Supporting Open Innovation with the use of a Balanced Scorecard Approach:

A Study on Deep Smarts and Effective Knowledge Transfer to SMEs

Graham Manville*, Norwich Business School, University of East Anglia, UK
Fahri Karakas, Norwich Business School, University of East Anglia, UK
Martyn Polkinghorne, Bournemouth University Business School, UK
Nick Petford, Office of the Vice Chancellor, Northampton University, UK

* Corresponding Author: g.manville@uea.ac.uk

Abstract

This study aims to develop the theory of knowledge management and organisational performance within a small and medium enterprise (SME) context using action research (AR) involving a higher education institution (HEI) and a SME. The vehicle for the knowledge exchange was Knowledge Transfer Partnerships (KTPs), the United Kingdom's primary mechanism for delivering government funded knowledge transfer to small and medium enterprises (SMEs). KTPs facilitate knowledge exchange from HEIs to SMEs via the recruitment of a graduate plus an academic supervisor from the partnering HEI. The AR study was an award winning KTP and the project deliverable included the implementation of a balanced scorecard for the SME to improve organisational performance. The transfer of knowledge was subsequently fed-back into the university in order to develop a performance framework for measuring the effectiveness of KTP research within the HEI in order to share knowledge and improve effective for other KTP projects.

Keywords: Knowledge Transfer, Performance Measurement, SME, Open Innovation, Balanced scorecard

1. Introduction

SMEs are a vital part of any national economy; since they comprise the great majority of enterprises and employment in any country in the world. As SMEs are becoming more knowledge

intensive, knowledge has become one of the critical driving forces for long term success of SMEs (Beylier et al., 2009). As such, managing knowledge is a critical capability for SMEs because it helps them leverage their most critical resource (Kumari et al., 2015; McMahon, 1999). SMEs need to apply effective knowledge management in order to enhance their competitiveness, support management decision making, increase their efficiency in operations, increase levels of customer service, and increase capacity for innovation (Coulter, Baschung & Bititci, *et al.*, 2000; Kessler, Allocca & Rahman, 2007). Knowledge management can be defined as the process of critically managing and using knowledge to meet existing needs, and developing new knowledge in order to take advantage of new opportunities (Quintas et al., 1997). However, knowledge management for SMEs differs from that of large organisations (Durst and Runar Edvardsson, 2012). For SMEs, knowledge management is only relevant if the SME can deploy knowledge easily and pragmatically for its strategic goals; such as higher profits or increased efficiency (Durst and Runar Edvardsson, 2012; Yew Wong, 2005). Since knowledge is created, shared, transferred, and applied through and by people, SMEs need to manage knowledge in a humanistic way and rely on tacit knowledge of their employees, rather than advanced databases or technologies (Yew Wong, 2005).

Innovation and knowledge are currently placed at the heart of the UK Government's competitiveness agenda. The KTP initiative remains the UK's primary mechanism for delivering government funded knowledge transfer to small and medium enterprises (SMEs) since its introduction in 1975 under the previous name of Teaching Company Scheme (TCS). A KTP aims to facilitate the transfer of knowledge between university and industry partners. "Knowledge Transfer Partnerships is a UK-wide programme to encourage business and knowledge base collaborations. Knowledge Transfer Partnerships help businesses and organisations to improve

their organisational performance through the use of the knowledge, technology and skills that reside within academic institutions" (www.KTPonline.org.uk). Based upon UK Government figures (KTP Annual Report 2014), KTPs have demonstrated considerable evidence of success with official metrics drawn from data returns showing that on average each company partner has seen an increase in annual profits of £227k, the creation of 3 genuine jobs and a significant increase in skills-base of existing staff. As a result of government money invested in KTP in 2013 to 2014, UK businesses benefitted by annual profits of £211 million, employed 450 new staff, and increased £207 million in annual exports.

The fundamental model supporting KTPs is the premise that a knowledge base partner (university or research organisation) will provide the required specialist knowledge and expertise to enable business to deliver a project of strategic importance, and that a graduate will be employed to undertake the work. KTPs develop a 3-way partnership in which the company own the project outcomes, the academic team gain commercial experience/materials to support teaching and research, and the graduate gains valuable personal development and work experience within a fast track management environment (Roach & Polkinghorne 2007). Based upon an independent research study by Warwick Economic and Development (WECD, 2015), approximately 10,000 such TCS/KTP projects have been delivered to date in the UK (WECD, 2015). From a policy viewpoint, the promotion of collaborative research and university–industry research centres and the involvement of industrial partners in academic research projects have become important for economic growth and competitiveness. According to the UK government website the tripartite benefits are significant. It is reported, on average, participating businesses report an annual profit increase of £1M after taking part and the creation of approximately two new jobs. Academic knowledge partners also benefit by producing at least three research projects

and two research papers per project. With respect to the KTP Associates, 60% of them are offered permanent roles on conclusion of the project (www.gov.uk, 2016).

British universities allocate considerable resources to facilitating interaction with industry and KTPs are at the heart of transfer of knowledge and innovation. For instance, 4000 full-time employee equivalents at UK HEIs manage third-stream activities aimed at the needs of businesses and other organisations. The production of skilled graduates by universities is one of the most highly valued benefits of academic research for industrial organisations (Salter and Martin 2001). It is therefore the purpose of this paper to consider how the transfer of knowledge and innovation within a KTP could be improved and enhanced through the application of a balanced scorecard approach to measure and monitor the consequential beneficial attributes relating to the successful transfer of knowledge.

2. Open Innovation

Open innovation has been defined as the new paradigm for the management of innovation centred on the use of inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation (Chesbrough, 2006). The key here is employing both internal pathways and external sources to find ideas for innovation (Brunswicker and Vanhaverbeke, 2015; Lichtenthaler, 2011). A growing number of organisations have moved to an open innovation model to tap into the ideas of diverse people and communities (Battistella and Nonino, 2013; Chesbrough, 2006). Open innovation may be considered as an organisation's endeavour to profit from external knowledge without making heavy internal investment in long term research (Markman, 2016). Open innovation is strategically used by companies to unlock the

latent economic value in diverse ideas, identify R&D projects in a world of abundant information, and better develop and access intellectual property (Chesbrough, 2006; Lichtenthaler, 2011).

University–industry links and their impact on open innovation have been a growing interest of research in management and innovation studies (Hall 2004). The economic and social functions of universities, such as improving employable skills of cohorts of graduates, building actual working relationships among institutions, and generating scientific knowledge have been recognized to be important contributors to generating open innovation (Cohen et al. 2002). Some of the growing trends include an increasing number of patenting activities by universities, increasing university revenues from licensing (Thursby et al. 2001), expanding the number of researchers engaging in academic entrepreneurship (Shane 2005), growing shares of industry funding in university income (Hall 2004) and the growth of technology transfer offices or science parks (Siegel et al. 2003). While research on university–industry links has traditionally focused on the transfer of intellectual property (patenting, licensing, commercialisation), recent observers have pointed to a more multi-faceted nature of university–industry links (Agrawal 2001). They identify various channels (Cohen et al. 2002) or mechanisms (Meyer-Krahmer and Schmoch 1998) that function as informational or social pathways through which information, knowledge and other resources are exchanged or co-produced across universities and industry. This process is referred to as Absorptive Capacity (Cohen and Levinthal, 1990; Zara and George, 2002).

