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Using a Mixed Method 'Petri-dish' Diagram to Determine Complex Impacts of Leadership Development in Extant Entrepreneurs

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Abstract (3-500words):

Smaller enterprises are considered to be the greatest potential source of growth in the European economy[4]. As such interventions to improve their sustainability and to realise their growth potential are being publically funded across the European Union [15]. In Wales, UK a programme of leadership development for extant entrepreneurs (LEAD Wales) has been funded for such a purpose. A full time research team has been associated with the programme since its inception (Jones et al, 2013). One of the aims of the research has been to determine the impact of the intervention upon the beneficiaries.

A novel methodological approach has been required to determine the impact of this type of programme upon the delegates and the delegates upon their businesses. Existing methods used for other programmes were considered to be limited in this regard. At the start of the project a narrative literature review was undertaken to determine the extent to which existing methods could be used in relation to determining impact of the LEAD Wales programme. This review determined that no single established or widely accepted method was available for use. As a result, multiple mixed-methods from other fields of study (primarily entrepreneurship education and economic impact) were used in the first phase and reviewed in full after 30 months. Amendments were made and a second review of methods was undertaken at 42 months. The effectiveness of the methodological approach was determined according to measures of reliability and validity and, as mixed-methods allows, these were the product of triangulation of multiple methods.

The first finding of the research was that the mode of measurement of effectiveness of the experiential learning programme was judged according to the audience that requested the conclusions. There is no single measure of effectiveness but rather a complex of outputs required by different stakeholders. In order to correctly formulate this, a research framework was created that lead to the creation a generic research framework diagram that recognises the importance of audiences for research and targets of intervention.

In designing the full methodological approach, the authors found that amending a case study approach first advocated by [13] allowed the multiple and mixed methods to be mapped in such a way that multiple methods could be used to provide data for integrated analysis, with enough diverse data to triangulate whether the perceived impacts were valid and reliable.

This 'mixed-method petri-dish diagram' approach has proven beneficial in providing a strong framework to determine the impact of the LEAD Wales programme suitable for all audiences. This novel approach to impact analysis of the complex social realities of leadership development amongst extant entrepreneurs is considered to be transferable. The implications for further research are in the widening of the role of the case study in mixed-methods research, particularly relating to experiential learning. In practice, the level of research focus on the LEAD Wales programme is not always possible or appropriate. Further study is required to test the methodological approach with other programmes and other learner groups.

Keywords: mixed-methods research, novel, petri-dish, case study, complexity, entrepreneur, leadership

1. Introduction/Background

1.1. The LEAD Wales Programme; a unique research opportunity.

The LEAD Wales programme has been funded since January 2010 to run at no cost to the participants in the south and north-west counties of Wales in the UK, in an area known as the 'Convergence' region. The target audience for the programme is owner-managers or primary decision makers from micro, small and medium sized enterprises. These will be known as extant entrepreneurs throughout this paper for the sake of brevity and to distinguish them from a more commonly researched group of learners – nascent entrepreneurs [3];[7]. The term extant entrepreneur has been defined by the authors as '*an individual who organizes and operates an enterprise or enterprises, taking on personal financial or other risk to do so*'. This wider than usual definition allows inclusion of any individual who heads an organisation involved in economic activity whether for profit or other social value and who adopts a personal financial or other risk as a result. It does not automatically assume that the 'entrepreneur' is 'entrepreneurial' in their mindset [11, 12] and in so doing further differentiates this group from the more commonly studied nascent entrepreneur or corporate leadership learner.

The LEAD Wales programme is funded to provide leadership development support to these extant entrepreneurs as a result of a commonly held belief that a significant proportion of extant entrepreneurs would not have had formal leadership training or development prior to starting their enterprise and that enhancement of leadership skills or behaviours amongst this group has positive impacts on business sustainability and growth.

