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Soft side of knowledge transfer partnership between universities and small to medium enterprises: Exploratory study to understand process improvement

Abstract

The study explores the soft side of knowledge transfer partnerships between universities and small to medium enterprises (SMEs), a topic which is often neglected in the knowledge management literature. The aim of this paper is to uncover the issues which emerge during information of a partnership between heterogeneous organisations and universities. In addition, the study unfolds the criticalities of typical process improvement capability that supports the knowledge transfer partnerships between universities and SMEs. Using multiple cases, this study unravels the dominant elements that influence knowledge transfer process development, governance, implications and responsibilities. The major contribution of this study is the development of a framework based on empirical evidence using three Knowledge Transfer Partnerships (KTPs) which illustrates the way in which soft factors in knowledge transfer partnership phases may have an impact on success or failure of university-industry collaborations for innovation.

Keywords: Knowledge transfer partnership; SMEs; University; case study; process improvement.

1. Introduction

Knowledge Management has been studied in a range of contexts from international and multinational business, to projects (Eskerod and Skriver, 2007; DeFillippi, Arthur and Lindsay, 2006), to consultancies and individual organisational case studies (Khalil, Claudio and Seliem, 2006). The management of knowledge has been discussed as a necessary core competence for modern organisations that seek to obtain and maintain competitive advantage (Geiger, 2011). It is well known that using yesteryear tools will not yield a competitive advantage to firms and it has been perceived by some to replace lean principles, in particular, Total Quality Management (TQM), as the fundamental means by which many organisations can achieve competitive advantage (Ju et al., 2006). Govindarajan and Gupta (2000) state, "*unless an enterprise continuously generates new knowledge, it will soon be playing tomorrow's game with yesterday's tools"* (p72) and Ambrosini and Bowman (2001) observe that "*tacit knowledge…*[has] *been argued to occupy a central place in the development of sustainable competitive advantage*" (p811). In addition, individual level knowledge creation is vital for further knowledge utilisation, hence Sabherwal and Becerra-Fernandez (2003) highlighted "*organisations that continue to invest in the intellectual growth of their individuals will continue to reap rich returns via growth in organisational knowledge*" (p248).

Knowledge management has been described in a range of studies as the use of Information Technology to aid the collection and dissemination of knowledge, as the general process of acquiring and disseminating knowledge (Alavi & Leidner, 2001), as the complex interaction and knowledge exchange between individuals, groups and organisation (Small & Sage, 2005) and as the transfer of knowledge between organisations (Bettencourt, Ostrom, Brown and Roundtree, 2002). It has been said that key to the study of knowledge management is the concept of 'knowledge productivity' that is "*the production of knowledge in some distributable form*" (Tillema, 2006, p174). The role of a university in the technological development of industry, through knowledge sharing or transfer, is topical and well researched (Bekkers & Freitas, 2008; Bozeman, Fay, & Slade, 2013; Bruneel, D'Este, & Salter, 2010; D'Este & Patel, 2007; Pinto & Fernandez-Esquinas, 2018). However, much of this literature is perceived as being

initiated or driven by the transfer of technical knowledge, typically via patents or through the establishment of new or joint ventures (Perkmann and Walsh, 2007). What has received little attention is the acquisition of non-technical knowledge between university and organisations, such as business process improvement knowledge, also referred as soft side of knowledge. The dynamics of university-industry relationships have been recognised as needing further research since it is the "*actual relationships - rather than generic links* – [that] *play a stronger role in generating innovations*" (Perkmann and Walsh, 2007, p260). Potential hindrances to successful partnerships relate to culture, expectation and environment: that university and industry have significantly different working cultures, especially in terms of time and short-term objectives. Organisations tend to expect measurable deliverables whereas much of the university's expectation is in the form of tacit knowledge that is "*difficult to identify and articulate*" (p48). There are also commercial pressures that play upon the organisation and may disrupt or end the relationship with the university (Cyert and Goodman, 1997).

This paper examines the challenges involved in undertaking Knowledge Transfer Partnerships (KTPs) between university and industry. KTPs are part-funded mechanisms for uniting enterprises with university knowledge repositories in order to deliver tangible business benefits. Despite the rise in popularity of KTPs since their inception, they have received little academic attention. An extensive review of the literature has identified a single study that used a KTP as the context for research into cultural barriers to change (Losekoot, Leishman and Alexander, 2008). However, the review did not identify any literature that studies the processes of knowledge acquisition that exist within KTPs, nor any examinations of the challenges that KTPs present to the partnering organisations such as SMEs or the individuals involved in their execution. This research focuses on KTPs in different industry settings, and explores different phases of development in the KTP lifecycle. In this respect, this study is believed to be the first that empirically examines this mode of university-industry engagement with small and medium-sized enterprises (SMEs), and thereby it also makes a novel contribution to our understanding of soft side of KTPs for the acquisition of knowledge

2. Literature Review

Atherton (2003) explore the multi-faceted nature of knowledge that is found within the literature, noting the many different perspectives and definitions can be compared along the dimensions of subjectivity-objectivity and individual-group. Clark and Geppert (2002) identify these conflicting streams of knowledge management research that on the one hand consider knowledge to be a commodifiable and transferable resource, but also recognise the complexity of knowledge transfer and its social and situational dependence. In attempting to move away from further classifications of knowledge that contrive to expand the divides along those dimensions Cook and Brown (1999) unite them through understanding that the work that is performed by individuals involves both knowledge and action. Such 'knowing as action' is said to "*bridge the epistemologies*" (p383) of the polarised dimensions. Skaret, Bjorkeng and Hydle (2002) illustrate the important conceptual leap that is enabled by the notion of 'knowing' when observing that many organisations focus upon creating layers of knowledge repositories so that they "*know what one knows*" (p193) but comment that "*knowing that you have a spade brings you nowhere, unless you know how to use the spade and have a hole to dig*" (p193). Knowing, therefore, does not refer to anything that is consumed by, or necessary for action to take place, but is, in fact, a fundamental part of that action (Hicks, Nair and Wilderom, 2009; Skaret, Bjorkeng and Hydle, 2002). Knowing is "*that aspect of*

action…that does…work" (Cook and Brown, 1999, p387) and is "*simultaneously a condition for and a consequence of acting"* (Wagenaar, 2004, p651).

