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CONTEXT AND ENTREPRENEURSHIP IN KNOWLEDGE TRANSFER PARTNERSHIPS WITH SMALL BUSINESS ENTERPRISES

By Martin Wynn and Peter Jones

Abstract: Entrepreneurship research has often focused on the capabilities and motivation of the entrepreneurs themselves, but there have also been more recent attempts to understand contextual factors that can engender and support entrepreneurial activity. This article examines the contextual factors in evidence in four Knowledge Transfer Partnership case studies, where entrepreneurial activity has played a key role in developing and implementing significant change projects in small business enterprises. Based on a detailed analysis of these case studies, a number of contextual factors are identified that may act as a model for others researching entrepreneurship in similar contexts. The study finds that four main factors in the broader socio-economic environment were key in engendering entrepreneurial activity: the influence of the local university; availability of financial support; regional knowledge production; and the presence of industry clusters pursuing similar objectives. There were also a number of influencing factors within the small business company environment: the potential to develop human and social capital, particularly evident in family businesses; and the opportunities to rapidly adopt and change technology platforms and systems which encouraged entrepreneurial thinking and initiative taking. The case studies also evidence that entrepreneurial initiatives may not always produce successful long-term outcomes.

Key Words: Entrepreneurial activity; context; contextual factors; KTPs; small businesses; SBEs

Short Title: Entrepreneurship in Small Businesses

Introduction

Context has been seen as the key to entrepreneurship for some time but in identifying 'Future Directions in Entrepreneurship Research', Marlow (2014:1) suggested that 'the critical and dynamic influence of context is taken for granted and remains invisible'. In contributing to a review of 'entrepreneurial challenges for the 21st Century', Wallevik (2015:12) emphasised 'the need to analyse entrepreneurship in each specific context to understand: what entrepreneurship is, who the entrepreneur is, where entrepreneurship happens, why entrepreneurship is important, and how one can nurture entrepreneurship'. In a similar vein, Zahra, Wright and Abdelgawad (2014:479) suggested that advancing research in entrepreneurship 'requires attention to the role of context in motivating people to engage in entrepreneurship'. Garud, Gehman and Giuliani (2014:1177) argued that 'contexts are key moderators of success or failure, dictating the availability or the viability of entrepreneurial innovation'. In exploring the 'inputs for entrepreneurs' to create a new venture in a high-tech context, Zivdar et al. (2017:243) stressed that 'the decision making process in any society is influenced by environmental context'. More specifically Stam and Bosma (2015:329) have identified a wide range of contextual factors seen to be important in explaining entrepreneurship including 'entrepreneurship as a social (family) phenomenon', 'entrepreneurship as an organizational product', the 'nature and localization of industries', 'regional formal institutions' and 'regional knowledge production'.

Within the UK Knowledge Transfer Partnership (KTP) scheme, approved projects can play a valuable role in encouraging greater academic engagement with businesses, and in pursuing entrepreneurial and enterprising behaviour within those

businesses (Wynn and Jones, 2017). More specifically, KTP projects can not only help businesses to innovate - and as such offer an important context for entrepreneurship - but can also support companies in the management of entrepreneurial change. This paper illustrates how some of the KTP projects undertaken with support from the University of Gloucestershire have harnessed important contextual factors to encourage entrepreneurial activity and to manage change.

Entrepreneurship and Context

The term entrepreneurship is widely used in business, government and media circles, but there is little by way of a consensus as to its meaning. Hansen, Monllor and Shrader (2016:240) note that 'there is plenty of debate in the entrepreneurship literature regarding entrepreneurial opportunity' but that 'there also has been a lack of construct clarity'. They maintain, nevertheless, that 'across these debates there are many underlying commonalities and potential for more clear constructs'. Kao (2006:69), for example, has suggested that 'entrepreneurship is the process of doing something new and something different for the purpose of creating wealth for the individual and adding value to society'; and Bruyant and Julien (2000:173) have similarly argued that 'entrepreneurship is concerned first and foremost with a process of change, emergence and creation: creation of new value and at the same time change and creation for the individual'. Carlsson et al. (2013:914) suggested that entrepreneurship 'is carried out by individuals, entrepreneurs, acting independently or within organizations, to perceive and create new opportunities and to introduce their ideas into the market, under uncertainty, by making decisions about location, product design, resource use, institutions, and reward systems'.

The origins of business research into entrepreneurship can be traced back to the 1940s and 1950s (Jones and Wadhwani, 2006), but in recent decades the pace of

such research endeavour has grown rapidly. Within the business and management literature the major focus of work, to date, has been on 'the role and characteristics of individuals and teams' and in 'opportunity recognition and venture creation', with venture creation taking 'the form of the creation of new organizations or of new activities within existing organisations' (Carlsson et al., 2013:914). Albertini and Muzzi (2016:110), for example, argued that 'the start-up of new organizations can be an opportunity for repositioning traditional entrepreneurial capabilities.' Carlsson et al. also recognised the importance of context in encouraging entrepreneurship and suggested that 'the socioeconomic environment, consisting of institutions, norms, and culture as well as availability of finance, knowledge creation in the surrounding society, economic and social policies, the presence of industry clusters, and geographic parameters, may influence entrepreneurial activities at all levels' (Carlsson et al., 2013:915).

Autio et al. (2015:1098) have suggested that 'the associated neglect of contextual influences constitutes a major gap, since policy action seeks to influence entrepreneurial activity by manipulating the contexts in which individuals chose to act or not'. In a similar vein, Mack and Putzschel (2014) argued that ways in which contextual factors influence the entrepreneurial process has not received a great deal of attention in the research literature. In focusing on entrepreneurial innovation, Garud, Gehman and Giuliani (2014:1177) reported some researchers had taken 'a micro approach to studying how entrepreneurs and their teams are able to successfully innovate, and they contrasted this 'agent-centric perspective' with 'a context-centric perspective' which looks to offer insights into how different contexts can induce entrepreneurial innovation.