As well as funding the intervention with the extant entrepreneurs, the programme also incorporates a dedicated research team. The research team was located at two sites in Wales, UK and is supplemented with expertise from individuals at both site in economics, social sciences, and the study of small business. While the team itself was multi-disciplinary in its past experience, the initial focus of the academic study followed that used by a predecessor program at Lancaster University (LEAD) which commenced in 2002 [8]; [9]; [10]; [5]; [6]) which had a strong small business and education focus. As such the initial phase of research lead to non-academic publications focussing on the improvements in enterprise performance but more academic activity focussed on the characteristics of the extant entrepreneurs attracted to the programme and the impacts of the LEAD Wales model of extant entrepreneur development in a regional development context (Henley and Norbury, 2011; Jones *et al*, 2012). Unsurprisingly given trends in the UK higher education environment, the research was heavily biased towards published outcomes in the rich area of academic endeavour relating to regional development and publications were primarily qualitative and constructivist in nature. Methodological tools from related fields of study (primarily entrepreneurship education and economic impact) were used in the first phase and reviewed in full after 30 months. Meanwhile the programme was moved out from its administrative home in the business school to an academic support department specialising in external relationships and funding. While this move was made for administrative reasons, it also prompted review of the research approach.

2. The need for a novel approach

In 2013 new appointments were made in the research team which subsequently resulted in a review of the prior research programme. The review identified the prior focus on the extant entrepreneur as described above and resulted in a new research framework being created.

This framework encouraged the research team to determine the impact of the LEAD Wales model of leadership development intervention by examining three linked but separate 'entities': the delegate, their organisation or enterprise and the local economy, in the context of the learning model being used. This more structured approach was used to explain the value and direction of the research to the multiple audiences for which the research was required – the delegates (business), the funding bodies (economic development) and the multiple academic communities to which the research was of interest. The mode of measurement of effectiveness of the experiential learning programme was judged according to the audience that requested the conclusions. The reviewed identified that there could be no single measure or construct of effectiveness but rather a complex of outputs

required by different stakeholders. The resulting framework diagram created for the LEAD Wales programme is shown in Figure 1.

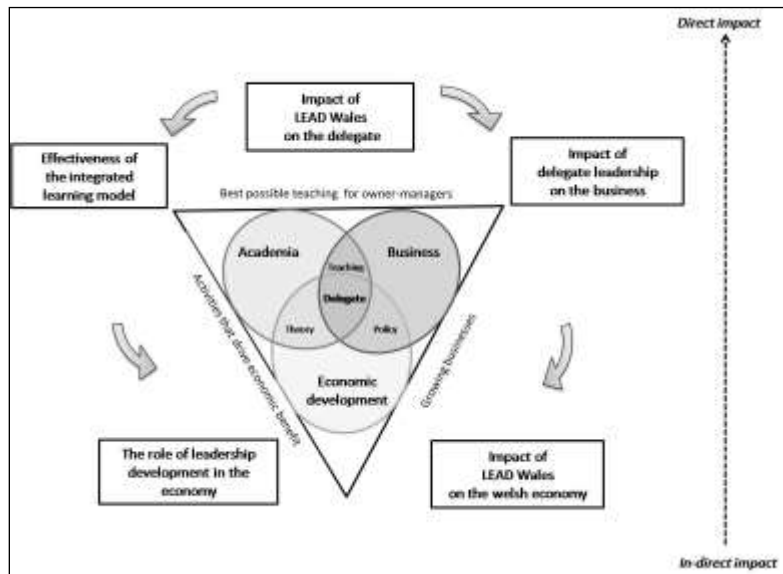


Figure 1. Research Framework for LEAD Wales as of March 2013.