A recurring criticism of the extant knowledge transfer literature is the relative lack of appropriate empirical testing and evidence to support theoretical concepts and organisational knowledge-models, a lack of common terminology to express the conceptual building blocks, and a tendency to focus upon the process of knowledge transfer and organisational learning rather than the process of knowledge creation (Nonaka, von Krogh and Voelpel, 2006; Nonaka, 1994). The term 'knowledge acquisition' is used in this study as it reflects the multi-faceted nature and perspectives of knowledge in an organisational context. The literature discusses many knowledge-based themes including the importance and benefits for organisations to create new knowledge, for organisations to utilise existing knowledge, the systems and methods that facilitate knowledge use and the importance of the individual as well as the collective. In doing so the terms 'knowledge management', 'knowledge transfer', knowledge production' and 'knowledge creation', among others, are used, often interchangeably. The term 'knowledge acquisition' encompasses these terms and is one that is frequently used in the literature for this purpose (Alondieriene, Pundziene and Krisciunas, 2006; Clark and Geppert, 2002; Gupta and Govindarajan, 2000).

Universities' have the great potential to contribute in regional value creation. There is a relationship between academic engagement and commercialisation (Perkmann et al, 2013) which is thoroughly addressed. Universities contribute differently in different conditions, their contribution is different in developing and developed countries (Serbanica, 2014). Research shows that the motives of (and outcomes for) university and industry actors correspond despite their different work environments (Ankrah et al, 2013).

University-industry knowledge transfer can unfold in many ways and impacts multiple stakeholders, and that, especially in highly differentiated university systems (Rossi and Rosli, 2014). Universities in UK develop a commercialisation agenda and strategic priorities for knowledge transfer, along with the organisational support mechanisms to facilitate knowledge transfer. The scale and scope of knowledge transfer activity different for high research intensive (HRI) and low research intensive (LRI) universities (Hewitt, 2012). Though UK Universities have long been involved in knowledge transfer activities - the last 30 years have seen major changes in the governance of university-industry interactions. Knowledge transfer has become a strategic issue: as a source of funding for university research and (rightly or wrongly), and as a policy tool for economic development (Agrawal, 2001; Geuna and Muscio, 2009). Some of the literature that examines the nature of inter-organisational transfer and co-production of knowledge focuses on the interaction between commercial organisations. For example between law firms and clients, and between management and engineering consultants and their projects (Skjolsvik, Lowendahl, Kvalshaugen and Fosstenlokken, 2007). Skjolsvik et al (2007) find that knowledge-intensive business service (KIBS) firms are more concerned with being able to legitimately claim their possession of knowledge of specific aspects of business and management in order to secure future contracts than with their actual possession of that knowledge. This literature also tends to focus on examining the political or institutional mechanisms by which knowledge transfer can be promoted or conducted, such as the triple helix of relationships between university, industry and government (Abd Razak and Saad, 2007). This review informs the importance of inter-

organisational knowledge transfer between heterogeneous organisations and non-availability of studies that investigates the soft side of knowledge transfer between universities and SMEs.

3. Background of Knowledge Transfer Accounts

Schemes such as Knowledge Transfer Accounts (KTAs) exist to provide funding for university-industry knowledge acquisition and may be used to fund Knowledge Transfer Partnerships (KTPs). Knowledge Exchange Opportunities (KEOs) also exist that are outwardly similar to KTPs but focus upon supporting the linkages between social sciences and the commercial world. Further, shorter schemes, such as Strategic Insight Programmes (SIPs) also exist that aim to fund the establishment of links between university and commerce but without undertaking such significant programmes of work or knowledge acquisition.

Knowledge transfer is widely emphasised as a strategic issue for firm competition. Knowledge transfer has to be reliable and codified (Albino et al, 1998). Social exchange plays a vital role in knowledge transfer between partners (Muthusamy and White, 2005) and can influence the nature of partnership. Knowledge Transfer Partnerships (KTPs) facilitate the relationship between university and organisations and are equally applicable to the acquisition of technical knowledge and business management knowledge (KTP, 2013). KTPs are "*UK-wide programmes*" that form a partnership between an organisation and "*a university, further education college or research and technology organisation…to help your business develop*" (KTPa, 2013). Organisations may be micro-sized, small to medium-sized enterprises (SMEs) or large business, in private, public or third sectors. Sector-specific variants of KTPs also exist including those that focus upon environmental and sustainability issues.

Projects that KTPs aim to deliver include development of new and existing products, development of marketing strategies and the development of business processes and practices (KTPc, 2013). The benefits that KTPs are expected to bring are significant, ranging from the creation of new jobs to the increase in profits: an increase in profit before interest and taxes (PBIT) of £220,000 has been achieved in some instances (KTPb, 2013). The success of KTPs has been widely reported, and they have, for example, been used as vehicles for improving the service provided to alcoholic hospital patients, achieving ISO9000 certification and the design of high-technology products.

In brief, KTPs are part-funded ventures whereby an Associate is employed to undertake a significant project for an organisation, supported by experts and academics from the university. Being part-funded by the Technology Strategy Board or similar funding body, typically up to 65% of the total cost, some of the commercial pressures that have been shown to be influential and deleterious to knowledge-intensive businesses (KIBs) co-production of knowledge (Cyert and Goodman, 1997) can be seen to be significantly reduced by the adoption of KTPs as a mechanism for organisational development.

Over three thousand organisations have embarked upon KTPs since their launch in 2007 (KTPc, 2013). KTPs are more than simply mechanisms for organisations to receive funding to undertake work, rather they are intended to be mechanisms for transferring knowledge and enable knowledge to be "*embedded into the business*" (KTPa, 2013). In addition to delivering real benefits for organisations, KTPs are aimed at providing benefit to "*all the partners*" (KTPd, 2013): being of strategic or tactical importance for the

business, requiring expertise from the knowledge base partner and be challenging for the Associate that is employed to undertake the work (KTPd, 2013).