As regards contextual factors influencing entrepreneurship in different spatial contexts, Hayton, George and Zahra (2002) reviewed past research on the association between national culture and entrepreneurship. This review revealed that culture acts as a moderator for the relationship between contextual factors and entrepreneurial outcomes, and that culture acts as a catalyst rather than a causal agent for entrepreneurship. Cullen, Johnson and Parboteeah (2014) looked to examine the combinative effects of cultural values and social institutions to explain national differences in rates of opportunity entrepreneurship, and their work suggested that specific institutional contexts mitigated or enhanced the effects of cultural drivers of such entrepreneurship.

In addressing such contextual factors on a regional basis, Stam and Bosma (2015:329) suggested that contextual, rather than individual, factors reflect a number of distinct perspectives including the nature and number of organisations, culture and the labour market structure and employment opportunities. More specifically, two sets of factors were identified by Stam and Bosma (2015: 330) which are relevant to the current paper. On the one hand, they saw 'entrepreneurship as an organisational product' and 'entrepreneurship as a social (family) phenomenon' as key factors operating within companies; and on the other, 'regional access to financial capital' and 'regional knowledge production', as factors of relevance in the wider socio-economic environment. In addressing the former Stam and Bosma (2015:330) suggested that 'a human capital effect', and 'a social capital effect' may be important mechanisms at work. Typically, for example, in a family business environment, 'human capital effects' might include family members learning entrepreneurial skills, whilst 'social capital' could include parents providing knowledge and skills for the children's businesses. In non-family SBEs, the 'human capital effect' may be evidenced in the development of

a close-knit management team to incorporate new skillsets and competencies into their day-to-day actions and activities, while the 'social capital effect' may encompass the widening of skills and awareness amongst a broader section of company staff.

In examining the importance of 'regional knowledge production', Stam and Bosma (2015: 331) emphasise the role that universities and research centres can play in producing new scientific and technological knowledge, which is seen as an important source of entrepreneurial opportunity and Talbot et al. (2012) analysed the nature of entrepreneurial capability and capacity building within a university environment. Further, Stam and Bosma (2015:333) also suggest that 'knowledge workers in these organisations respond to opportunities generated by new knowledge either with developing new businesses for their employer or with starting a new firm' and that 'geographical proximity to these sources of new knowledge is an asset, if not a prerequisite, to entrepreneurial firms in accessing and absorbing spill overs from universities and research centres'. While this brief review of the literature suggests that a wide range of contextual factors can influence entrepreneurial activity work, this paper looks to examine six main contextual factors drawn from the literature. On the one hand, the influence of the local university, the availability of financial support, regional knowledge production, and the presence of industry clusters in encouraging entrepreneurial activity and change are examined. On the other hand, the significance of social and human capital in engendering entrepreneurial activity is also assessed. The paper can also be seen as fulfilling a research gap in responding to Duxbury's (2012:9) call for 'more case study research in entrepreneurship'.

Knowledge Transfer Partnerships

Knowledge transfer (KT) is not new per se (Decter, 2009), but interest in its role in promoting economic growth and job creation has been growing for over two decades. Hardhill and Baines (2009:82) suggested, that 'since 1993 the promotion of knowledge transfer to maximise public investment has been a recurrent theme in UK policy documents'. The Lambert Review of Business-University Collaboration (Lambert, 2003:31), for example, acknowledged the scale of public investment on teaching and research within the UK's universities, and formally endorsed the belief that 'transferring the knowledge and skills between universities and business and the wider community increases the economic and social returns'.

KTPs are a tripartite partnership between a business, an academic institution and a graduate. The general aim of the KTP scheme is to meet a core strategic need with the focus being on delivering increased profits for businesses through improved quality and operations, increased sales and access to new markets. The academic institution employs a usually recently qualified graduate, known as the Associate, who works at, and brings new skills and knowledge to, the business. KTPs can last between 6 and 36 months, depending on the scale of the project, and during the life of the project an academic from the academic institution is assigned for 25 days per annum to support and supervise the project. This role is generally termed the 'academic supervisor', sometimes supported by an 'academic lead' who remains in the background to provide advice when needed. The two positions are sometimes combined, with one academic undertaking both roles.

KTPs are partly funded by government grant aid and partly by the business which contributes to the cost of the academic and the salary of the Associate. The

scale of the business' contribution varies depending on the size of the company, with typical annual contribution for a small to medium sized businesses (SME) being £24,000 and that for a larger company being £30,000. Since 2003, the University of Gloucestershire has completed 45 KTPs and in 2013/2014 the Gross Value Added by the University's KTPs was £4.1 million (Biggar Economics, 2015). An increasing number of small business enterprises (SBEs) have embarked on KTP projects. SBEs are defined by the European Union as having between 10 and 49 staff and less than 10m euro annual turnover. Of the 45 KTP projects noted above, 30 were with SBEs, and as regards the nature of the projects, 30 were related to information systems, e-business or software development; 11 were based on new sales and marketing developments; 3 focused on new product development; and 1 delivered general efficiency improvements in a local authority.

The research question that this paper addresses is what particular contextual factors engendered entrepreneurship in these KTP projects. Some existing studies have attempted to identify the key determinants of successful knowledge transfer. Wu, Hsu and Yeh (2007), for example, pointed out the importance of knowledge sharing and learning intensity, and Knockaert et al. (2011) highlight the significance of top management composition. More recently, building on the model developed by Enkel, Bell and Hogenkamp (2011), Wynn (2018) concluded that there were 12 critical success factors in determining the outcome of technology-centred KTP projects. Whilst the contextual factors help explain 'why' entrepreneurial activity flourished, these change factors are more linked to 'how' it took place. They are: project leadership, project management capability, team building, ownership and initiative taking, knowledge transfer intensity, university-company collaboration, procedural and process discipline, project alignment to business strategy, requirements specification,

product selection and fit, implementation execution, and technology absorption and handover. These change factors are used in the analysis of KTP documentation and interview notes to identify the significance of contextual factors in the KTP projects.