The formalised framework as shown in Figure 1 is still in place and it has multiple objectives:

1. *It shows the unit of research (the sample) in context.* At the centre of Figure 1, the delegate is the immediate subject of the intervention but also the most available unit of research (the sample) and all findings flow from examination of the delegate in context. The delegate is the key to this Venn diagram approach.
2. *It sets out and limits the relationships between the various and diverse possible fields of study.* As shown in the three ovoids that form the venn diagram at the middle of Figure 1, identifying three interconnected audiences for the research output; business, academia and economic development, allows the researchers to see the two additional possible modes of dissemination (policy and teaching) in addition to academic theory which had previously been the focus.
3. *It aligns the research to the programme being studied.* Having determined the audiences and the modes of dissemination, the subject under study can be clearly split into three domains: effective teaching, growing business and wider economic benefit – shown as the three sides of the triangle. These are the domains that the programme targets and the framework includes them to show clear continuity between activity and research.
4. *It provides focus.* Five research foci were created which were considered to be achievable given the available data, but also to be relevant to the programme as a whole. In undertaking analysis based on the research questions posed, measurable research objectives – such as impact (on the delegate, on the business), effectiveness (of the teaching) or description (of the role of leadership) provide focus for the data collection and analysis approaches
5. *It sets the findings in context.* The extent to which the evidence of change seen could be considered to be as either a direct or indirect result of the intervention was easily shown as a continuum. This provided a justification for research expenditure in the context of the programme funding.

Having noted that the framework was effective in helping to both focus and maximise value from the research, the team set about creating a generic version of the framework suitable for use with other research projects. This is shown below in Figure 2.

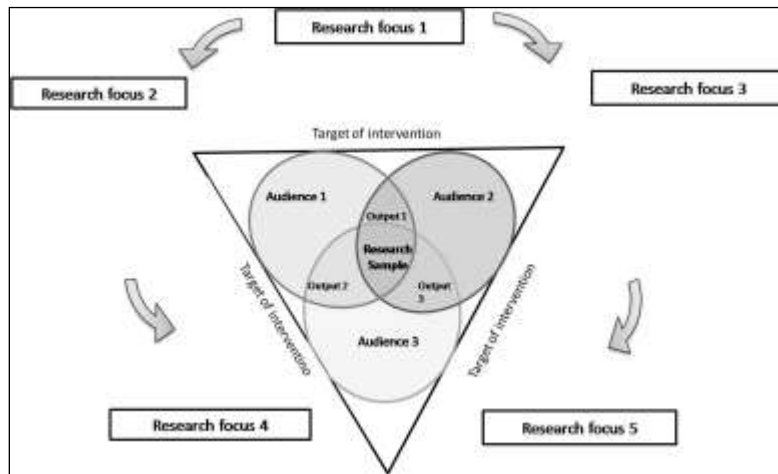


Figure 2. Generic research framework example.

Having brought the research framework down to five key areas of focus (as shown in the black rectangles in Figure 1 and 2) and therefore prompting five high level research questions, the research team set about determining which research methodology approach would gain the best practicable research outcomes given the limitations of the research team (two full time researchers managed by two Professors) and available budget.

The first phase of the programme had involved multiple methods of data collection, undertaken in parallel in the two sites. When the review was undertaken, no formalised methodology had been written which encompassed all of the data collection and analysis methods. Rather each method was dealt with in isolation to achieve an independent aim. The new research framework provided an opportunity to revisit the research approach and methodology and to set these out formally in order to maximise the effectiveness of the research activity for all the involved actors – the researchers, the delegates, the funders and the academic community.

3. Research Approach

3.1 Requirements of the research approach

Prior to deciding on the specific methods of data collection and analysis the research team confirmed their research paradigm. In agreement with much of the existing literature as already effectively reviewed by Creswell [14] it was determined that quantitative research, although traditionally used to determine the effectiveness of learning through direct feedback from learners, is ineffective alone. Equally, qualitative collection and analysis of narratives provided only one element of the picture. The authors found that using a case study approach, populated with multiple mixed methods, provided enough data to triangulate whether the perceived impacts were valid and reliable. This would seem a simple deduction based on effective practice in social science methodologies; however to retrospectively adopt this approach after three years of data collection and analysis required careful consideration.