KTPs, therefore, offer an attractive way for universities and enterprises to collaborate. Typically, university graduates are employed as KTP Associates to undertake a substantial piece of work for an organisation under the guidance of an Industrial Supervisor and an Academic Supervisor. Not only does the KTP provide the organisation with a dedicated resource to undertake a significant project but also provides access to a university's corpus of knowledge and experience. The university gains the opportunity to inject its expertise into the commercial environment and to engage in further research. Additionally, the Associate gains valuable vocational experience and is supported by a programme of further study resulting in nationally recognised qualifications, including the opportunity to study for a higher degree. Being part funded, and not requiring the diversion of existing human resources away from current organisational activities, KTPs potentially have significant advantages over other more traditional consultancy arrangements, particularly for small to medium-sized enterprises (SMEs).

A further expected benefit of undertaking KTPs is providing academics opportunities to develop contemporary teaching materials and conduct research that may contribute toward national research evaluations such as the Research Excellence Framework, as well as the chance to apply knowledge and expertise (KTPe, 2013) - for which, half a day per week of the academic's time is allocated, for the duration of the partnership (KTPe, 2013). KTPs have been conducted with over 100 universities and other knowledge base partners, across a variety of disciplines including business management (KTPe, 2013).

Recent graduates, employed as Associates to undertake the partnership work, get the opportunity to use their degree in a real-world situation whilst gaining invaluable career experience in managing a significant project. During the KTP, approximately 10% of an Associate's time is spent gaining further qualifications and training. Recognising the complexity of undertaking such a programme of work KTP Advisers are employed to support the development of the KTP proposal and ongoing partnership (KTPe, 2013). Advisers support academics in meeting their objectives, as well as guiding the training of Associates and the administration of funds (KTPe, 2013).

The Figure 1 depicts the typical interactions between the various actors that are involved in KTPs, and are discussed in detail later. The frequency of interactions varies greatly between actors. The interactions between the KTP Associate and the Industrial Supervisor, and indeed the whole organisation, are almost continuous; the Associate being physically located within the host organisation. The Associate is also in frequent contact with the Academic Supervisor, this being a stipulation of the KTP contract, and often necessitated by the work being undertaken by the Associate; at times there is a need to work closely together, for example, during the early stages of the partnership when the programme of work is being detailed. Contrastingly, the KTP Adviser will only be in direct contact with the other actors during Local Management Committee (LMC) meetings, although ad hoc communications may take place outside this. Similarly, the Academic and Industrial Supervisors may only make direct contact at the monthly Management Meetings, though in practice they tend to meet more often than this, for example, attending meetings that are scheduled by the Associate to discuss key developments.

To highlight the relatively high frequency of contact between the Associate and the Academic and Industrial Supervisors, those relationships have been indicated by bold arrows in Figure 1. It can be seen that these relationships are the primary means by which problems, skills gaps and their resolutions are identified and addressed within the KTP Partnership. Beyond these day-to-day relations between individuals, occasions arise, such as during monthly Management Meetings, where the KTP Adviser, the Associate, Academic and Industrial Supervisors will be working together as a small group. Also, recognising that the Associate spends the majority of their time working in the host organisation, they are frequently involved with other individuals that are affected by the KTP's activities, but who are not directly involved with the KTP, and these interactions are therefore not indicated in Figure 1.

KTPs can be seen to involve instances where knowledge acquisition appears to occur between individuals, between small groups of individuals and, ultimately, between individuals throughout the organisation. The Associate's role among these relations is of paramount importance and therefore forms the focus of this study's examination of knowledge acquisition in a KTP context.