There have been some recent studies on open innovation and knowledge transfer exchanges in universities (De Wit, Dankbaar, and Vissers, 2007). Padilla-Meléndez and Garrido-Moreno, 2012; Perkmann and Walsh, 2007); analysing the main factors affecting researcher engagement in knowledge transfer exchanges; including personal and professional background, institutional context, social network, and recognition (Padilla-Meléndez and Garrido-Moreno,

2012; Savino, Messeni Petruzzelli, and Albino, 2015; Ardito, Messeni Petruzzelli, and Albino, 2015).

Research indicates that social networks and coordination among researchers, businesses, university administrators, and technology transfer offices are critical in fostering sustainable performance of open innovation projects **(**Perkmann and Walsh, 2007). Since universities increasingly rely on external sources of innovation via inter-organisational network relationships, these social networks are becoming the strategic focal points for collaborative research. However, the challenge is to devise a multidimensional system for measuring and managing different aspects of performance in such open innovation projects.

3. Performance Measurement and Management

Historically performance measurement related to financial performance metrics that were effectively lagging indicators and by the late 1980's were no longer considered appropriate for managing performance. Following the publication of relevance lost (Johnson & Kaplan, 1987) performance measurement theory was recognised as an interdisciplinary research area which transcends functional disciplines such as areas such as finance, marketing, operations and human resources. This led to the development of a number of performance frameworks such as the balanced scorecard (Kaplan and Norton, 1992; 1996), the performance pyramid (Lynch and Cross, 1991) and the performance prism (Neely et al., 2002). Balanced Scorecard Performance measurement has been defined as "a metric used to quantify the efficiency and/or effectiveness of action" (Neely, 1995). Neely's paper spawned a plethora of articles on the topic but the focus was invariably on measurement rather than managing performance. Davenport (2006) has argued that performance management should reinforce organisational learning and this was supported by

Henri (2006) who argued that the cultural and behavioural aspects of managing performance had been overlooked. Performance measurement has also been criticised by Hamel (2009) for promoting a command and control systemic approach thus diminishing employee engagement. The focus on the measurement aspect of performance whilst ignoring the cultural and behavioural aspects has led to unintended consequences if employee engagement is not managed and this can lead to gaming of metrics (Smith and Goddard, 2002). This prompted further studies in performance measurement and management which has strengthened the importance of cultural and behavioural aspects of performance (Bourne and Neely, 2000; Franco-Santos and Bourne, 2003; Garengo and Bititci, 2007). More recent studies by Bourne et al., (2013) and Smith and Bititci (2017) have advocated employee engagement within performance management frameworks.

A research study conducted by Marr and Schiuma (2003) found that balanced scorecard was the most widely used framework based on the citations in leading journals and its adoption by practitioners. This paper also proposes a balanced scorecard performance framework (Kaplan and Norton, 1996) for managing open innovation as the authors believe it is the most appropriate performance framework to promote stakeholder engagement. The balanced scorecard measures and manages performance from four important perspectives- financial, customer, internal processes and learning and growth - which can be aligned to the vision and strategy of the HEI.

4. Measuring Performance of KTP Activities

There is a stream of literature that demonstrates a balanced scorecard approach can be used effectively to assess the impact and outcomes of collaborative research projects under an open innovation strategy (Flores, Al-Ashaab, Magyar, 2009; Al-Ashaab, Flores, Doultsinou,

Magyar, 2011). The balanced scorecard approach has been used to balance multiple and competing objectives that universities develop in collaboration with industry partners. In particular, balanced scorecard has been considered an effective and holistic method to measure, track, and improve the outcomes of collaborative research projects (Flores et al., 2009; Al-Ashaab et al., 2011). As open innovation projects are multidimensional in representing the interests of various stakeholders, balanced scorecard approach is an effective method for synthesizing and balancing multiple objectives of these projects.

Capturing individual performance of KTPs on a case by case basis is relatively straight forward as KTPs have strong governance procedures in place with the funding bodies. Upon completion of a KTP, a final report outlining the deliverables and the tripartite benefits of the organisation, the knowledge base and the Associate is submitted to Innovate UK who act as the managing agent. However gaining a holistic performance framework which enables HEIs to capitalise on the benefits of open innovation described earlier is more problematic. According to Rossi and Rosli (2015), the growing economic importance of HEIs' engagement within knowledge transfer has led to policy makers from around the world to devise metrics to measure performance. Many countries such as the USA, Canada and Spain have their own data collection methods to monitor knowledge transfer. From a UK perspective, the Higher Education Funding Council for England (HEFCE) conduct an annual survey known as the Higher Education–Business and Community Interaction Survey, (HE-BCI) (HEFCE 2012). It has been acknowledged in the literature that knowledge transfer impact is difficult to quantify (Hughes et al, 2011). This is because knowledge transfer is about interactions rather than a simple linear relationship of transactions (Rossi and Rosli, 2015). Selecting a strategic management framework than can unify multi-disciplinary functional areas and measure performance is key to managing

the knowledge management process within a higher education institution. Research by Lin (2015) has discussed the possibility of using the balanced scorecard for managing knowledge transfer within Taiwanese organisations.

7. Methodology

The purpose of this research is to highlight the potential of action research in developing a performance framework for measuring the effectiveness of knowledge transfer partnerships. The chosen methodological approach is a form of action research, which involves the researchers taking on the role of active consultants (Gummesson, 2000; Whyte, 1991). We chose an action research for the present study for a variety of reasons. First, the process of action research allowed us to both implement the KTP projects and reflect on the process to develop a performance framework for evaluating the projects and their outcomes (Coughlan and Coghlan, 2002; Kemmis, McTaggart, and Nixon, 2013; Valmohammadi and Ahmadi, 2015). In other words, action research held the potential to advance our understanding of performance management of KTPs in higher educational institutions while addressing significant issues related to knowledge transfer and collaboration across organizations (Valmohammadi and Ahmadi, 2015). Second, action research has allowed us to work towards multiple goals (including designing and implementing knowledge transfer projects, measuring the effectiveness of these projects, developing a balanced scorecard framework for these projects, and sharing the results with collaborating organizations and academic and practitioner communities) at the same time through a developmental, empirical, reflective, and participative process (Argyris, Putnam and Smith, 1985; Coghlan and Brannick, 2014). Third, the process of action research enabled us to find ways of engaging in problem solving, knowledge generation, knowledge transfer, evaluation, and assessment activities at the

same time; resulting in a reflective, dynamic, and multifaceted process of dialogue among our multiple roles as researchers and practitioners (Somekh, 1995). In other words, we have been able to balance different roles including narrative and discursive roles through sense-making, and participatory and generative roles through knowledge transfer and sense giving (Lüscher and Lewis, 2008).