Research Methodology

Four qualitative case studies are used for this research, set within a wider context of the 30 KTPs undertaken by the University of Gloucestershire with SBEs in the period 2003-2012. Saunders, Lewis and Thornhill (2007) identified a case study as ‘a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context, using multiple sources of evidence’. One of the main strengths of this approach is its depth, and the amount of ‘rich data’ or detail it can generate. As noted above, Duxbury (2012) has pointed out the need for case studies in entrepreneurship research. He sees entrepreneurship as an emerging discipline which ‘has fallen short of bringing its theory and literature up to the standards of others in the management sciences’ and that ‘scholars have called for more case study research, particularly those incorporating non-retrospective and longitudinal observations’ (Duxbury, 2012:9).

In these case studies, several different methods were used to collect data, all of which are associated with a qualitative approach. A range of documents were analysed to corroborate and augment evidence from other sources (Yin, 2003), notably - in this research - that gleaned from interviews, observation and first-hand involvement in the projects. Document study encompassed the original project proposals, put together in conjunction with the company managers, who then directed the project and chaired the regular project review meetings, usually held weekly. The minutes of these weekly review meetings and the three monthly Project Board

meetings held with the local representative of the UK government's funding body were also analysed. The project final reports - one authored by the Associate and the other jointly by the academic supervisor and company management - and the many emails sent and received across the duration of these projects and beyond have also contributed to the research findings.

Framework analysis (Mason, Mirza and Webb, 2018) was used to identify the range and salience of key items and concepts, and to discover relationships between them. In inductively analyzing these documents and interview notes, a two dimensional framework was constructed comprising the six contextual factors noted above on one axis, and the 12 critical success factors for KTPs on the other. The sources were searched for data relevant to any particular cell in this framework. This data was then classified into a number of themes and sub-themes. These were:

Costs: Project cost to company; Salary of Associate; IT equipment and systems purchase.

Benefits: Government financial support; Bottom-line benefits to company; Process improvements.

Project management: Role of Associate; Role of supervisor; Use of methodology

Skills and capabilities: New knowledge input from supervisor and Associate; Training availability in local area; Industry contacts and seminars

Supervision and support: General role of the University; Role of the academic supervisor; Local networking opportunities

Systems and technology: Selection process for technology procurement; Functioning of technology; Systems benefits

People and teams: Project team capabilities; Technology knowledge transfer; Handover to company staff

This structurally coded data, mostly in the form of statements, was assigned to one or more of the six factors identified from the literature review. This produced a matrix of thematic content assigned to different contextual factors. The data was processed

from the matrix format into a mind map for each project, what enabled a further clustering of themes and related issues within each major contextual factor.

Participant observation by the academic supervisors has also contributed to the interpretation of events, evidenced both in the formal meetings noted above, but also in the many informal discussions with the Associates and company managers. These findings were supported by more recent interviews and phone conversations with project team members and company management, which were noted. This allowed the authors to develop their understanding of the projects, the decision making and knowledge input processes of team members involved. As Walsham (1995:76) notes, 'it is desirable in interpretive studies to preserve a considerable degree of openness to the field data, and a willingness to modify initial assumptions and theories. This results in an iterative process of data collection and analysis, with initial theories being expanded, revised, or abandoned altogether.'

The case studies were selected as they were all SBEs and involved technology projects where entrepreneurial change was seen as a key objective as stated in the project proposals. Three of the four companies could be considered 'family businesses' and they spanned the 'three counties' region which can be seen as the University's catchment area (Gloucestershire, Herefordshire and Worcestershire). TPG DisableAids, based in Hereford, is a provider of equipment for the elderly and disabled and had grown steadily since 1984 to employ 45 staff with a turnover of £4.0m prior to the start of the KTP project in 2009. It was founded by Tony and Pamela Gibbs in the 1980s, and is now run by son and daughter Alastair Gibbs and Mandy Harrold. C&G Services (Europe) Ltd are in Stonehouse, south Gloucestershire, and specialize in the provision of skills training for industries and utilities in the UK, and the provision of health and safety consultancy services.

The company had a turnover of £1.4m in 2004/5 (at the start of the KTP project) in a national market of many £billion turnover per annum, and employed 25 staff. The company was run by husband and wife team Bob and Jane Oldmeadow, who still own the company today. AuraQ was established in the late 1990s (albeit under another name – NTL), specialising in process improvement. Located in Malvern, the company steadily built its turnover, generating revenues of over £0.5m in 2007 prior to the start of the KTP project, when it had just 6 full-time staff. It was, and still is, owned by managing director Mike Clarke. Beaumont Travel was a well-established bus and coach company located in the centre of Gloucester. With 36 staff and a turnover of £1.1m when the KTP project started in 2006, it had been built up by Mike Sadler, and his wife and son also worked in the company. The case studies exhibited varying small business profiles with different project objectives, providing a relevant cross-section of cases for investigation of the research question.

Case study 1: New e-trading capability at TPG DisableAids, Hereford

TPG DisableAids saw the business opportunity to rapidly grow market share, particularly in the new market segments driven by public authority care management, insurance industry home equipment provision, and lifestyle products for the elderly. It was critical that the company had the systems capability to respond to the equipment and service requirements of the NHS and related bodies at short notice as the elderly and disabled leave hospital and return to their homes. The NHS e-procurement initiatives required specific inter-organisational systems integration capabilities which the company had hitherto not had.

The project objectives were to introduce an e-trading capability to allow the company to operate electronically across its extended supply chain. Failure to enable electronic trading would cause significant damage to the company's ability to tender

for upcoming supply contracts (and post sales services) and have a detrimental effect on efficiency. The provision of new information reporting capabilities and improved communication and sharing of information in-house and with key clients and suppliers was also seen as an important outcome, particularly in the context of the tracking of large contracts. At the same time, the company had to install new e-procurement and order capture capabilities to allow transaction processing with NHS and other key customers.

Developing an entrepreneurial solution based on existing investment was seen as attractive, but there were technology integration issues with the company's legacy accounting systems. An upgrade of some elements of the existing IT infrastructure was necessary to provide a solid foundation for the introduction of modern technologies. The company decided to use open source/freeware support for in-house development providing a secure, reliable and a flexible platform to develop in house systems capabilities. There were a number of different technology components in the project. The new e-portal architecture was based on a modern technology (MVC J2EE) design pattern whereas the design of the middleware database was necessarily based on the old legacy accounting systems file structures. To plug the gap between these two technologies, a new data mart (a small data warehouse containing specific sales order information) was created. A one-way synchronisation technique was used to extract data from the middleware database and populate the data mart on a regular basis.