With the research framework having being set by the context, opportunities and limitations of the study (not least of which were the three major audiences) and being that it looked at a complex of disciplines and actors, a pragmatic philosophical stance was considered to be the most appropriate. While the LEAD Wales programme was

trying to develop leadership, a concept where a social constructivist philosophy is advocated, a positivistic approach to data on economic change was also appropriate. The research team struggled to justify adopting any single traditional epistemological approach and pragmatism was considered appropriate. This further supported the use of a formal mixed methods approach.

3.2 Research opportunity

The research team were integrated into the LEAD Wales programme from the outset. This gave them privileged access to the research sample, the delegates. This level of access overcomes problems that are sometimes faced of research with this group. Extant entrepreneurs are often perceived to be reticent to participate or collaborate in research, particularly when the research doesn't have direct benefit for them or their enterprise.

At the time that the research approach was being re-developed in 2013, data had been collected from the following sources:

- Survey questionnaires (paper based) of all participants at the beginning and end of the programme (100% sample)
- Survey questionnaires (online) of participants annually each year after completion(100% sample)
- Focus groups from each cohort of delegates up to 8 volunteers up to 12 months after they complete the programme
- Individual biographical interviews with selected delegates up to 12 months after completing the programme
- Literature review
- Anecdotal evidence collected through observation by staff

Additional data collection commenced in March 2013, including participant observation and traditional third party observation of delegates during delivery days. An amended survey questionnaire was created in November 2013 to replace that previously completed by all delegates at the beginning and end of the programme in order to capture new data to support grounded theories developed as a result of analysis of data from the initial phase of the programme.

4. The Amended Case Study Diagram approach

At the time that the research methodology was being reviewed and reframed (summer 2013), this complex of data collection methods had not been designed to be an integrated whole and as a consequence analysis had been undertaken on each individual data source with some discussion of findings from each in the context of others. During the review, an audit of data collection and analysis produced tables, an example of which is as shown in Table 1. These tables, although complicated and comprehensive in their description of the research methods, didn't provide a full view of way in which the results from multiple methods of data collection could be grouped together for analysis, nor how the multiple methods related to the functional activities of the programme being studied. Therefore there was incongruence between the justification for the data collection and analysis methods and worse a lack of clear justification of how the results from analysis could provide answers to the research questions.

To overcome this and make all aspects of the methodology clear, a method used most recently in the Multiple Case Study approach advocated by Stake (2005) was adopted. This method was familiar to one member of the research team as a result of doctoral case study research. The research team identified that treating the LEAD Wales programme as an intrinsic case study allowed a better representation of the mixed-method approach to be created. This overcomes some of the failures of prior methods as described by Baxter and Jack [1] of showing the true conceptual framework.

Table 1. Example of a summary of approaches and methods used in the LEAD Wales research programme 2010 - 2014

Approach	Multi-method, qualitative and quantitative. Pragmatic.					
Questions	What impact does the LEAD Wales programme have on the; delegates?; delegate enterprises?; economy of Wales					What are effects?
Method of data collection	Desk study	Survey questionnaire		Observation	Focus group	Reflective interviews staff
		Pre – and post course	Annual survey			
Sample source	All written resources including delegate feedback and anecdotal evidence	100% delegate population		50% of sessions.	Volunteers from the delegate population	Volunteers delivery staff
Method of analysis	Qualitative – coding and theory development	Mixed. Descriptive statistics, bibliometric key word analysis, coding	Mixed. Descriptive statistics, bibliometric key word analysis, coding	Qualitative – coding and theory development	Qualitative – coding and theory development	Qualitative coding and theory development

Although, in the spirit of pragmatism, using Stake's worksheet concept to display and conceptualise the full extent of a complex multiple mixed-method approach was obvious to the authors at the time, it is not a commonly used or proven approach.