Action research (AR) differs from traditional approaches, as it is research in action as opposed to research about action. Coughlan and Coghlan (2002) conducted a comprehensive study of action research in operations management and identified several characteristics:

- AR is about research in action as opposed to research about action
- AR is a participatory process involving the researcher and the organisation
- AR simultaneously makes the intervention more effective whilst building up a body of knowledge.
- AR is an iterative sequence of events comprising cycles of knowledge acquisition, analysis and feedback.

Different forms of cycles have be employed in AR and Cagliano et al., (2005) applied the plan do check, act (PDCA) cycle (Deming, 1986). The iterative cycles of the AR in this study followed a cyclic pattern below:

KTP 1 (Cycle 1)

- Planning – Scoping out the 1st KTP Project with the SME, Bournemouth Churches Housing Association (BCHA)– Develop Income Stream from "Supporting People" Funding which allows vulnerable people to live independently
- Resource Gathering – Securing the KTP Funding, Allocating the Academic Supervisor & Recruiting the graduate (Associate)

- Implementation – Implementation of the KTP project plan and producing deliverables to the client and the HEI.
- Evaluation – Production of final report and scoring of report by Innovate UK

KTP 2 (Cycle 2)

- Planning – Scoping out the 2nd KTP Project – Develop a Performance Management Framework and a Culture Change Programme which could enable BCHA to improve its efficiency and provide a platform for growth.
- Resource Gathering – Securing the KTP Funding & Recruiting the graduate (Associate)
- Implementation – Implementation of the Balanced Scorecard Framework to the client and dissemination of research outputs by the HEI
- Evaluation – Production of final report and scoring of report by Innovate UK. The AR team members

Development of a Balanced Scorecard for a HEI (Cycle 3)

- Planning – Conceiving an idea to apply the principles of the Balanced Scorecard in a HEI research context.
- Resource Gathering – Opportunity to use some of the HEIF funding for developing the concept and the assemblage of a research team comprising an Academic Supervisor, a KTP Manager and a Pro Vice Chancellor.
- Implement – Development of a balanced scorecard framework which could serve as a knowledge management system.
- Evaluation – The framework was not implemented but a strong community of practice was maintained as the researchers moved to new institutions.

AR can potentially be prone to threats of validity and assumptions must be subjected to public testing (Argyris et al., 1985). Farooq and O'Brien (2015) applied triangulation (Denzin, 1970) in their AR study on manufacturing technology to guarantee validity and reliability. For validations purposes in this study, secondary research and documents will be used as a form of triangulation.

The AR approach supports the notion of Deep Smarts (Leonard and Swap, 2004) as it is a very powerful form of knowledge creation and management. Leaders that possess Deep Smarts can view their business overall or forensically work in detail. They possess a unique skillset which is difficult to codify as "their judgement and knowledge—both explicit and tacit—are stored in their heads and hands" (Leonard and Swap, 2004, p 88). According to Raelin (2006, p164), participants "are able to change their course of action based on a vigorous and open exchange of views. By this point, they have begun associating learning with the very act of collaborating with others". Raelin adds that it is vital to assess the impact of action learning on institutional collaboration.

This study aims to evaluate how higher education institutions can manage their knowledge on KTP projects in a symbiotic way which supports research and enterprise. The method will evaluate the success of a Knowledge transfer partnership which took place between 2004 and 2006. The project was to implement a balanced scorecard performance management framework in a housing association and the outcomes of the project will be discussed and how mutual symbiosis (Dayasindhu, 2002) occurred where the knowledge base facilitated new knowledge exchange to all stakeholders but adapted the balanced scorecard framework that was adapted into a conceptual model for the university.

The completion of the KTP final report coincided with an action learning initiative devised by the Vice Chancellor and the Pro Vice Chancellor for Research and Enterprise. The initiative

was known as “Releasing Potential” and it was rolled out across the university and eventually won a national teaching award (BU Annual Review, 2008). It comprised action learning sets with facilitative coaches and the opportunities for members of sets to discuss with other action learning set team members.

Within the KTP project it comprised of three core members including the “Company Supervisor” who was a Director of the housing association, the “Associate” who was a graduate recruited to implement the project over a two year period. The third member of the team was the “Academic Supervisor” who had the skills and expertise not currently available at the organisation.

The peripheral members of the team who had a pivotal role in helping to synthesise the knowledge within the university were the Knowledge Transfer Partnerships Manager and the Pro Vice Chancellor for Research and Enterprise. The KTP Manager was responsible for the successful conclusion of all of the KTPs which each had their own “Academic Supervisor”. The Pro Vice Chancellor was responsible for Research and Enterprise and was the champion of the “Releasing Potential” initiative across the university.

Between these stakeholders, a conceptual model was developed from the success of the KTP project to highlight critical success factors within the management of a KTP project. The aim was to develop a holistic set of metrics in a balanced scorecard which interlinked between the financial costing of the KTP, the customer satisfaction from the business engagement, the effectiveness of the KTP from bid success to final report score and finally the personal development of academic staff.

INSERT TABLE 1 HERE

---

8. Results

BCHA was initially a SME sized social housing association and also a registered charity and was involved in two KTPs during a five-year relationship with its knowledge base partner. The first KTP involved the positioning of the housing association to be eligible for additional funding in order to provide supplementary housing services to enable their tenants to live independently. This scheme known as "Supporting People" was a national government initiative that provided local authority funding that was ring-fenced for the purpose of supporting independent living for vulnerable tenants. The funding came on stream in the early 2000's and BCHA experienced a rapid growth in revenue. On completion of the KTP, a final report was submitted by the KTP partnership and it is judged independently. The grading of the final report assesses the KTP in terms of delivery on project outcomes for all three stakeholders i.e. the company, the knowledge base partner and the Associate (KTP Annual Report, 2011). Each KTP is awarded a grade ranging from A to E with "A" being outstanding and E being unsatisfactory (KTP Guidebook, 2013). The scoring will be based on the quality of the final report and there is guidance on how for KTP Advisors can assess completed projects. However, the Advisor guidelines are confidential but the criteria they judge on are: the overall quality of the KTP; the benefits to the organisation; the benefits to the knowledge base partner and the benefits to the KTP Associate (Ibid, p 43-44) According to Innovate UK's KTP annual reports, approximately 55% of KTPs have historically scored either A or B and the latest Innovate report of 2014 rated 61% of KTPs as good or excellent (KTP Annual Report, 2014).

The first KTP with BCHA began in 2001 and concluded in late 2003 when the final report was completed. It was considered a success and its final report was scored as a "B" which was considered a good quality KTP. The University had a portfolio of KTPs and B was the highest

scoring KTP award and this had been achieved by several completed KTPs. The success of the BCHA KTP cemented the relationship with between the university and BCHA and following discussions between the two parties, it was decided to bid for a new KTP relating to quality management and performance measurement. The deliverable for the new project was to implement a balanced scorecard framework and change management process to move the organisation onto a more commercial footing whilst retaining its mission. The success of revenue growth from the first KTP meant that improved governance and performance measurement criteria were essential for managing the organisation in order for BCHA to deliver efficient and effective services to its tenants. In addition, BCHA were aware that the Supporting People funding would not always be available and they would need to identify additional revenue streams in order to remain sustainable and grow.

