Investigating the Impact of Training Influence on Employee Retention in SMEs: A RCaRBS Analysis on Sparse Data

Abstract

This study investigates the impact of available training alternatives (TAs) on employee retention in small and medium enterprises (SMEs). An un-ignorable problem with this research problem is that individual SMEs may utilise different combination of TAs. The considered survey questionnaire allowed respondent SME owners/managers the option to gauge the level of satisfaction of a TA or to indicate they did not use it. It follows, therefore, that the survey based data set is sparse, the 'did not use' option inferring that a form of missing value is present (for the Likert scale based satisfaction value present if a TA was used). To facilitate an effective analysis of the considered sparse data set, since the missing values have meaning, the nascent RCaRBS technique is employed. As a development of the CaRBS technique, this technique is able to undertake multivariate regression-type analysis on sparse data, without the need to manage the missing values in any way. Results are presented from the RCaRBS analyses relating to SME owner/managers' satisfactions with TAs and their impact on two employee retention facets, namely greater employee loyalty and conversely losing an employee to a competitor. Emphasis here is on the graphical elucidation of findings in regard to model fit and TA contribution. The pertinence of the study is the inclusiveness of the data considered (a novel approach to analysing sparse data), and the comparisons between these associated issues of TA satisfaction and employee retention.

1. Introduction

Today's business environment is characterised by escalating competitiveness and globalised markets, with increasing demand for efficiency gains, lower costs and enhanced effectiveness (Lin and Jacobs, 2008). Baptiste (2008) noted that a motivated and industrious workforce was critical for business survival in a global environment. Consequently training provision has evolved both in sophistication and form (Saunders, 2000). Furthermore, the concept of life-time employment has eroded with job-hopping a natural evolution and people striving to maximise their value in terms of salary and employment conditions (Talhiya, 2012).

Small and medium enterprises (SMEs) are, however, characterised as possessing inferior training provision and management skills in contrast to larger businesses (Jayawarna *et al*., 2007; Kitching, 2008), with less work based training (Hoque and Bacon, 2006), fewer

qualified employees and lower involvement in government training schemes provision (Matlay, 2004). Motivation for the analysis in this study is evident in Jayawarna *et al*. (2007) and Nikandrou *et al*. (2009), suggesting that more evidence needs to be provided to elucidate the link between employee training and employee retention.

This study applies a novel analysis technique to investigate the relationship between SME training provision and employee retention. Inspection reveals a limited literature especially with regard to the impact of different training alternatives (TAs), such as learning at a local college, learning by doing and distance learning, upon employee retention (Nikandrou *et al*., 2009). The reality of the utilisation of TAs by SMEs is that not all SMEs will have used all the available TAs (not all SMEs would utilise training sourced from all available TAs). It follows, therefore, that an issue prevalent in this study is that the considered training-retention data set is sparse, since each response from a SME owner/manager could be one of two responses, either that they used the TA and gave a Likert scale based score on the level of satisfaction towards it or the SME did not use that TA so no score given. As such the data is understandably sparse, an issue that can cause problems for the ability to pertinently analyse it using traditional analysis techniques (see Di Nuovo, 2011; Huisman *et al*., 1998; Olinsky *et al*., 2003; Schafer and Graham, 2002).

This study, in an analysis of the associated training-retention data set, which will be understandable "sparse", employs the nascent RCaRBS (Regression-type Classification and Ranking Believe Simplex) technique. RCaRBS is able to analyse a sparse data set, importantly, without the external management of the missing values present, such as possible in the situation described above. The RCaRBS technique was introduced in Beynon *et al*. (2010a; 2010b), as a development on the CaRBS technique (Beynon and Buchanan, 2004; Beynon, 2005a; 2005b), to undertake multivariate regression-type analyses. It is a technique whose analytical approach is based on 'uncertain reasoning' (Roesmer, 2000), its technical rudiments being based on the Dempster-Shafer theory of evidence (Dempster, 1967; Shafer, 1976).