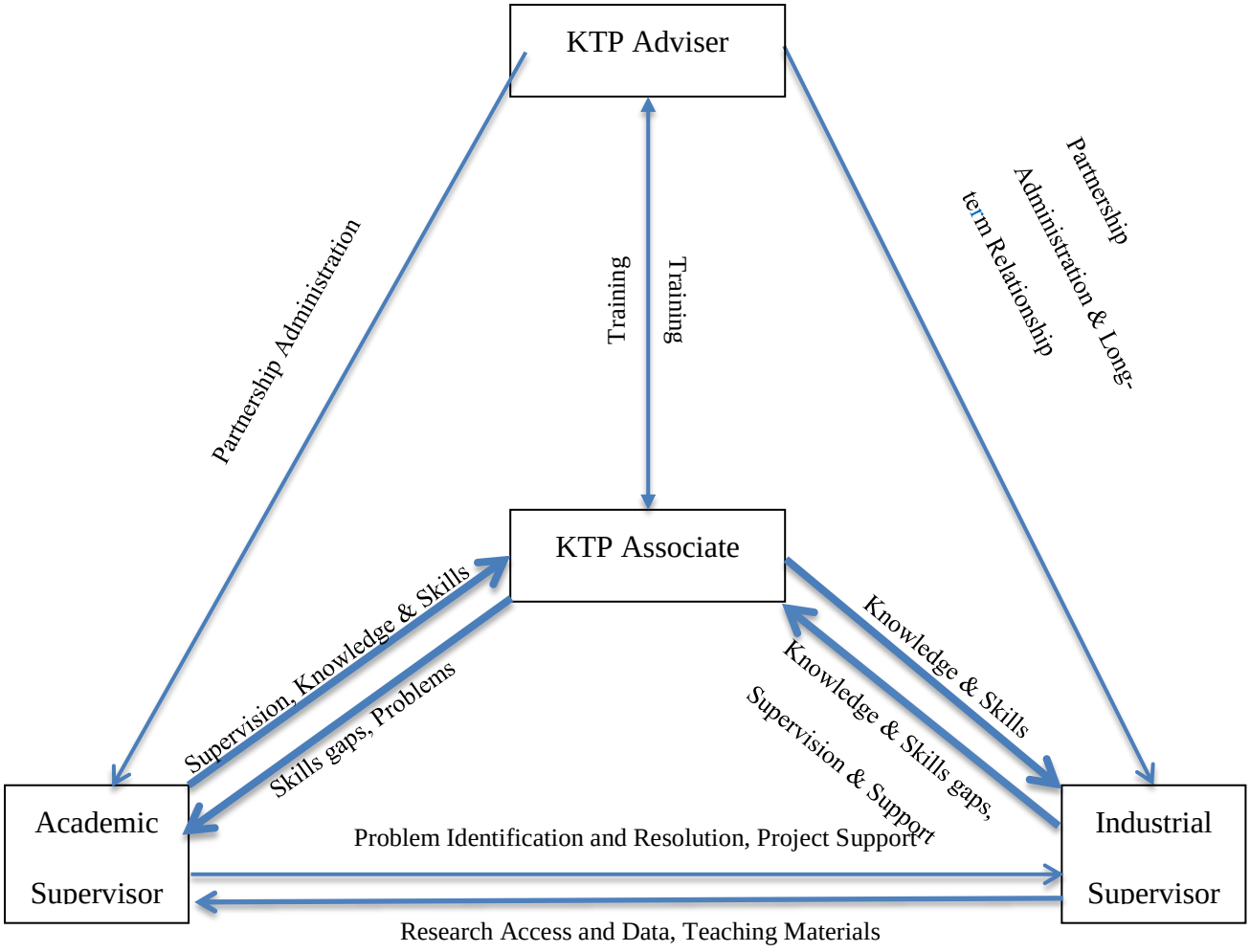

Figure 1. KTP Actors and their interactions

4. Research Methodology

The importance of knowledge acquisition for modern organisations cannot be overemphasised. However, it remains a problematic subject for both academic research and practical application, as it has been conceptualised in different and sometimes contradictory forms. Despite this apparent confusion, programmes such as KTPs exist that attempt to foster knowledge acquisition and they have been shown to be successful in generating significant benefits for the organisations involved. Such schemes may be able to shed light upon the challenges that organisations face when attempting to promote the acquisition of knowledge. This paper, therefore, makes an investigation of KTPs as vehicles for knowledge acquisition.

KTPs are designed to deliver a significant programme of work. It is the work that is undertaken by the Associate that results in the acquisition of knowledge for the partnering organisations. Adopting the notion of knowing, or 'knowledge as doing', enables the study of knowledge acquisition by observing the context of the work being undertaken. Situations or events that prevent the intended work being undertaken thereby inhibit the acquisition of knowledge.

There are many potential sources of issues that could adversely affect the work that is undertaken in KTPs. These may be ascertained from an examination of Figure 1 and comprise the Associate's knowledge and skills gaps, the provision and effectiveness of subsequent training, support from academic and industrial supervisors as well as other personnel in the partnering organisations and the accurate identification of organisational problems along with their successful resolution. However, as the literature suggests, the process of knowledge acquisition is complex and the number and nature of problems are likely to be numerous. For example, the competing interests of the partnering institutions, discussed in section 2.0, may be sources of further problems. The next section is a discussion of the research design, process, methodology and methods for data collection, and their relationship to the aims and objectives of the paper i.e. endeavours to capture the rich and diverse nature of the KTP environment in which work is undertaken and thereby knowledge is acquired. The methodology is described and justification for its selection provided

4.1 Research Design

According to Yin (1994, pp.19) research design is the action plan to help a researcher execute the research from its inception to its conclusion. It does this by providing the researcher with "the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions" (Yin, 1994). A schematic representation of the research design adopted is shown in figure 2. Participatory Action Research (PAR) was adopted as the Research Methodology and case study approach was adopted as the primary research method for collecting data. The rationale behind this combination was that Participatory Action Research (PAR) studies PAR is offered as a middle-ground that "*combines participant observation with explicitly recognised action objectives and a commitment to carry out the project with the active participation in the research process by some members of the organisation studied*" (p369). Adopting a role that is deeply embedded within the research context affords advantages that arguably cannot be achieved by other approaches. The observational research was carried out whereby the researcher acted as a participative observer (Pohland 1972). Whyte (1989) proffers PAR

as a form of research that is rooted within the action research paradigm but distinct from other ways in which it is practised.