The company developed the capability to trade electronically with key customers including NHS Shared Business Services and local authority organisations responsible for the provision of disabled facilities grants and associated products and services. Improved efficiencies were seen throughout the order and sales processing

procedures utilising web portal technology, whereby order information was accepted over the web and returned to the customer as an invoice, thus minimising the opportunity for human or machine error. The company's environmental impact improved by removing the need to print paper documents and post to customers. The training of in-house workers to use the portal enhanced very basic IT skills necessary for clerical work. Furthermore, the production of accurate financial figures allowed staff to develop confidence in the new software systems, creating enthusiasm among staff for new ways of working and the use of modern technology.

Case Study 2: Process and systems innovation at C&G Services (Europe), Stonehouse

C&G Services' main customers are utilities, plant manufacturers and machinery manufacturers. Prior to the start of the KTP project in 2005, the company held several valuable contracts, including two with major utility companies - Severn Trent Water and Thames Water, and had enjoyed steady growth for some years. Company owners Bob and Jane Oldmeadow were the main drivers behind the KTP project that aimed to make business processes smarter and more efficient allied to the introduction of new web-based software. The company suffered from extremely detailed procedures, which were deemed necessary because of the use of potentially dangerous equipment, and the need to impart correct advice in any given situation. It was also believed that more modern systems would avoid the need for further administrative personnel. The company was at risk of being 'top heavy' in its ratio of administrators to trainers.

The old computer systems had evolved as the company expanded and took on new services and new staff, and IT expertise within the company was insufficient to develop the systems that the largest clients were requiring. Following the

assessment of the current technologies and business processes in the company, the project team focused on how to improve and reengineer processes and what new software could best support these new ways of working. The key process change objectives revolved around speeding administration and enhancing customer service. The Associate undertook a specification of functional requirements for new systems and developed a new technical architecture that would support a web portal to make these new systems available on the Internet to major customers. This would allow them to book training courses online and track training histories for their own staff.

After a review of software available on the market, this preliminary work led to the selection, procurement and implementation of the Course Booker software package. It had the dual purpose of providing in-house processing and reporting of relevant training data and customer transactions, and provided a web-based portal for customer access, course booking and associated services. The new system went live in 2007, encompassing the transfer of 5 years' worth of essential business data from legacy systems. The initial phase focused on the new course booking and administration functions. Specific project outputs included improved information availability for both in-house staff (for example between booking coordinators and instructors out in the field) and for key customers via the portal function.

Faster information processing and better access to key data for clients and staff allowed more time for proactive work with clients and prospective clients. Greater information visibility gave the company more 'control' over workload with easier knowledge of existing client refresher-training schedules and associated new requirements allowing more efficient and effective management and allocation of company staff. This was evidenced by clients in terms of improved and more

proactive support facilities bringing more business, with circa 80% of business coming from 20% of the client base. The company was aware that there was much 'untapped' business to be won from the larger organizations it dealt with. Bottom-line benefits came from a reduction in paper and storage of £15K per annum and headcount avoidance (as the company expanded) of four administrators across the company.

The embedding of a new information culture within the company highlighted the importance of information in the internal functioning of the company and at the customer interface through the web portal. This required training and new skillsets for the company's own staff, producing a highly computer literate, customer-aware workforce. Expenditure on new systems and technologies totaled in excess of £50K as a one-off investment to secure the project benefits.

Case Study 3: New template developments at AuraQ, Malvern

In 2007, AuraQ took the decision to move towards providing software solutions rather than just process management services to its clients, and specifically to offer bespoke software components based on the Metastorm Business Process Management (BPM) product range. The KTP project was designed to research and develop these BPM tools to support a new revenue stream to allow a doubling of turnover within a 3-year period, enabling a step change in AuraQ's capabilities and potential in the BPM marketplace. The intention was to make the Metastorm templates configurable for new and existing clients, and provide the company with a real opportunity to establish itself in this emerging field of process optimisation and business change.

The KTP project was to be the platform for a major infusion of knowledge regarding the Metastorm products and their development for bespoke and template applications. A key differentiator of Metastorm was its ability to manage both human-

centric and system-centric processes, and it had a range of tools for process redesign, organisational restructuring, systems and process integration and executive reporting/business intelligence. Of particular importance was the fact that the company was the only accredited Metastorm partner in the UK, and this provided an opportunity to significantly grow the business in this new market niche. AuraQ had the opportunity to establish itself as a specialist operator in the BPM market in the region, based on its position as a Metastorm partner.

The overall aim was to research, develop and bring to market innovative web-based software templates for enhancing the user-interface of Metastorm BPM software. Solutions were aimed at being both customisable to different user requirements, yet robust and scalable enough to work in different technical environments. The main achievements were largely technical, concerning: software functional specification for the template developments; user Interface design; database design; development of software layered architecture; delivery of final software templates for sale and utilisation by Metastorm users. The areas of knowledge transfer included: knowledge on various Metastorm development tools (Pro-Vision, Discovery and Insight) and their application within key client sites; application of the .Net orchestration tool to develop bespoke applications and templates for use with multiple clients; process analysis with key clients and the formulation of software requirements specifications for new template adaptation and development; design and coding of bespoke software components in the .Net environment; project management methodology skills; and application of systems development methodologies for bespoke applications.

The templates were delivered and new skills embedded in company staff. The final report noted that 'AuraQ can now provide a bespoke user interface for

Metastorm BPM users' and that 'this will be sold as a product to enhance usability and provide an interface with industry standard products such as Microsoft SharePoint'. They also noted that this would 'generate income from sales and support which is in addition to our usual income from services' (Technology Strategy Board, 2011:5). As regards the University, the project had provided a 'deeper understanding of business requirements, especially for SMEs for the future similar projects' and enabled 'two to three staff to start a new research area in business process modelling, analysis, optimisation and simulation' (Technology Strategy Board, 2011:11) .