The second KTP commenced in 2004 and concluded in 2006 with the final report submitted in 2007 (Knowledge Transfer Partnerships, 2007). The independent review panel judged it to be an exceptional KTP and awarded it a grade "A" on account of the KTP exceeding expectations of all three stakeholders. With respect to BCHA, it reported in the final report that it had climbed over 400 places in its benchmarked ranking by the social housing regulator. It had an immediate cost saving of £250,000 and an increase in turnover to £12M (BCHA Annual Report, 2007). As of 2015 the turnover has continued to rise and now stands at over £24 million (BCHA Annual Report 2015) which is a testimony of the legacy of the KTP. As a result of the growth in turnover, the employee headcount has risen from under 250 when it qualified as an SME to over 450 staff. The resulting impact of the KTP culminated in winning the award for the Best KTP for the South West of England in 2008. The success of the KTP also attracted higher education innovation funding (HEIF) from HEFCE to promote Knowledge Transfer within the region (BU

Annual Review, 2008, p. 29-30). During discussions in this knowledge sharing process, the opportunity of applying the principles of the balanced scorecard from the KTP in a university context were considered as it could allow a more joined up approach to Knowledge Transfer within universities.

The four perspectives of the balanced scorecard were brainstormed with the Academic Supervisor and the Knowledge Transfer Manager to arrive at a set of critical success factors for each perspective. A summary of the CSFs are shown in Table 2.

INSERT TABLE 2 HERE

For this application, the four business functions of financial, customers, internal business processes and learning and growth were retained, and against each function four perspectives were applied that were considered to important for the successful delivery of KTPs. The definition of each perspective has been based upon experience of delivering previous KTPs, and observation of KTP academic teams in action.

The value of each perspective can be determined by bringing together specific key performance indicators that are measurable and appropriate to the consideration of Deep Smarts. On their own they provide useful data. Combined within criteria they provide essential information, but integrated within the balance scorecard they become crucial knowledge that facilitates both management now, and future prediction.

8.1 Proposal of a balanced scorecard solution

Based upon these considerations, a balanced scorecard was developed to facilitate the monitoring and managing of open innovation supporting KTP delivery (See Figure 1).

INSERT FIGURE 1 HERE

Each perspective encompasses several (at least one and no more then 3) key performance indicators to provide a tangible measure of effectiveness.

The financial perspective links directly to the HEI strategy. The customer perspective is the market oriented linkage which influences the financial aspect. The internal business processes perspective directly affects service delivery and influences the customer perspective. The learning and growth perspective provides the behavioural and cultural influences which affect new opportunity development, incentives/rewards and academic engagement. An example of KPIs for HEIs are shown below and appropriate targets can be set which can navigate the HEI to achieve the strategic objectives within their respective research and enterprise strategies.

Financial

- Value of Bids submitted
- Value of KTPs awarded
- Value of follow on KTPs and/or chargeable non teaching revenue to each client

Customer

- No. of KTPs awarded to host institution divided by no. of KTPs awarded in the geographic region
- Average KTP score awarded by Innovate UK
- No. of related enterprise activities

Internal Business Processes

- Bid Conversion - Value of KTP awards divided by the value of KTP bids
- No. of publication outputs generated via KTP activity

- Ratio of completed KPIs

Learning & Growth

- No. of staff engaged in KTP enterprise bids
- No. of promotions attributed to KTP activity
- No. of staff attending KTP related development sessions

9. Discussion

This paper contributes to the advancement of performance management theory and practice by developing a balanced scorecard framework to assess knowledge transfer and KTP outcomes. We used action research as a methodology that builds on our own KTP experiences and processes; critically reflecting upon our practices and processes. KTPs are a tangible form of action learning (Raelin, 2006) and open innovation (KTP Best Practice, 2013) and although the primary aim is to improve the organisational performance and competitiveness of the organisation, there are highly prized supplementary benefits. They are the direct knowledge acquisition from the three stakeholders and this was achieved via explicit knowledge in the form of codified approaches to learning such as structured training courses as well as tacit knowledge exchange between the stakeholders (Nonaka and Takeuchi, 1995; Tsoukas, 2003).

There was evidence of open innovation which was defined by Dowling (2015, p68) as "an approach to research which emphasises collaborating, making use of external expertise and sharing risks/rewards". Open innovation in this case study has been iterative with the KTP collaboration spanning two sequential KTPs over a five-year period. This built trust within the relationship and the success of the first KTP provided a lot of learned lessons which made the second KTP a resounding success which ultimately won a UK regional award. Dowling (2015)

believes that for firms to capitalise on open innovation, they need to possess absorptive capacity via highly skilled individuals who can recognise and take advantage of relevant opportunities.

The relationship between the institutions allowed the organisation to grow beyond the size of a SME and to become self-sustaining with the housing association subsequently experiencing rapid growth over the subsequent decade (BCHA Annual Report, 2015). With respect to the Associate the graduate not only benefited from codified explicit training but developed tacit know-how through knowledge exchange as well as being offered a managerial role on conclusion of the project. A summary of the tripartite benefits to the Associate, Company Supervisor and Academic Supervisor where featured in a case study which was been archived by Innovate UK (KTPOnline.org.uk). During the subsequent ten years, all of the stakeholders have moved on in their respective careers with most joining new organisations. During this time, strong stakeholder engagement (Bourne et al., 2013; Smith and Bititci, 2017) a community of practice (Wenger et al., 2002) has been nurtured. In addition, a regional collaborative network was set up after the conclusion of the KTP (BU Annual Review, 2008, p29-30).

Unfortunately as key members of the KTP partnership had left the HEI, the tacit knowledge (Polanyi, 1974) was no longer there and as a result there were not the opportunities to share a community of practice between other KTPs in the university's portfolio. Notwithstanding, the authors believe that if KTPs were managed using a balanced scorecard framework (Kaplan and Norton, 1996), there would be greater opportunities to turn the tacit knowledge into explicit knowledge (Nonaka and Takeuchi, 1995). The balanced scorecard framework that was developed as a result of action learning builds on the work of Lin (2015) and extends it into a workable scorecard which unifies the nurturing, incentivising and motivation of staff, the operational aspects of successful KTP completion, the business engagement and retention aspect and finally

the financial aspects of the KTP which are the responsibility of the KTP Manager. The authors believe the balanced scorecard framework could facilitate the codification of the tacit knowledge in a way that preserves institutional knowledge within universities and provides opportunities for maximising the absorptive capacity.

10. Implications for research and practice

The results of this study have implications for staff and managers in both universities and partner organisations. The relationships among knowledge sharing, innovation processes, deep smarts, and balanced scorecard indicate the importance of establishing relevant knowledge infrastructures, rigorous measurement systems, and interpretation of information from multiple perspectives as prerequisites for the effectiveness of open innovation. Such factors must be strongly emphasized in both the university and the partner organisation's organisational cultures and work practices. The KTP experience suggested several best practices, practical implications, and forms of collaboration to achieve this; which are summarised in Table 3.