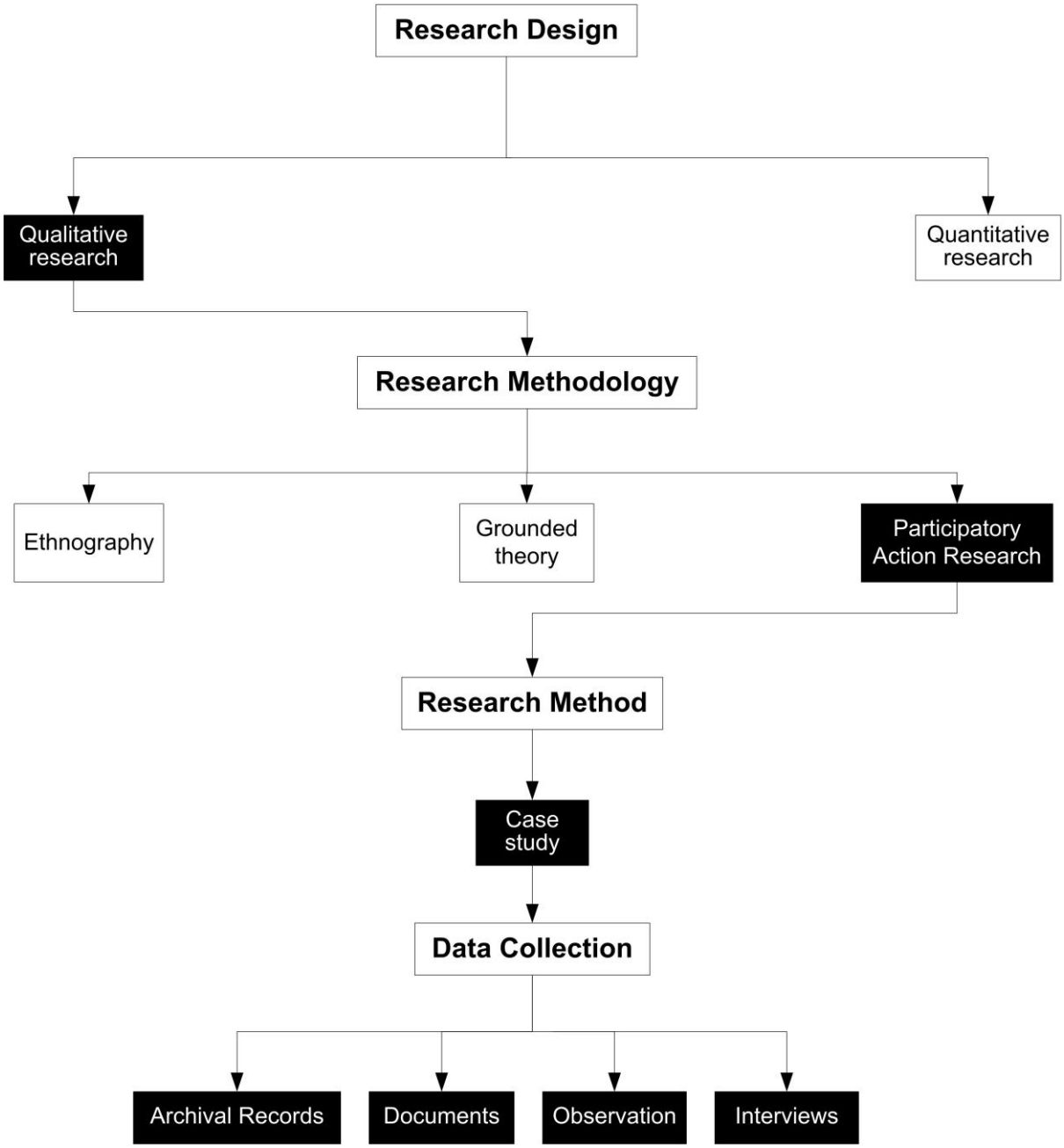

Figure 2. Research Design

The case study approach as a research method for data collection is being widely used as a "common research strategy in psychology, sociology, political science, business, social work, and planning" as it has the potential to make unique contributions "to our knowledge of individual, organisational, social, and political phenomena" (Yin, 1994, pp.2). This unique characteristic of the case study approach endows the ability to acquire and "retain the holistic and meaningful characteristics of real-life events" (Yin, 1994, pp.2) which can be of tremendous importance in any sociological research study. To fill the gap in research on limited understanding on how the acquisition of non-technical knowledge between university and organisations takes place – a Participatory Action

Research (PAR) led research Methodology in-conjunction with multiple exploratory case study approach was adopted as the primary research method for collecting data. The nascent nature of the dynamics of university-industry relationships on soft side of knowledge transfer partnerships requires an research design as the one adopted for this study (see Figure 2) to answer: (a) the "how" (how does the dynamics of university-industry relationships enable firms to implement and leverage the power of soft side of knowledge transfer partnerships for enabling innovation?) and (b) the "why" (the motivations and impacts of university-industry relationships for enabling innovation). To this end, PAR observational research of three organisations engaged in KTPs that endeavour to deliver business process improvements with a university in the South West of England were selected based on their focus on providing understanding how the acquisition of non-technical knowledge between university and organisations takes place. As the work is exploratory in nature and so a case study approach (Yin 2003) was adopted for its usefulness in uncovering 'why?' and 'how?' phenomena occur in-context of the dynamics of university-industry relationships. The use of three different cases and multiple approaches were used to capture the detail of the cases, and through using this methodological triangulation the study can also claim a degree of validity and recoverability.

4.2 Data Collection

Twelve semi-structured interviews were conducted in each of the three organisations (i.e. cases). This was further completed with approximately forty hours of on-site observation and the compilation of instantaneously-sampled field notes in each of the three organisations (Paolisso and Hames, 2010), to the point of theoretical saturation (Guest, Bunce and Johnson, 2006). Interviews were also conducted with each KTP Associate responsible for conducting the business process improvements in each organisation, and this was done for all three organisations (i.e. cases). Interview questions were based upon the potential sources of tensions identified from the literature, then cyclically developed to elicit further discussion of salient and emerging topics following initial data analysis (Halcomb and Davidson, 2006). Data analysis of the interviews and field notes was performed using thematic indexing (Guest et al., 2012).

The study of each organisation lasted for a minimum of two years and the entire project lasted four years. Since each of the three KTPs adopted the same approach to achieve the objectives of each partnership, this offered a greater degree of comparability than would have been possible by observing three KTPs that utilised different approaches. Also, by exploring KTPs in organisations that operate in dissimilar sectors of commerce the relevance of this study's findings to other KTPs is improved. Triangulation of the research findings across research sites and long-term immersion in the field of research contribute to the quality of action research (Whittemore et al., 2001), termed 'recoverability'. Our rationale behind the selection of these specific cases was driven by an 'replication logic' via-a-vie 'sampling logic' as this enabled to have confidence in the robustness of our theory building as it enabled pattern matching across cases as recommended by Yin (2003).

4.3 Case Companies Background

Company A: The first KTP organisation is a non-profit, rural, agricultural society: hereafter referred to as the 'Rural' organisation. It has been in existence for over 200 years and employs in the region of fifty personnel. The society exists to support

agriculture and rural activities in the South West of England and is a nationally and internationally recognised institution.

The KTP with Rural was initiated to develop and implement an environmental management system (EMS). This was required to improve the organisation's waste management systems and practices and thereby deliver bottom-line savings. It was also envisaged that the achievement of an accredited EMS would enable the society to demonstrate and market it's commitment to minimising its environmental impact and enable it to support other organisations in the area to pursue the development of their EMS in the future.

Company B: The second KTP organisation is a nationwide provider of refrigeration, mechanical and electrical services to a range of businesses, predominantly supermarkets and food distributors: hereafter referred to as the 'Service' organisation. The organisation was formed in 1988 and employs in the region of 450 employees. The KTP with Service was initiated to explore the organisation's existing business and information systems, develop a short and long-term strategy, and identify and implement other operational improvements.

Company C: The third KTP organisation is a design and manufacturing company providing electro-pneumatic products for a range of military applications: hereafter referred to as the 'Military' organisation. It is part of a global group that has been in existence for over 25 years and employs over 4,000 employees. The study was made at a single site that employs in the region of seventy employees. The KTP with Military was initiated to develop and implement a New Product Development (NPD) process to improve the efficiency and effectiveness of new product introduction.

