth of experience in both academia and industry, hence could significantly improve their employability for a wider array of jobs at graduation.

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