INSERT TABLE 3 HERE

The balanced scorecard framework implies that practitioners should consider and balance all four perspectives in their decisions and actions. It purports that a holistic consideration of these four sets of factors provides practitioners the big picture and guidance on how to manage and measure knowledge transfer. As universities are confronted by economic and social challenges, the balanced scorecard model can provide practitioners with a fresh perspective on addressing those challenges. Therefore, the benefit of the model comes from its unique holistic measurement perspective it provides leaders. One of the next steps of this research will be to create a practical inventory that helps practitioners measure their outcomes and outputs with respect to these four

dimensions. There might be a possibility of conflict among these four dimensions. In such cases, it is important to provide customized coaching and mentoring for practitioners to help them overcome the dominance of one perspective at the expense of others. The inventory will also include practical recommendations for practitioners to find a balance among these four dimensions and create balanced solutions in case of potential problems.

Further research is needed to solidify the contributions of this study to the fields of performance management and higher education institutions. Future research should develop psychometric, experimental and ethnographic methods for further exploration, operationalization and measurement of this framework in higher education institutions. Interview-based methodologies can offer rich descriptions of how practitioners generate and transfer knowledge across organizational boundaries. Longitudinal studies could delineate the processes through which practitioners generate, transfer, and measure actionable knowledge. Mixed designs combining in-depth qualitative methods and large-scale survey data can be used to inquire the nature and scope of performance management and knowledge transfer in higher educational institutions.

11. Limitations

This study has several limitations that need to be addressed in future research. First, the present paper is based on a single in-depth qualitative case study. The paper's single case was purposefully selected to illustrate the development of a balanced scorecard framework in two KTP projects (Kemmis, McTaggart, Nixon, 2013). Without collection of further case study data and replication of the empirical study in other university contexts and KTP projects, the results are not generalizable to different contexts. Although a single case does not provide any basis for grand

generalisation, it provides thick descriptions and rich insights on a unique process of action research applied in higher education context (Whyte, 1991; Zuber-Skerritt, 1992).

The measurement of knowledge transfer projects may need adaptation for different organizational contexts and across different KTPs. For example, we expect that balanced scorecard framework can be better developed in non-governmental and social purpose projects due to their mission-driven outcomes. Balanced scorecard framework is also more compatible with higher education institutions having progressive, experimental, and innovative cultures or practices. We are aware that there may be challenges in incorporating a balanced scorecard framework for KTPs in today's universities where fierce economic pressures and harsh research expectations can make the process seem too corporate or managerial. It is critical to engage with and closely work with academics and practitioners as they face challenges in the implementation of this model. Personal diagnosis, friendly mentoring, peer review, and on-the-job training, will all be helpful to support practitioners in putting this model to practice.

12. Conclusion

This study has explored open innovation using the experiences of Knowledge Transfer Partnerships within a UK HEI from 2000 to 2008. The success of a particular award winning KTP project completed with a SME housing association charity which included a deliverable that successfully implemented a balanced scorecard framework (Kaplan and Norton, 1996). The completed project initiated reciprocal open innovation to develop a balanced scorecard framework to measure associated KTP performance within the HEI. The rationale for employing a scorecard for measuring innovation within a HEI was an attempt to make explicit the attributes of Deep Smarts (Leonard and Swap, 2004) in a codified framework. The learning and growth elements of

the scorecard can enable a HEI to induce tacit knowledge sharing via employee engagement (Bourne et al., 2013; Smith and Bititci, 2017) to facilitate communities of practice (Wenger et al., 2002). This could in turn promote tacit to explicit knowledge exchange through the balanced scorecard framework with the aim of creating a virtuous knowledge creation and management process (Nonaka and Takeuchi, 1995). The developed framework has the potential to manage open innovation and KTP processes through several best practices and business engagement activities shown in Figure 6; demonstrating how open innovation can be more effectively and efficiently developed through multiple initiatives and cross-organisational projects.

Going forward, we envision a more inclusive vocabulary of performance management in higher education institutions, which is enriched and nurtured by the dimensions of balanced scorecard. The vitality and utility of the balanced scorecard framework is based on the measurement insights and the big picture it provides practitioners in their decisions and actions at work. Without such integration on a substantial level of nuanced thinking and balanced action, practitioners may be confronted with the threats of facing analysis paralysis and making partial decisions. Our knowledge generation and transfer dictionary needs new frameworks, fresh and creative thinking, and a more integrative and interdisciplinary outlook. We need more inclusive measurement systems that bridge and encompass disparate and isolated streams of knowledge. We envision conceptualizing performance management in HEIs in broader terms than efficiency and to encompass learning, development, contribution, positive impact, and innovation. We suggest analysing patterns of successful KTP projects and opening up new spaces of innovation where academics and practitioners can design and measure their performance standards to create innovation across organizational borders. Finally, we need to further address the issue of how to

bridge the world of practitioners and academics by co-constructing relevant knowing and learning through action research that is reflexive and dialogical.

References

Agrawal, A. 2001. University-to-industry knowledge transfer: literature review and unanswered questions. *International Journal of Management Reviews*, 3, 285–302.

Al-Ashaab, A., Flores, M., Doultsinou, A., & Magyar, A. 2011. A balanced scorecard for measuring the impact of industry–university collaboration. *Production Planning & Control*, *22*(5-6), 554-570.

Argyris, C., Putnam, R., & Smith, D. M. 1985. *Action Science*. San Francisco: Jossey-Bass.

Battistella, C., & Nonino, F. 2013. Exploring the impact of motivations on the attraction of innovation roles in open innovation web-based platforms. *Production Planning & Control,* Vol. 24 (2-3), 226-245.

BCHA Annual Report. 2007. Available from: https://www.housingnet.co.uk/download_pdf/13828/. Accessed on the 15th September 2016

BCHA Annual Report. 2015. Available from: https://bchaorguk.s3.amazonaws.com/Publications/Performance%20Report/BCHA%20Annual%20Report%202014-15.pdf Accessed on the 15th September 2016.

Beylier, C., Pourroy, F., Villeneuve, F., & Mille, A. 2009. A collaboration-centred approach to manage engineering knowledge: a case study of an engineering SME. *Journal of Engineering Design,* 20(6), 523-542.

Bititci, U.S. Turner.T. and Begemann. C. 2000. *International Journal of Operations and Production Management,* Vol. 20, No.6, pp 692-704

Bourne, M. and Neely, A. 2000. "Why performance measurement interventions succeed and fail", paper presented at the 2nd International Conference on Performance Measurement, Cambridge, MA.

Bourne, M., Pavlov, A., Franco-Santos, M., Lucianetti, L. and Mura, M. 2013. Generating organisational performance: the contributing effects of performance measurement and human resource management practices, I*nternational Journal of Operations & Production Management*, Vol. 33 Nos 11/12, pp. 1599-1622.

Brunswicker, S., & Vanhaverbeke, W. 2015. Open innovation in small and medium-sized enterprises (SMEs): External knowledge sourcing strategies and internal organisational facilitators. *Journal of Small Business Management,* 53(4), 1241-1263.