4.4 Observations

Each of the three KTPs employed Process Mapping (PMapping) as a means of investigating the current state of the business processes and of producing a plan of necessary or desired changes. Process mapping is "*an analytical technique*" (Paradiso and Cruickshank, 2007, p32) that graphically depicts how areas of an organisation work and is an "*effective tool*" (p32) for documenting the current-state. Furthermore, this is not merely an approach to recording a snapshot of current-state but "*with process mapping, organisations create not only an 'is' map…but also a 'should' map that tells where you want to go*" (HFMA, 2006, p1). PMapping is widely regarded as being a core approach to undertaking business improvement (Parry, Mills and Turner, 2010; Lasa, Laburu and Vila, 2008; Paradiso and Cruickshank, 2007). PMapping is used extensively throughout manufacturing industries but has also been used in laboratories (Frederick, Kallal and Krook, 2000), construction (Winch and Carr, 2001) and in service environments.

Though there are numerous variants of this approach they all attempt to provide a mechanism for gaining a detailed understanding of the current state of the way in which the organisation works (White and James, 2014). In the case of Rural, the process maps enabled the current waste management processes to be analysed for deficiencies in light of both regulatory requirements and the requirements of ISO14001 and Eco-Management and Audit Scheme (EMAS) environmental management certifications and awards. In Service, the process maps enabled the identification of duplication of work and the associated implementation of efficiency savings. In Military, the process maps

enabled the current business development processes to be analysed and an improved process to be designed.

5. Cross-Case Analysis

Due to the nature of the phenomenon understudy, a hybrid analytical approach was adopted that considers Eisenhardt's two-step procedure was adopted (Eisenhardt, 1989). First, a case study protocol to systematically collect data according to the research objective was developed. Data were initially analysed for each case at an individual level and the within-case analysis was conducted for each case company separately. Second, a cross-case analysis synthesis was used to identify common themes emerging on dynamics of university-industry relationships on soft side of knowledge transfer partnerships. This helped ensure the reliability and validity of the research findings. A schematic representation of the entire case-study process adopted is shown in figure 3. This hybrid analytical approach outlined in figure 3 was followed so as to ensure focus findings patterns within and between case companies. The discussion on within-case analysis and cross-case analysis is presented below.

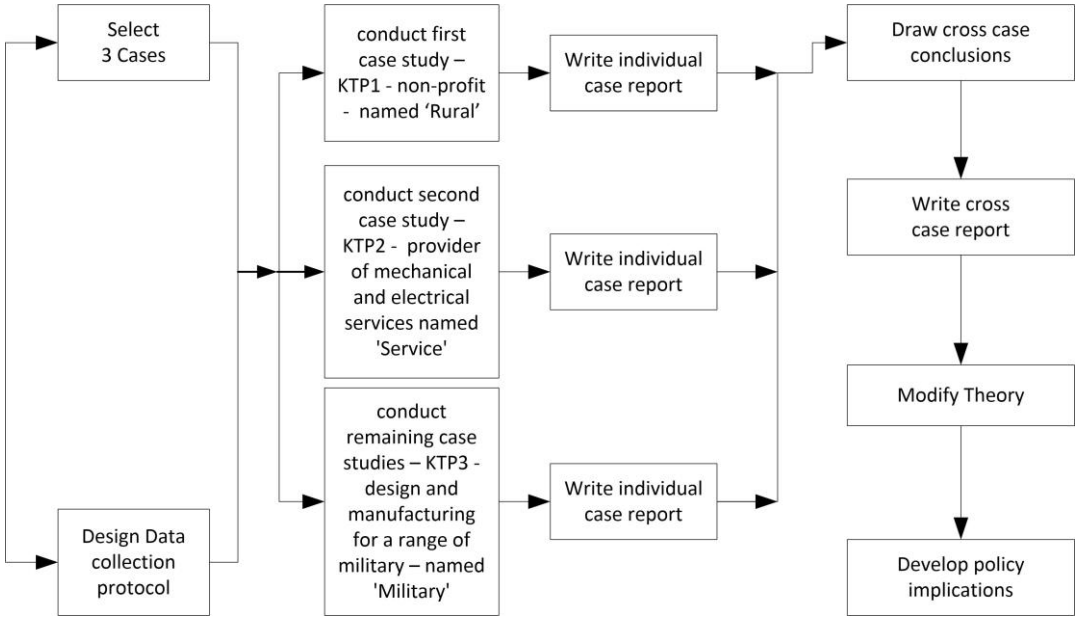

Figure 3. Case-study process adopted for 3 KTPs

5.1 Phases of KTP Development

PMapping afforded an effective means of acquiring knowledge of the key business processes along with their associated business processes. This enabled Associates to confirm or refine KTP objectives and identify productive work to undertake. Process mapping was found to be an important facilitator of socialisation that can contribute toward effective knowledge acquisition (Nonaka and Konno, 1998; Nonaka, 1994). The resultant process maps were also found to be valuable repositories of individual knowledge that could be utilised by the organisation for future process and staff development (Ewenstein and Whyte, 2007).

Despite the seemingly disparate goals of each of the three KTPs each partnership was found to exhibit a similar developmental lifecycle comprising three phases (Figure 4). The three phases can be broadly divided into early, middle and late stages, characterised

by the level of communication between the Associate and the Academic Supervisor, the clarity of KTP objectives and the Associate's level of motivation.

The early phase of all three KTPs was characterised by very high levels of communication between the Associate and the Academic Supervisor. The degree of communication appeared to be related to the Associates' frustrations at the lack of clarity of the KTP goals and objectives. Although each KTP was launched with seemingly well-defined objectives, the finer details, including for example what other staff else would be involved in resourcing the efforts, often resulted in frustrating delays for the Associates (indicated by arrow A in Figure 4). During this time the Associates required reassurance that the delays were not a reflection of their own performance. Providing other shorter projects for them to undertake were found to be valuable, both in delivering unplanned benefits for the organisation and also for improving the Associate's understanding of the organisation, its processes and other staff: Rural KTP added the development of an online customer booking system, Service KTP added the implementation of revised software in Human Resources and Finance departments, and the Military KTP added the creation and delivery of 6-sigma and DFA/M workshops with the organisation's key suppliers.