The element of originality here is that Stake's original worksheet concept, first published in 1995, was developed to a) help plan case studies, b) focus heavily on the relationship between individual cases within multiple case studies – not between methods used within the case study approach. In this way the approach has been amended to show the ways in which the various methods of data collection cover each functional activity of the case – for this reason the term 'mixed-method petri-dish diagram' was coined. The petri-dish was considered a suitable metaphor, in that the subject of study is viewed from above in its growth environment, and considered in context, where temperature, atmosphere and light are substituted for political, economic or social factors. The discipline of designing the petri-dish diagram requires the wider context and external influence to be taken into account and to clearly show that there are enough diverse sources of data to allow triangulation of findings, mixing both qualitative and quantitative methods, data from each functional activity and remaining within the boundary of the case as identified. Figure 3 shows the diagram created for LEAD Wales.

It can be seen that the petri-dish diagram shown in Figure 3 contains only the data collection methods, and not the data analysis. This is an intentional outcome of the approach: by pulling together the data collection in this way, it was clear that all data was being analysed using the same tools. In the case of LEAD Wales, descriptive statistics and bibliometric analysis from suitable sources in all functional activities – the evidence produced was used to support or disprove the grounded theories produced as a result of coding of qualitative data. The data being analysed could be divided according to the functional activity, sub-samples (such as cohorts, demographic sectors) or other sub-sets of the sample population. It is worth noting here that the sample is purposive – as with many social science case studies, the research is being undertaken opportunistically and as such the sample population is self selecting. This being the case all and every method of verifying the validity of data, especially that volunteered by the sample population, rather than observed, is of value.

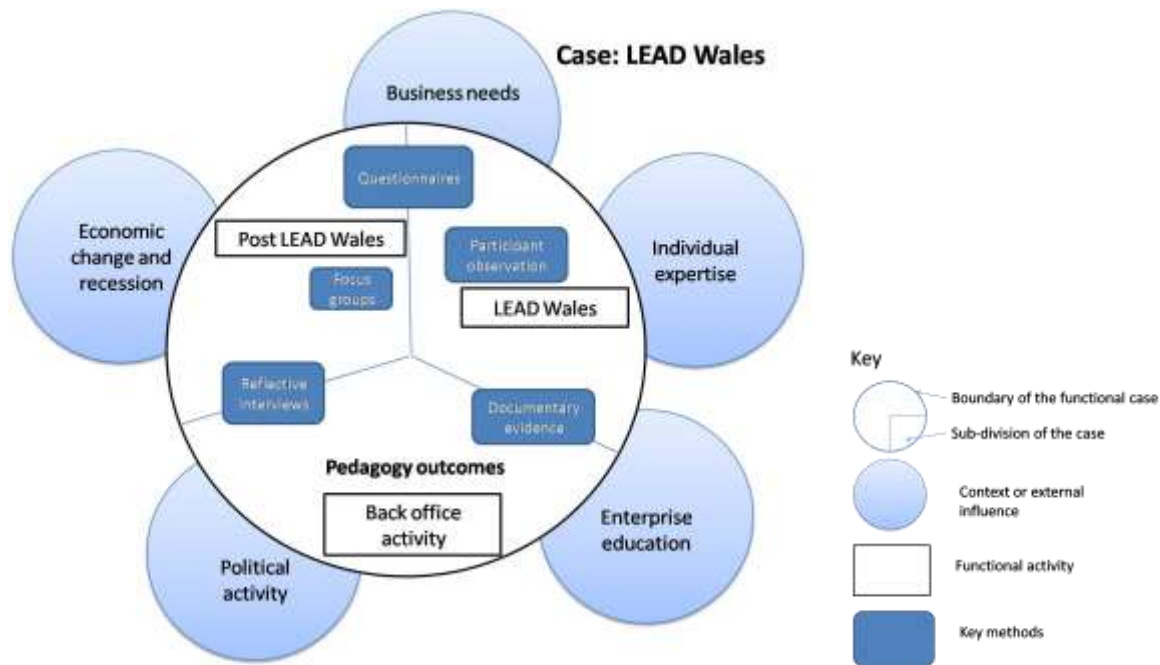


Figure 3. The LEAD Wales petri-dish diagram, adapted from a concept in Stake, 1995.