BU Annual Review. 2008. Available from: https://www1.bournemouth.ac.uk/sites/default/files/asset/document/annual-review-2008.pdf Accessed on the 24th September 2016

Cagliano, R., Caniato, F., Corso, M., & Spina, G. 2005. Collaborative improvement in the extended manufacturing enterprise: lessons from an action research process. *Production Planning & Control*, *16*(4), 345-355.

Chesbrough, H. W. 2006. *Open innovation: The new imperative for creating and profiting from technology.* Harvard Business Press.

Cohen and Levinthal 1990, "Absorptive capacity: A new perspective on learning and innovation", *Administrative Science Quarterly*, Volume 35, Issue 1 pg. 128-152.

Cohen, W. M., Goto, A., Nagata, A., Nelson, R. R., & Walsh, J. P. 2002. R&D spillovers, patents and the incentives to innovate in Japan and the United States. *Research policy*, *31*(8), 1349-1367.

Coghlan, D., & Brannick, T. 2014. *Doing action research in your own organization*. Sage.

Coughlan, P., and D. Coghlan. 2002. "Action Research for Operations Management." *International Journal of Operations & Production Management* 22 (2): 220–240.

Coulter, J., Baschung, N. S., & Bititci, U. S. 2000. Benchmarking for small-to medium-sized enterprises. *Production Planning & Control,* 11(4), 400-408.

Davenport, T.H. 2006, "Competing on analytics", Harvard Business Review, Vol. 84 No. 1, pp. 98-108.

Dayasindhu, N. 2002. Embeddedness, knowledge transfer, industry clusters and global competitiveness: a case study of the Indian software industry. *Technovation*, *22*(9), 551-560.

Deming, W. E. 1986. Out of the crisis, Massachusetts Institute of Technology. *Center for advanced engineering study, Cambridge, MA*, *510*.

Denzin, N. 1970. "Strategies of Multiple Triangulation." In *The Research Act in Sociology: A Theoretical Introduction to Sociological Method,* edited by N. Denzin, 297–313. New York: McGraw-Hill.

De Wit, J., Dankbaar, B., & Vissers, G. 2007. Open innovation: the new way of knowledge transfer?. *Journal of Business Chemistry*, *4*(1), 11-19.

Dowling Review. 2015. Available from: http://www.raeng.org.uk/policy/dowling-review/the-dowling-review-of-business-university-research Accessed on the 24th September 2016

Durst, S., & Runar Edvardsson, I. 2012. Knowledge management in SMEs: a literature review. *Journal of Knowledge Management,* 16(6), 879-903.

Farooq, S., & O'Brien, C. 2015. An action research methodology for manufacturing technology selection: a supply chain perspective. *Production Planning & Control*, *26*(6), 467-488.

Flores, M., Al-Ashaab, A., & Magyar, A. 2009. A balanced scorecard for open innovation: measuring the impact of Industry-University collaboration. In *Working Conference on Virtual Enterprises* (pp. 23-32). Springer Berlin Heidelberg.

Franco-Santos, M. and Bourne, M. 2003. "Factors that play a role in 'managing through measures' ", Management Decision, Vol. 41 No. 8, pp. 698-710.

Garengo, P. and Bititci, U. 2007. "Towards a contingency approach to performance measurement: an empirical study in Scottish SMEs", International Journal of Operations & Production Management, Vol. 27 No. 8, pp. 802-825.

Gummesson, E. 2000. *Qualitative methods in management research*. Sage.

Hall, B. H. 2004. *Innovation and diffusion* (No. w10212). National Bureau of Economic Research.

Hamel, G. 2009. "Moon shots for management", *Harvard Business Review,* Vol. 87 No. 2, pp. 91-98.

HEFCE. 2012. "Strengthening the Contribution of English Higher Education Institutions to the Innovation System: Knowledge Exchange and HEIF Funding." HEFCE. http://www.hefce.ac.uk/media/hefce/content/whatwedo/knowledgeexchangeandskills/heif/pacec-report.pdf

Henri, J. F. 2006. Organisational Culture and Performance Measurement Systems. *Accounting, Organisations and Society,* 31:1 pp77–103.

Hughes, T., D. Bence, L. Grisoni, N. O'Regan, and D. Wornham. 2011. "Scholarship that Matters: Academic/practitioner Engagement in Business and Management." Management Learning 10 (1): 40–57.

Johnson, H. and Kaplan, R. 1987. *Relevance Lost: The Rise and Fall of Management Accounting,* Boston, MA, Harvard Business School Press.

Kaplan, R. and Norton, D. 1992. "The balanced scorecard: measure that drive performance", *Harvard Business Review,* Vol. 70 No. 1, pp. 71-9.

Kaplan, R., and Norton, D. 1993. “Putting the balanced scorecard to work”, *Harvard Business Review,* 71 (5).

Kaplan, R. and Norton, D. 1996. “Using the balanced scorecard as a strategic management system”, *Harvard Business Review,* Vol. 74 No. 1, pp. 75-85.

Kessler, E. H., Allocca, M. A., & Rahman, N. 2007. External knowledge accession and innovation speed in the small and medium sized enterprise (SME). *Small Enterprise Research,* 15(1), 1-21.

Knowledge Transfer Partnerships. 2007. Annual Report 06/07, Technology Strategy Board, HM Government.

KTP Annual Report. 2011. Available from: https://static.ktponline.org.uk/assets/2011/pdf/KTP-AR-201011.pdf Accessed on the 1st September 2016

KTP Annual Report. 2014. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/426670/KTP_Achievements_and_Outcomes__2014_FINAL.pdf Accessed on the 15th September 2016

KTP Best Practice. 2013. A Best Practice Approach to Open Innovation. Available from: http://www.ncub.co.uk/reports/knowledge-transfer-partnerships-a-best-practice-approach-to-open-innovation.html Accessed on 15th September 2016

KTP Guidebook. 2013. KTP Guidebook for KTP Advisers and Offices. Available from: http://www.open.ac.uk/foi/main/sites/www.open.ac.uk.foi.main/files/files/ecms/human-resources/k/Knowledge-Transfer-Partnership-(KTP)/KTP%20Guidebook%20HRM063.pdf Accessed on the 15th September 2016

Kumari, S., Singh, A., Mishra, N., & Garza-Reyes, J. A. 2015. A multi-agent architecture for outsourcing SMEs manufacturing supply chain. *Robotics and Computer-Integrated Manufacturing,* 36, 36-44.

Leonard, D. & Swap, W. 2004. "Deep Smarts" in Little, S. & Ray, T. (eds.) (2005) Managing Knowledge, London, Sage, pp. 157-169 (First published in *Harvard Business Review,* Sept Issue, pp. 88-97).

Lichtenthaler, U. 2011. Open innovation: Past research, current debates, and future directions. *The Academy of Management Perspectives,* 25(1), 75-93.

Lin, H. F. 2015. Linking knowledge management orientation to balanced scorecard outcomes. *Journal of Knowledge Management*, *19*(6), 1224-1249.

Lüscher, L. S., & Lewis, M. W. 2008. Organizational change and managerial sensemaking: Working through paradox. *Academy of Management Journal,* 51(2), 221-240.