The middle phase of all three KTPs was characterised by similar reductions in the level of communication with the Academic Supervisor. As the KTP objectives and details became clearer, and the Associates' familiarity with the organisation improved, so they improved their ability to carry out the necessary work with less support and reassurance. It is notable that in some instances the valuable shorter projects that had been introduced in the early phase were found to continue for considerable periods of time. These were occasionally found to become minor disturbances as they contributed to rapidly increasing workloads: in particular, short projects to implement software improvements and manpower planning systems in the Service organisation were considerable additions to the planned Associate workload.

The later phases of the Rural and Service KTP were characterised by similar changes. Both Associates were observed to be keen to increase their remit and make further business improvements beyond the original scope of the KTP. This was both encouraging to observe, as the Associates' skills and abilities were expanding, but also contributed a minor source of tensions as their efforts were restricted to focus upon achieving the primary objectives of the KTP above other benefits (indicated by arrow B in Figure 4). The later phase of the Military KTP, however, was found to exhibit markedly different characteristics. This KTP was beleaguered by an apparent lack of management support when attempting to complete the project objectives. Toward the end of the KTP the Associate became increasingly frustrated at being unable to have achieved all of the stated objectives of the KTP: once again, Associates were found to feel personally responsible for delivering a successful KTP and experienced great frustration and anguish when prevented from doing so.

In summary, despite pursuing very different goals and objectives in each of the three KTPs, with organisations that operate in different commercial environments, each was found to progress through similar phases of development. The KTP Associates underwent similar periods of frustration and motivation, coupled with differing degrees of communication with the Academic Supervisor and the requirement for emotional support.

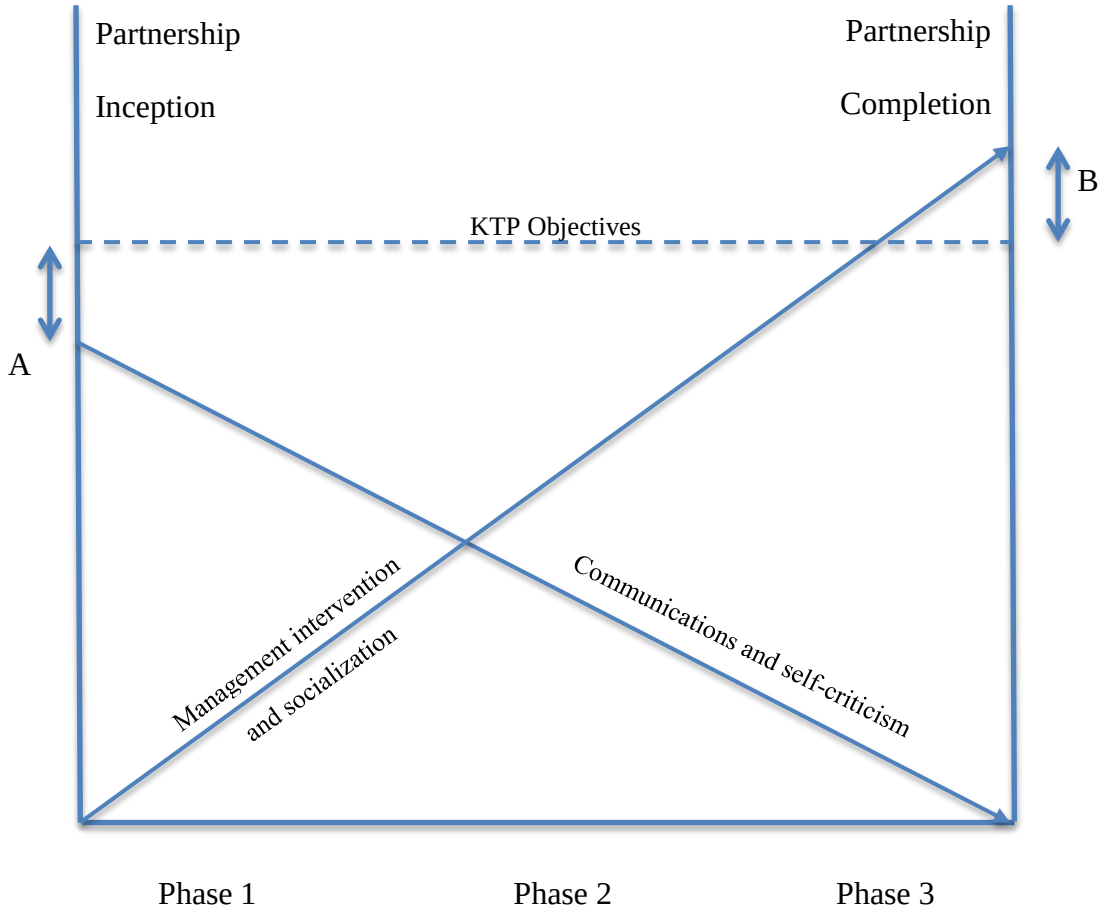

Figure 4. Phases of KTP Development

5.2 Governance of KTPs

This section asserts that KTPs are not problem-free and though they are seemingly effective mechanisms for undertaking business improvements they can generate considerable anxieties in their constituent staff. It was not the purpose of this research to evaluate the effectiveness of the KTP scheme, but each of the three KTPs was found to deliver a range of valuable business process improvements. Largely these were in line with the originally intended outcomes of the partnership. More importantly, this research has identified three themes that were problematic and common to each KTP; Associate Integration, Partnership Objectives and Associate Motivation.

Associate Integration

One of the immediate issues that faced KTPs was the integration of the project Associate with the partner organisation. Even though the Associates underwent formal induction programmes these were insufficient by themselves to fully immerse the individual with the organisation. All three Associates that were the subjects of this study relate the tensions that surrounded their introduction to the company and the difficulties this presented. Over time, though, some Associates were capable of socialising with other members of staff during the performance of PMapping and forging relationships that reduce the workplace tensions.

Partnership Objectives

All three KTP projects identified a period of flux when the objectives of the partnership were changed or modified. This was often a period of considerable tension for the Associates who, without clear and stable goals, found it difficult to progress the project and often became demotivated and frustrated. Undertaking the activity of PMapping was found to be an effective way of acquiring knowledge of the organisation and its operations, the knowledge that subsequently informed the development of clear project goals. In constructing the PMaps - the Associates gained knowledge of the organisations' systems and working practices and also interacted with the other members of the organisation, thus facilitating the development of closer working relationships and reducing workplace tensions. PMapping, therefore, provided a relatively simple approach to integrating the Associate with the organisation and of generating potentially valuable knowledge that may aid the development of the project objectives and the realisation of the partnership deliverables.