5. Conclusions

In trying to communicate a relatively complex research endeavour to multiple audiences the authors have identified two useful tools to describe a mixed-methods research programme. These tools appear to be transferable to other research projects. Whilst many qualitative and mixed methods research programmes still follow the time-line or flow-chart diagram approach (as used effectively by [2], pp.589) these new diagrams

allow the true pragmatic nature of mixed-methods research to be first focussed and bounded, using the framework diagram and then the relationship between multiple data collection methods to be characterised in a relatively simplistic fashion using the petri-dish diagram. This research programme has proven its use in the retrospective examination of an existing complex of data collection.

The chosen methodological approach has proven beneficial in providing a strong framework to determine the impact of the LEAD Wales programme suitable for all audiences. This novel approach to impact analysis has proven to be effective in analysing the complex social realities of leadership development amongst extant entrepreneurs but is considered to be transferable to other similar fields. The implications for further research are in the widening of the role of the case study in mixed-methods research, particularly relating to experiential learning where multiple disciplines may be involved in the development of pedagogies, and further multiple disciplines are appropriate for collecting data based on the affective, cognitive and conntive outcomes sought.

In practice, the level of research focus on the LEAD Wales programme is not always possible or appropriate. Further study is required to test the methodological approach with other programmes of experiential learning and other learner groups.

References

1. Baxter, P. and S. Jack, (2008), "Qualitative case study methodology: Study design and implementation for novice researchers", *The qualitative report*, 2008. Vol. 13, No. 4, pp. 544-559.
2. Bryman, A., (2012), "Social research methods": Oxford university press.
3. Collins, L., A. Smith, and Paul, (2006), "Applying a Synergistic Learning Approach in Entrepreneurship Education", *Management Learning*, 2006. Vol. 37, No. 3, pp. 335-354.
4. European-Commission, (2014), "A Partial and Fragile recovery", 2014, European Commission: Brussels.
5. Henley, A., K. Jones, and H. Norbury, (2011), "Preliminary Evaluation of the Impact of an Integrated Leadership Development Programme for SME Owner-Managers in Wales". 2011.
6. Jones, K., et al., (2012), "Higher education engagement in leadership development: Using autobiographical narrative to understand potential impact", *Industry and Higher Education*, 2012. Vol. 26, No. 6, pp. 461-472.
7. Karataş-Özkan, M. and E. Chell, (2010), "Nascent entrepreneurship and learning": Edward Elgar Publishing.
8. Kempster, S. and G. Watts, (2002), "The entrepreneur as leader: an exploration of leadership development among small business owner-managers", 2002. Vol., No.
9. Kempster, S., (2009), "How Managers Have Learned to LEAD: Exploring the Development of Leadership Practice". null. Vol. null. null.
10. Kempster, S. and J. Cope, (2010), "Learning to lead in the entrepreneurial context", *International Journal of Entrepreneurial Behaviour & Research*, 2010. Vol. 16, No. 1, pp. 5-34.
11. Kuratko, D.F., (2009), "The entrepreneurial imperative of the 21st century", *Business Horizons*, 2009. Vol. 52, No. 5, pp. 421-428.
12. Rae, D., (1999), "The Entrepreneurial Spirit: Learning to Unlock Value": Blackhall.
13. Stake, R.E., (1995), "The art of case study research": Sage.
14. Creswell, J., (2009), "Research design: Qualitative, quantitative, and mixed methods approaches": SAGE Publications, Incorporated.
15. Wilson, K., (2008), "Entrepreneurship education in Europe", *Entrepreneurship and higher education*, 2008. Vol., No., pp. 119-138.