Lynch, R. L. and Cross, K. F. 1991. *Measure Up! Yardsticks for Continuous Improvement,* London: Blackwell Publishers

Markman, A. B. (Ed.). 2016. *Open Innovation: Academic and Practical Perspectives on the Journey from Idea to Market.* Oxford University Press.

Marr, B. and Schiuma, G. 2003. Business Performance Measurement – Past, Present and Future. *Management Decision,* 41:8 pp 680–7.

McMahon, R. G. 1999. Recent SME research: a critical review. *Small Enterprise Research,* 7(1), 68-75.

Meyer-Krahmer, F. and Schmoch, U. 1998. Science-based technologies: university–industry interactions in four fields. *Research Policy*, **27**, 835–851.

Neely, A., Gregory, M. and Platts, K. 1995. “Performance measurement system design: a literature review and research agenda”, *International Journal of Operations & Production Management,* Vol. 15 No. 4, pp. 80-116.

Neely, A., Adams, C. and Kennerley, M. 2002. *The Performance Prism,* Englewood Cliffs, NJ: Prentice-Hall.

Nonaka, I., & Takeuchi, H. 1995. *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford university press.

Padilla-Meléndez, A., & Garrido-Moreno, A. 2012. Open innovation in universities: What motivates researchers to engage in knowledge transfer exchanges? *International Journal of Entrepreneurial Behavior & Research,* 18(4), 417-439.

Perkmann, M., & Walsh, K. 2007. University–industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews,* 9(4), 259-280.

Polanyi, M. 1974. *Personal Knowledge: towards a Post-Critical Philosophy*, Chicago, IL, University of Chicago Press. (First published in 1958).

Quintas, P., Lefere, P., & Jones, G. 1997. Knowledge management: a strategic agenda. *Long Range Planning,* 30(3), 322385-391.

Roach, J. (ed) and Polkinghorne, M. (ed), 2007. *Applications of Knowledge Transfer to Small and Medium Sized Businesses.* 2007 ed. UK, Bournemouth University.

Raelin, J. 2006. "Does action learning promote collaborative leadership?."*Academy of Management Learning & Education* 5, no. 2: 152-168.

Rossi, F., & Rosli, A. 2015. Indicators of university–industry knowledge transfer performance and their implications for universities: evidence from the United Kingdom. *Studies in Higher Education*, *40*(10), 1970-1991.

Salter, A. J., & Martin, B. R. 2001. The economic benefits of publicly funded basic research: a critical review. *Research Policy*, *30*(3), 509-532.

Savino, T., Messeni Petruzzelli, A., & Albino, V. 2015. Search and recombination process to innovate: A review of the empirical evidence and a research agenda. *International Journal of Management Reviews.*

Shane, S. 2005. Government policies to encourage economic development through entrepreneurship: The case of technology transfer. *Economic development through entrepreneurship*, 33-46.

Siegel, D.S., Waldman, D., Link, A. 2003. 'Assessing the impact of organisational practices on the productivity of university technology transfer offices: an exploratory study'. *Research Policy* 32 (1), pp. 27-48.

Smith, & M., Bititci, U.S., 2017. Interplay between performance measurement and management, employee engagement and performance. *International Journal of Operations & Production Management*, *37*(9), pp.1207-1228.

Smith, P.C. and Goddard, M., 2002. Performance management and operational research: a marriage made in heaven? *Journal of the Operational Research Society*, *53*(3), pp.247-255.

Somekh, B. (1995). The contribution of action research to development in social endeavours: a position paper on action research methodology. *British Educational Research Journal,* 21(3), 339-355.

Thursby, J. G., Jensen, R., & Thursby, M. C. 2001. Objectives, characteristics and outcomes of university licensing: A survey of major US universities. *The journal of Technology transfer*, *26*(1-2), 59-72.

Tsoukas, H. 2003 “Do we really understand tacit knowledge?” in Little, S. & Ray, T. (eds.) (2005) *Managing Knowledge*, London, Sage, pp. 107-125 (First published in The Blackwell Handbook of Organisational Knowledge Management, Easterby-Smith, M. & Lyles, M. (eds.) pp 410-427, Oxford: Blackwell – edited version).

Valmohammadi, C., & Ahmadi, M. (2015). The impact of knowledge management practices on organizational performance: A balanced scorecard approach. *Journal of Enterprise Information Management,* 28(1), 131-159.

WECD. 2015. KTP Impact Report. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/467142/KTP_Report_July_2015_Exec_summary__1-SEP-15_.pdf Accessed on the 20th September 2016

Wenger, E. McDermott, R. and Snyder, W. M. 2002. *Cultivating Communities of Practice: A Guide to Managing Knowledge*, Boston, MA, Harvard Business School Press.

Whyte, W. F. E. (1991). *Participatory action research.* Sage Publications, Inc.

Wittgenstein, L. 1958. *Philosophical Investigations*, Oxford, Blackwell.

www.gov.uk. 2016. Knowledge Transfer Partnerships: what they are and how to apply. Available from: https://www.gov.uk/guidance/knowledge-transfer-partnerships-what-they-are-and-how-to-apply . Accessed on the 21st September 2016

Yew Wong, K. 2005. Critical success factors for implementing knowledge management in small and medium enterprises. *Industrial Management & Data Systems,* 105(3), 261-279.

Zahra, S. A., & George, G. 2002. *Absorptive capacity: A review, reconceptualisation, and extension. Academy of management review*, *27*(2), 185-203.

Zuber-Skerritt, O. (1992). *Action Research in Higher Education: Examples and Reflections.* Kogan Page Limited, London, United Kingdom.

Table 1: The process of action research

Step	Level of analysis	Description of the action research activity or process
Planning of the KTP project	Scoping of the KTP project	We have scoped out the KTP project with the SME Bournemouth Church. We aimed to develop a culture change programme to improve efficiency and to enable growth.
Resource gathering	Resourcing the KTP project	We have secured the KTP funding, allocated the academic supervisor and recruited the graduate/associate.
Implementation	Implementation of the KTP project	We have implemented the KTP project and produced deliverables to the client and the HEI.
Data gathering	Data collection during the KTP project	We have taken extensive observational/ethnographic notes during project meetings, events, and implementation. We have also conversed with organizational actors.
Reading and analysis	Reading notes and interview transcripts in details	We have gone over all the data to understand the particularities, context, and outcomes of this KTP project.
Sense making	Analyzing the main points in the data set	We have outlined key points raised in all data set. We have produced a thick description of the KTP project and contextualized the qualitative data in light of contextual descriptions and historical trajectory of the project.
Categorization and pattern recognition	Understanding patterns and themes	We have come up with potential salient themes that are emergent (similar and different) throughout the KTP. We have identified performance standards of knowledge creation and transfer processes of the KTP project.
Interpretation and representation	Writing up the results	We have developed summaries and cross-checked qualitative findings and project outcomes. We have tracked the dynamics of the KTP projects after each stage.
Analysis and evaluation	Evaluation of the KTP project	We have analyzed project outputs and produced reports of findings. A community of practice has been maintained to share the implications.
Problem identification	Lack of performance frameworks to measure the effectiveness of KTP research	We have implemented a balanced scorecard framework to measure the effectiveness of KTP research within the HEI to share knowledge and improve effectiveness for other KTP projects.
Development of the performance framework	Developing a performance framework for KTP research	We have implemented a balanced scorecard for the SME to improve organizational performance. The transfer of knowledge was then fed back into the university in order to develop a performance framework for measuring the effectiveness of KTP research within the HEI.
Constant iteration	Bridging theory and practice	We have constantly iterated between empirical data (project outcomes) and insights provided by theories and the literature.
Explanation and abstraction	Contribution to theory	We have pinpointed the potential of the research in bringing a new framework of balanced card for higher educational institutions.