Associate Motivation

Each KTP underwent a period of time, in some cases a considerable portion of the overall project duration, where the Associate experienced a great degree of frustration and demotivation. The sources of frustration ranged from a lack of clear and stable project objectives to internal resistance to change. During these periods, the Academic Supervisor was called upon to provide significant levels of pastoral care. Although the Associates' supervisors may be expected to provide a degree of mentoring and technical support - the demands made by the Academic Supervisor to provide pastoral support could be considerable, particularly when the Associate faced tensions with their Industrial Supervisor and other colleagues.

5.3 Implications and Responsibilities

KTPs are part-funded initiatives utilising government funding to facilitate partnerships between universities and small to medium-sized enterprises. As such, the funding and partnering organisations have a responsibility of stewardship to what are essentially public funds. While it is not the purpose of this research to evaluate the effectiveness of the governance of KTP funds, the findings of this study suggest that systemic organisational resistance, not necessarily the resistance of individual employees, can be a pertinent inhibitor to the achievement of KTP objectives. The KTP with Military was notable for the reluctance of the organisation's management to consider the adoption of a great many of the partnership's suggestions for improvement. While a degree of resistance to change would not be surprising in such a partnership between university and commercial organisations (see Skjolsvik, Lowendahl, Kvalshaugen and Fosstenlokken, 2007), this organisation also exhibited an unwillingness to accept the Associate's measurements and observations of its current systems and practices. Consequently, government and funding partners should be mindful of organisations that fail to adequately support the achievement of the objectives for which funding has been secured.

In each of the three KTPs that were studied, the Associate was found to undergo considerable emotional turmoil. This was the result of several different factors: the lack of clear goals, or competing and changing goals, was found to induce short-term anxieties within each Associate, whereas a lack of support to achieve the KTP objectives,

however, was found to induce longer periods of anger and frustration, and in some instances, resulted in the Associate resigning their position or taking sick leave. Clearly, some degree of uncertainty around KTP objectives will exist at some point in time. All of the Associates were accepting of these situations. Prolonged periods of indecision, however, reduced the remaining time that was available to achieve the aims of the KTP and adversely affected the Associates. Not only did this result in a reduction in the Associates' motivation and level of performance, but also it had a significant deleterious effect upon their psychological well-being. The Academic Supervisor was frequently called upon to provide pastoral care and emotional support beyond that which they are required to provide in their everyday role as a University Senior Lecturer. Although the Associates' Supervisors may be expected to provide a degree of mentoring and technical support, the demands made on the Academic Supervisor to provide pastoral support can be considerable when the Associate faces tensions with their Industrial Supervisor and other colleagues. This suggests that the choice of Academic Supervisor for a proposed KTP should take into account the abilities of the supervisor to provide such pastoral support as well as their technical or experiential credentials. Furthermore, academic staff that undertake KTP supervision should be appropriately trained in providing such support, and that the university takes reasonable precautions to monitor the emotional well-being of the Associate and Academic Supervisors that they employ.

Further concerns also arose over the way in which KTPs had been advertised to university staff. The aims and benefits of KTPs have been outlined at the beginning of this paper and, as can be seen, these are significant programmes of work for both the university and the partnering organisations. However, *a university memo* that promoted KTPs to academics, while it identifies the potential to develop teaching and research outputs from these partnerships, also highlighted their attractiveness in terms of "*getting out of the university…for half a day a week*" and "*workload bundles!*" – academics having to complete a given number of 'workload bundles' per year to fulfil their contracts. The view of this paper is that this trivialising of the benefits of KTPs does not serve to reinforce the importance of these partnerships, not just to the partnering organisations, but also to the development of the United Kingdom's economy. Not all academic staff may have the necessary combination of skills and experience to lead KTPs successfully, furthermore, failure to provide appropriate pastoral support could be considered to be a failure in the partnership's moral obligations to the Associate that has been employed. The *university memo* suggests that even complex partnerships may be managed by all academics, ignoring the possibility that staff may have little or no prior management or consultancy experience, and may be in need of extensive training and support to ensure partnership success. The finding of this study is that academic staff require careful selection, training and support in order to be effective KTP supervisors.

6. Conclusions

Knowledge, its generation, replication and dissemination remains a key issue for modern organisations that seek to gain and maintain a competitive advantage. A variety of mechanisms exists that aim to facilitate knowledge acquisition in organisations. Among these, in the UK Knowledge Transfer Partnerships (KTPs) have found particular favour and been highly successful in delivering significant change in SMEs. Despite this, they have received little academic attention. This paper explores the challenges that surround the delivery of KTPs and makes a novel contribution to our understanding of soft side of KTPs for the acquisition of knowledge.

This research finds that KTPs in different sectors of commerce, with differing objectives, appear to mature through three similar phases of development. These stages are characterised by gradual reductions in the level of communication between the KTP Associates and Academic Supervisors, and increases in the degree of socialisation of the Associate with other employees. During the early stages, the Associates experience high degrees of self-criticism. Later stages require careful management to maintain project momentum, in particular through intervention between the Associates and other, often senior, staff in the organisation. Furthermore, this study highlights that KTPs are not simplistic undertakings and the partnering organisations have a duty of care to all stakeholders. Earlier research work didn't find any evidence that KTP Associates require considerable support, however, this research highlights that KTP Associates require considerable support in overcoming institutional resistance and self-criticism that can be considerable sources of emotional turmoil and stress. Commercial partnering organisations must be selected and managed with care to ensure that funds are used most effectively. Academic partnering organisations must recognise the challenge that KTPs present and must select, train and support staff appropriately.

Future research should explore the ways in which KTPs develop and mature. Researchers may explore how the KTP Associate's communication with other individuals fluctuates during the time of KTP. It would be useful to understand if the phases identified in this study are common to partnerships undertaken with other universities and organisations, or if they are determined in some way by the type of work that is undertaken.

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