However, these new templates were never sold by AuraQ as there were significant changes in the Metastorm market. The Metastorm products were acquired by another software house (OpenText), who halted the expected development of the product and this severely limited the potential of the templates developed via the KTP project. AuraQ suffered severe trading difficulties, with annual turnover dropping from £525K to £170K over the period of project. Although the KTP project had been a technical success in terms of software development, it had not been so in terms of the planned change in product offering and expected growth in turnover and profit.

Case study 4: New Product Development at Beaumont Travel, Gloucester

In the early years of the millennium, Beaumont Travel had developed bespoke software for its own, but they had also generated some interest in their software from other operators in the industry. However, they lacked the development skills needed to progress their in-house modules and outline concepts into fully configurable, integrated software. Dean Sadler, son of the company owner, played a key role in the development of new software that featured in the KTP project.

In developing the project proposal, it became clear that, in addition to using the software in Beaumont Travel, there was an opportunity to sell the final software products into the transportation industry sector. The company realised that they needed additional technical and project management skills and looked to the University of Gloucestershire and the KTP scheme to support them in this initiative. The areas of expertise that the Associate and academic supervisor brought to the company included the design and development of new software using web-based technologies such as PHP, MySQL, HTML, JavaScript, and Microsoft.Net and Dream Weaver; and software integration and project management skills and experience.

The project initially focused on market research (through questionnaire, interview, survey, and systems user reviews) to understand the key business requirements in the bus and coach industry and confirm the market potential of the proposed software products. This was followed by the analysis and modelling of mainstream business processes in the transportation industry, which eventually was the platform for a web-based solution with open-architecture to allow the new software products to be used in the transportation industry.

The software was built around a new database-independent central core system (TravelManager) that was web based with simple connectivity for customers operating across the Internet. The TravelManager system included modules for central daily business management, field-bus passenger and vehicle maintenance information. Interface modules were added to allow information exchange between TravelManager and other third party systems. These modules were alpha and beta tested with prospective customers leading to modification of some functions of the system to meet the individual customer's business requirements. A significant

breakthrough came in the post-development marketing of the product, as BT selected a modified working version as the central component of their customer relationship management (CRM) system for SMEs (this was re-badged as BT BizBox).

Beaumont Travel successfully developed a new line of business, providing niche software for its industry (and other) sectors. The new knowledge gained from the project significantly enhanced the company's ability to design, develop and market comprehensive web-based software. Feedback from customers using TravelManager clearly indicated that their operational efficiency had improved from deployment of the TravelManager system. There were several other benefits that resulted from this KTP programme. Within Beaumont Travel, a new technology culture was established, led by Mike and Dean Sadler, which was evidenced in the multi-skilling of employees; whilst at the University, the case study material was used in post-graduate teaching and produced at least one conference paper. Following the KTP, Beaumont Travel added further functionality to its software, providing flexible add-ins not only for the transportation industry but also for SMEs in other industry sectors.

Discussion

The case studies delivered a number of benefits for the companies, the University and the Associates, and more generally the final reports to the funding partner suggested that the KTPs successfully met their initial aims. The case studies also shed some light on a number of the contextual issues that have encouraged entrepreneurship.

The framework analysis highlighted the significance of a number of contextual factors regarding the broader socio-economic environment. As regards local university influence, the University of Gloucestershire played the pivotal role in the instigation of

the KTPs and in the development of entrepreneurial activity. However it was not the presence of the University per se that was the pivotal factor in facilitating entrepreneurship, but rather a number of discrete, though interlinked, elements that played a vital contextual role. The University's strategic commitment to enterprise was vitally important in providing the environment in which KTP activity was encouraged. Here, for example, there is a commitment to 'provide a coherent and well-integrated programme of support for businesses and employees' and 'to support enterprise and sustainable economic development in the locality' (University of Gloucestershire, 2012).

A significant role was played by the University's KTP specialist, a member of staff in the Business School, who initially sourced and secured each of the selected KTPs, and subsequently acted as either academic supervisor or academic lead in the majority of all the projects undertaken at the University. This was a constant, high impact, influencing factor across the duration of the selected KTPs, and the catalyst for the creation of an environment where entrepreneurial activity could develop and flourish. This was particularly the case in the 'selling' and 'project design' phases of the KTP life cycle (Figure 1), when possible projects were discussed, and where entrepreneurial thinking could be applied to particular project options. This role aligns with the 'agent-centric perspective' identified by Garud, Gehman and Giuliani (2014), but can also be seen in the broader 'context-centric perspective'; the contextual importance of this role in encouraging entrepreneurship cannot be overemphasised and in some ways the zeal of the university academics has matched, and on some occasions, exceeded that of the company personnel. Subsequently, once the projects were underway, the Associates also played an important role in the development of the KTPs at the operational level. At Beaumont Travel, for example, the Associate

acted as a team leader, investigated new market opportunities and added new functionality to the proposed new software, which in turn, met changing customer requirements. More generally, during all the KTPs presented in this paper, the academics acted as a conduit between the skills and expertise available from the University and the practical solutions needed by the company.