Table 2: KTP Critical Success Factors based on Balanced Scorecard

Financial:	a) provide a more significant return on investment b) generate greater revenue growth based upon the exploitation of unique skills and understanding c) facilitate a higher value offering that will permit a university to enhance its cost vs. price ratio d) improve cash flow through the provision of a greater volume of high value contracts
Customer:	a) increase KTP market share (with links to improved return on investment) b) improve levels of customer satisfaction (with links to revenue growth and increased cash flow) c) build brand (with links to revenue growth and cost vs. price for delivering KTP) d) improve levels of customer retention
Internal Business Processes:	a) improve levels of bid conversion to obtain KTP funding (with links to relative market share of KTP activity). b) improve synergy between research and teaching (with links to return on investment and cost vs. price for delivering KTP). c) improve final report gradings for completed KTPs (with links to customer satisfaction and brand building). d) provide an increase number of additional benefits (with links to customer retention for KTP partners and cash flow)
Learning & Growth:	a) develop academic careers together with levels of incentivisation received (with links to return on investment and to the level of bid conversion achieved). b) undertake continued professional development (CPD) in the context of the wider issue of staff retention within the organisation (with links to the level of bid conversion achieved and the level of synergy between research/enterprise activities). c) deliver successful coaching and mentoring to KTP partners (with links to the final report scores received from Innovate UK and additional activities undertaken). d) integrate into relevant Communities of Practice both within the KTP partnership, and also within academic discipline (with links to additional activities undertaken and the final report scores received from Innovate UK).

Adapted and built on the model of Kaplan & Norton, 1992.

Figure 1: Balanced Scorecard Framework to facilitate Open Innovation

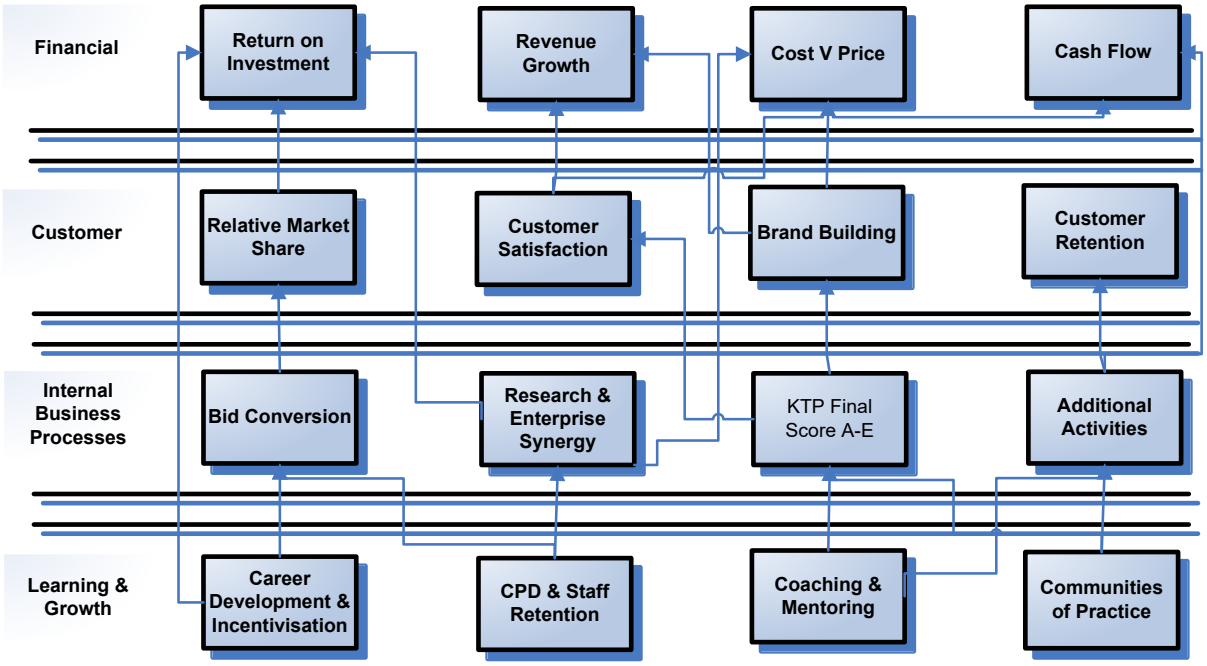

Table 3: Implications and recommendations for open innovation and knowledge transfer

Open Innovation	Develop inter-organisational arrangements for pursuing collaborative R&D Develop research partnerships Get ideas from all stakeholders across organisations Share academic publications and academic knowledge within industry Use social media platforms to receive suggestions, ideas, and feedback Disseminate knowledge freely (under open source licenses) to achieve greater impact without receiving an income
Absorptive Capacity	Engage in activities commissioned by industrial clients including consulting Commercialize intellectual property rights Transfer university intellectual property rights and patents to partner firms Start spin-offs and entrepreneurship start ups Provide strong infrastructure and information systems to share knowledge in order to facilitate knowledge transfer across units and organisations Increase participation in decision making and reduce barriers and boundaries between organisational levels to enable knowledge transfer
Communities of Practice	Design and implement KTPs (Knowledge Transfer Partnerships) to work on collaborative projects across organisations Form social relationships and networks at conferences, fairs, or industry events Develop informal relationships and circles of friends across organisations Provide postgraduate training, human resource development or executive education for industry employees Attend professional networks, boards, or project based committees Temporarily exchange personnel and share relevant tasks/roles to increase mobility of people Practicing job rotation to facilitate knowledge transfer and movement throughout the organisation and increase motivation

Deep Smarts Strategies	Develop customised individual know-how based on first-hand experience and tacit knowledge shaped by individual beliefs and social interactions Incubate academic entrepreneurship based on design thinking and immersive field work Improve synergy between research and teaching projects/activities Develop and commercially exploit innovations and inventions Generate everyday insights to improve quality of life at the university and partner organisations Stimulate entrepreneurial projects and incubators that add value for organisational stakeholders Provide effective rewards to reinforce knowledge sharing practices considering the diversity of employee needs
Balanced Scorecard	Measure and track performance of KTP projects Ensure a multidimensional assessment of project outcomes and deliverables Generate broad benefits for stakeholders, society and large externalities that are not easily captured by individual beneficiaries Generate value for stakeholders through social, community and cultural engagement (i.e. public lectures, arts events, exhibitions etc.)