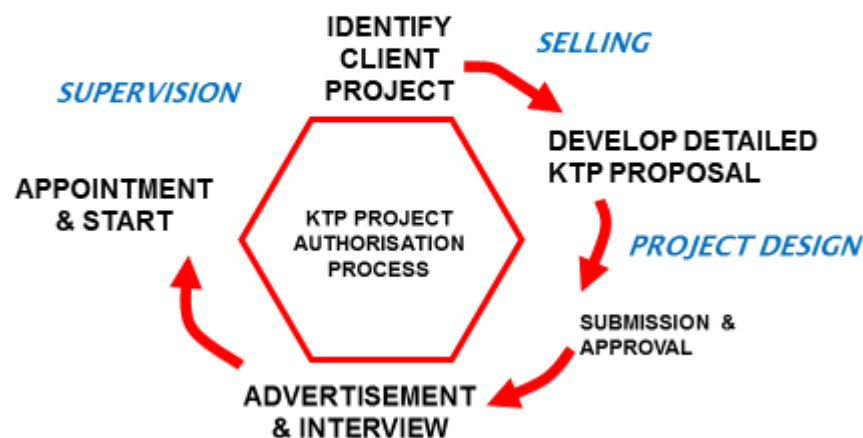


Figure 1. The KTP Selling and Design processes

Stam and Bosma (2015) concluded that 'regional knowledge production' and 'regional access to financial capital' were 'key contextual factors in supporting entrepreneurial activity', and this is supported by the case studies. The University, in liaison with Business Link and the Technology Strategy Board, held a number of events in the period 2003 - 2012 at which KTPs were explained and follow-up meetings with interested companies were arranged. Sometimes, these took the form of 'Smart Thursdays' at the University's Park Campus or at Chalfont House in Cheltenham, where Business Link were located. There were also a number of conferences including

the annual 'Growing Gloucestershire' conference and breakfast briefings to local companies in other locations such as Hereford. The role of the regional representatives of the UK funding body (which changed over time from Momenta to the Technology Strategy Board to InnovateUK), usually working in liaison with university staff, was a key influencing factor in attracting interest from small companies and then firming up arrangements and contractual commitments. The proactive and business informed activity of these staff was significant in encouraging SBEs to progress their project proposals. The range of seminars and briefings which involved these personnel not only developed knowledge about KTPs (and about information technology) in the wider region, but more specifically clarified the financial benefits of undertaking new initiatives within the operational and financial framework embodied in the KTP scheme. Almost half of the 45 KTP projects emanated from knowledge imparted at these events.

However, access to financial capital emerged as a particularly significant influencing factor that was a critical factor in encouraging these small companies to make a significant investment of their own time and human resources, as well as committing their own finances to these entrepreneurial change projects. This benefit was actively promoted via university and UK funding body regional representatives (Figure 2). The 66% government subsidy of staff costs, training, equipment and university supervision and other costs meant that the company partner paid just £24,000 for a £72,500 annual package – and this contribution could also be offset as investment in research and development against corporation tax if the companies were making declared profits. This was a major financial incentive that was seen as a major attraction by SBEs, not least by TPG DisableAids who undertook three sequential KTP projects between 2005 and 2011. This was not overtly stated in the

project final reports, but was evidenced repeatedly in discussions with the companies' senior management, not only about the total government subsidy, but also more detailed assessment of what could be spent on training, travel and Associate salary support.

At the same time, the cumulative acquisition and application of skills and expertise from one KTP to others over time can be a significant contextual factor in encouraging and facilitating entrepreneurship, and universities can be important and evolving repositories of such skill and expertise within regional business communities. Carlsson et al. (2013) recognised the importance of knowledge creation in the surrounding society and the presence of industry clusters as key

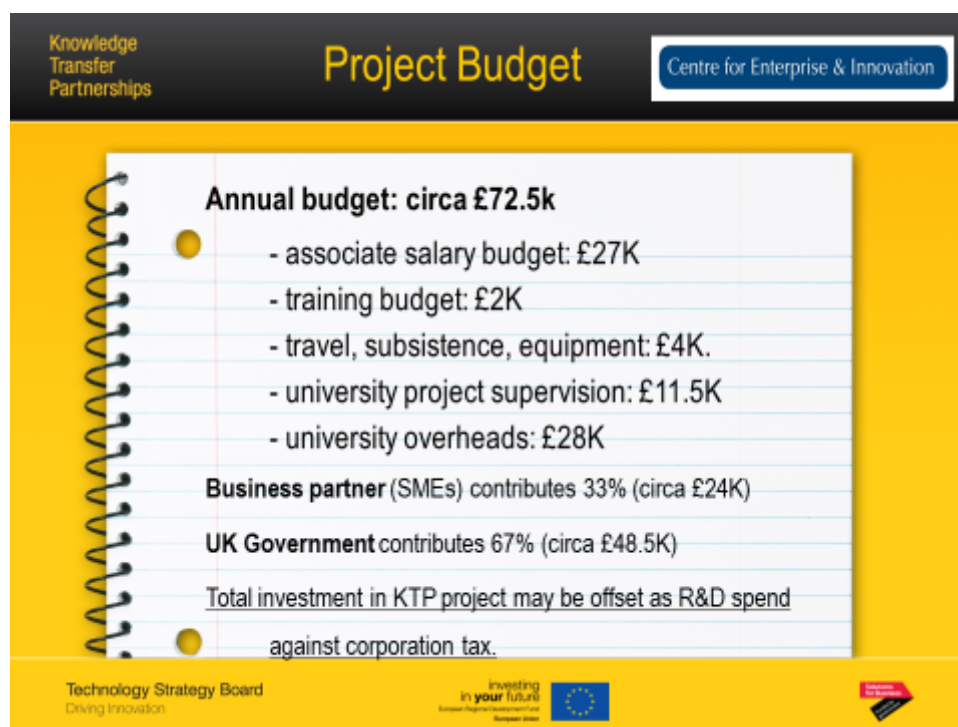


Figure 2. KTP financial benefits presented at a workshop for local businesses
Source: Wynn (2011:10)

influencing factors in developing entrepreneurial activity. A snapshot of the KTP projects being undertaken by the University of Gloucestershire with SBEs in 2010 (in the teeth of the recession following the 2008 financial crash) highlights this aspect (Figure 3). In addition to the TPG DisableAids and AuraQ KTPs, another five KTPs were underway with other SBEs in the region, with the authors being involved in the development of the proposals in all seven and as either academic supervisor or lead. This allowed the cross-fertilisation of ideas and exchange of experience which promoted the development of entrepreneurial thinking. The existence of ‘industry clusters’ was generally not formally organised nor regulated in any way. It was more a case of informal, *ad hoc*, communication and exchange of views between SBEs with similar aspirations for growth who saw the KTP scheme as a vehicle for the introduction of entrepreneurial initiatives. It was nevertheless a factor (even if of less significance than some of the others discussed here) in, first, making SBEs aware of

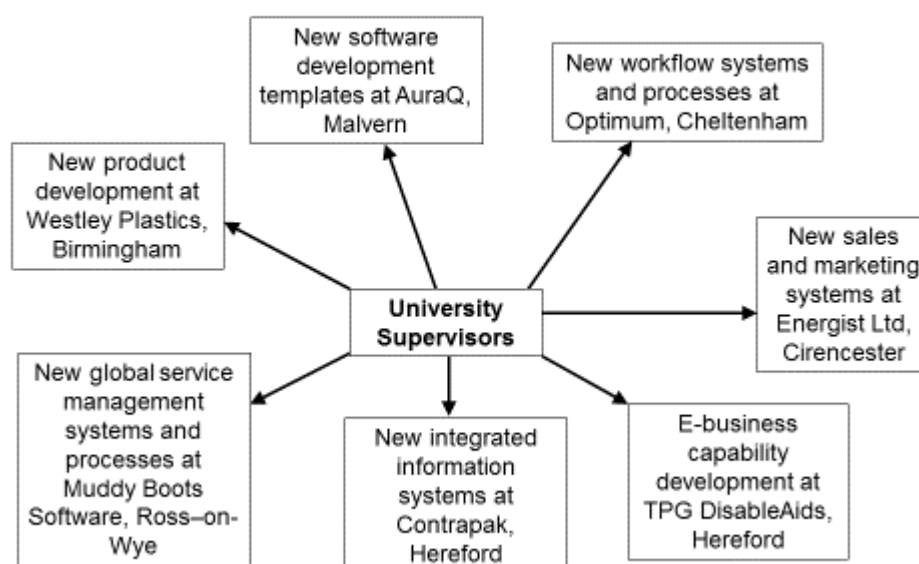


Figure 3. KTP projects with locally based SBEs in 2010

the KTP scheme, and then in bringing these companies into the scheme to pursue entrepreneurial initiatives. For example, at Optimum in Cheltenham (Figure 3), where the KTP project supported the implementation of new workflow systems and associated process change, discussions between the Optimum MD and the software supplier, Union Square, led to the latter embarking on a KTP of their own. The University also held a number of seminars for Associates working in parallel on the different projects to encourage exchange of experiences and application of new ideas in their projects.

However, the particular business environment within the case study companies points to the importance of certain other factors supporting entrepreneurial activity. A close-knit family environment appears to have been a factor in allowing entrepreneurial activity to flourish in three of the four cases. This was particularly evident at TPG DisableAids where three separate KTPs were pursued. The first (2005-7) concerned the development of a long-term IS strategy, the second (2006-8) the implementation of new marketing processes and materials, and the third (2009-11), as discussed above, the implementation of a new e-business capability. At Beaumont Travel, the key driving force for change was from owner director Mike Sadler, his son Dean and wife Ellen; and at C&G Services, husband and wife team Bob and Jane Oldmeadow were the inspiration and guiding hand for the new systems and processes ushered in by the KTP. This supports the concept of 'entrepreneurship as a social (family) phenomenon'. At all three case studies, family members were centrally involved in the management of projects and were exposed to new technology concepts and discussions about how they could be utilised within their companies. This represents what Stam and Bosma (2015) called the 'human capital effect', with family members learning new entrepreneurial skills. At Beaumont Travel, there was

also evidence of 'a social capital effect', whereby the new software project (TravelManager) allowed the owner's son to be actively involved in the software development process, working alongside the Associate and the University academic supervisor.

In recognising the 'temporal scale' of 'knowledge spillovers', Stam and Bosma (2015:334) suggested that the time lapse could run from a few months to several decades. Here, the former rather than the latter time scale was more the norm as knowledge transfer and entrepreneurial activity were derived from skills and expertise in technology and project management, rather than from research. In SBEs, the ability to rapidly develop or adopt new technology is a further factor in engendering entrepreneurial activity. This can be seen as 'technology opportunism', as is evidenced by a longer term assessment of the project outcomes of the case studies. The KTP final reports suggest the projects were successful in the short-term, but the longer-term view is more nuanced. At TPG DisableAids, the innovative amendment of old legacy systems and incorporation of new middleware products did indeed help satisfy the need for e-procurement by major public sector customers; but today, 7 years after the end of the project, the company's systems are being upgraded and the specific developments brought in by the KTP are no longer used. Nevertheless, the initiatives were of value at the time and helped the company continue to grow its turnover from £4.0m at the time of the project to £4.9m in 2016/17.

A similar picture emerged at AuraQ, where the KTP project aimed at template innovation with the Metastorm product, but eventually failed to deliver against targeted objectives for different reasons. The project commenced in 2009, when the company's business plan entailed a move towards software solutions rather than services, and

specifically to provide bespoke software components based on the Metastorm BPM product. The KTP project researched and developed these new BPM tools but shortly after completion of the project, Metastorm were bought out by OpenText who halted the development of the Metastorm product. Although AuraQ still support Metastorm users, the envisaged expansion based on the new Metastorm templates did not materialise. Nevertheless, by forging links with new business partners, the company came through some turbulent financial times in 2010-11, when turnover dropped to just £170K, but have since recovered well and now have 33 staff compared with just 6 when the KTP was started, and a turnover of £2.2m in 2016/17. This company has remained entrepreneurial, finding new options with other software providers. The continued success of the company has largely relied upon the 'agent-centric' entrepreneurship (Garud, Gehman and Giuliani, 2014) of its owner and managing director. Nevertheless, the initiatives pursued in the 2009-11 KTP project can be seen in terms of the contextual factors discussed above. Although this is not a family business, and thus the human and social capital effects are less to the fore, the growth of the company has been built upon technology opportunism allied to the sound reorientation and advancement of the company's skills base.

At Beaumont Travel, the KTP project was the catalyst for a major change in company operations. The traditional coach and bus company was closed shortly after the end of the KTP project, but Dean Sadler, son of the Beaumont Travel owner and managing director, established Beaumont Business Software Ltd, based in Sheffield, to develop and sell business and domestic software. The company is still in operation today, but turnover is small. Only at C&G Services can the new initiatives ushered in by the KTP be seen as a long-term embedded success, as the company has continued to flourish with improved processes and systems. The Course Booker system is still in

operation for the management and processing of training activities, and customers are able to track their training records online. Turnover was severely hit by the recession following the financial crash, but has recovered well and the company posted revenues of £1.6m in 2015/16.

Conclusion

There a number of contextual factors engendering entrepreneurship in these KTP projects, relating to two main areas – the broader socio-cultural environment and the SBE business environment (Figure 4).

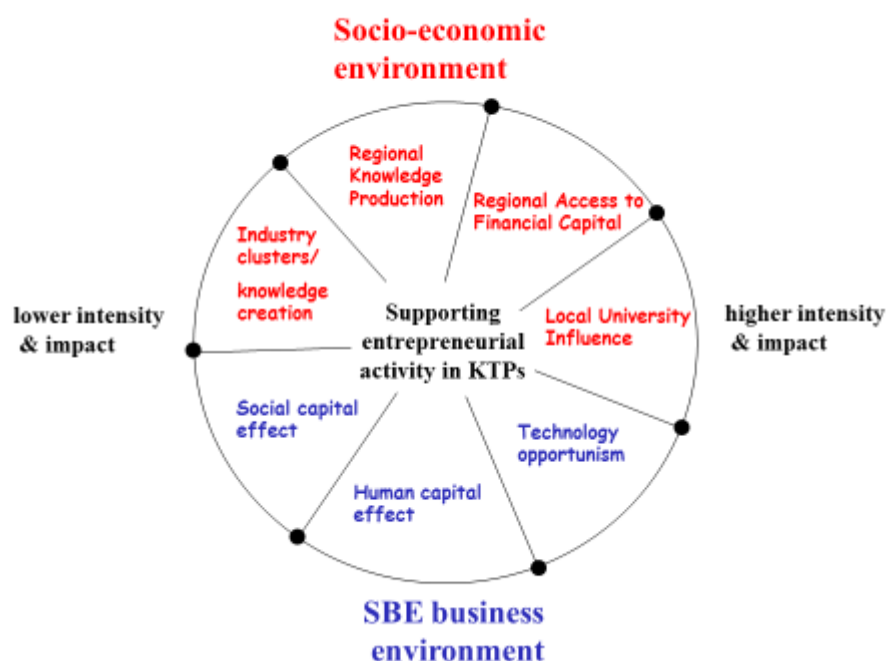


Figure 4. Contextual factors influencing entrepreneurialism in KTP projects with SBEs

In the broader socio-economic environment, 'local university influence' stands out as a key catalyst for entrepreneurialism in the SBEs studied. Equally, access to significant financial subsidy for the KTP projects, available via the Technology Strategy Board's regional advisor, gave incentive and impetus to the development of new ideas and entrepreneurial thinking necessary to secure such funding support ('regional access

to financial capital'). All four companies were also influenced to some degree by the range of seminars, conferences and events that promoted and explained the KTP scheme and how it could be used for change projects, but particularly for technology related initiatives aligned with the companies' broader business objectives. We see this as 'regional knowledge production', in part generated by the university but also by other entities (Technology Strategy Board, Business Link, Regional Development Agencies and more latterly gfirst LEP and the Growth Hub). The 'industry clusters' factor also played a part in generating entrepreneurial solutions and proposals via the KTP scheme, with 33 SBEs undertaking projects, most of them technology related, with the University in the period 2003-2012.

In the SBE business environment, the 'human capital effect' was evidenced in the three family businesses in particular, as family members learnt new skills and played leading roles in the KTP projects. The 'social capital effect' was also seen to be a factor at Beaumont Travel where the owner's son developed and applied new technology skills and set up a new software company (Beaumont Business Software). The case studies also suggest that opportunities offered by new technologies and the speed with which they can be implemented, particularly in SBEs, was a major influencing factor in encouraging entrepreneurial thinking and action. This we have termed 'technology opportunism'. A further observation from these case studies is to reaffirm that entrepreneurial activity is not always successful. In only one of the four cases were the new initiatives brought in by the KTP projects of enduring significance. Yet, the fostering of an entrepreneurial spirit has, perhaps, been of lasting value as these companies have adapted their strategies, products and technologies to meet the challenges of changing market environments.

Finally, the authors would argue that the paper makes a contribution to the understanding of how university-based KTPs, and wider university collaboration with local and regional companies, can both foster entrepreneurship and help to manage change within entrepreneurial ventures. The paper provides a reference point both for regional policy makers who are looking to encourage new entrepreneurial ventures, and for universities who are looking to grow their work with local and regional entrepreneurs. The contextual factors identified in these case studies (Figure 4) can be used as an initial model by other researchers studying entrepreneurship in SBEs, particularly in the context of knowledge transfer.

This research makes certain contributions to theory and conceptual thinking. On the one hand, the findings suggest that it is important to embrace a wide range of influences when looking to examine the role of contextual factors in fostering entrepreneurial activity. This will help address the issue of what has been perceived as the invisibility of context mentioned in the introduction to this paper. As such, the descriptive case studies which form the main body of this paper can contribute to entrepreneurial theory. On the other hand, the paper can be seen to add weight to resource based theories of entrepreneurship (Alvarez and Businetz, 2001) in that it focuses on the ways, through access to capital, social networks and educational institutions, that both individuals and small groups can leverage different types of resources to establish and develop entrepreneurial ventures. The findings are also consistent with opportunity-based theories of entrepreneurship (Murphy and Marvel, 2007) in that they illustrate how entrepreneurs can see the potential, and take advantage, of the opportunities created by developments in information and communication technologies. Nevertheless, the authors are aware that the paper has its limitations, not least that it is based on just four case studies. They would however

argue that the paper makes a modest contribution to developing a greater understanding of the role of contextual factors in entrepreneurship.

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Corresponding Author:

Martin Wynn, The Business School, University of Gloucestershire, The Park, Cheltenham, Gloucestershire GL50 2RH, UK. Email: mwynn@glos.ac.uk

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