The underlying 'uncertain reasoning' is what allows RCaRBS to analyse sparse data, without the need to manage in any way this inherent sparsity. Specifically, this technique combines into a single response value the view of a SME owner/manager in terms of whether they did not use a TA and, if they did use it, what satisfaction level they had for that TA, thus allowing a multivariate regression-type analysis to be undertaken between the use of and satisfaction with the TAs and employee retention (the impact of TAs on employee retention).

The results presented, even when considering a sparse data set, offer novel insights into the relationships between SMEs' owner/manager perceptions of satisfaction of TAs and two facets of employee retention, namely greater employee loyalty and losing an employee to a competitor. It also demonstrates the usefulness of a nascent research methodology, namely the uncertain reasoning which forms the rudiments of the RCaRBS technique. Results are presented separately for the two facets of employee retention, with emphasis on the visualisation of findings on model fit and TA contribution (in terms of their impact). These are then brought together in a summary of findings. The results presented demonstrate the almost unique way the RCaRBS technique is able to analyse sparse data, evidence that will be of interest to researchers in many areas of study.

The structure of the rest of the paper is as follow: In section 2, a discussion of SME training, employee retention and the considered training-retention data set is given, including the issue of the sparsity of the data analysed. In section 3, the RCaRBS technique is described including its ability to analyse sparse data. In section 4, two RCARBS analyses are presented on the SME training-retention data set. In section 5, results are interpreted in terms of the nature of SME training and employee retention. In section 6, conclusions are given as well as directions for future research.

2. SME Training, Employee Retention, Data and Sample

SME Training

The SME community continue to play a major role in economic recovery and growth of national economies globally due to numerical significance and contribution to national, European and global economies (Birchall and Giambona, 2007). In a UK context, SMEs account for over 4.5 million entities (99.8%), and 52.4% of employment, whilst Europe's population of SMEs accounts for 99.8% of all businesses and 66.2% of employment (SBS, 2008). In a global context, Jutla *et al*. (2002) estimated that the SMEs contribution to national economies accounted for 80% of global economic growth.

SMEs require resources, knowledge and skills to grow and improve efficiency and operational effectiveness. Previously, Dollinger (1995) constructed a typology that included the resource of human capital, suggesting that the employee represents a significant asset and a source of potential competitive advantage to any business (Barney, 2001; Penrose, 1959; Wernerfelt, 1995). The value of the human resource within the business can also be associated with Becker's (1993) perspective on human capital in its consideration and recognition of the skills, knowledge and competencies of the individual.

Aragon-Sanchez *et al*. (2003) noted that the SMEs human resource specific characteristics, namely knowledge, skills and attitudes (Barney and Wright, 1998), and organisational knowledge (Alavi and Leidner, 2001), can be utilised to enable competitive advantage (Lee and Bruvold, 2003). Thus, the training of the human resource is essential to provide suitably qualified, flexible, prepared and motivated employees (MacDuffie and Kochan, 1995). Walker *et al*. (2007) state, that the need for training provision is understood by SME owner/managers, provided that they recognise its relevance. Employee training is accepted as a process to enhance SME performance through enhanced profitability and productivity (Reid and Harris, 2002), organisational performance and capabilities (Chandler and McEvoy, 2000; Kotey and Folker, 2007), business survival (Ibrahim and Ellis, 2003) and enabling growth (Cosh *et al*., 1998).

For the purposes of this study, the training construct utilises the definition provided by Kitching and Blackburn (2002) and applied by Jayawarna *et al*. (2007: 324) as: *"Any attempt, within or outside the organisation, to increase job related knowledge and skills of either managers or employees."*

Employee Retention

Employee retention, often measured by employee turnover and employee attrition (Hausknecht *et al*., 2008; Kar *et al*., 2011), is the issue of retaining the services of employees, rather than them leaving to seek alternative employment. This has an increased impact when their reason for leaving an SME is to move to another competitor enterprise. Kuvaas and Dysvik (2009) suggest that where businesses provide training opportunities they benefit as employees become pro-socially motivated and are prepared to expand effort on behalf of the organisation. However, little is known within the current literature regarding what factors contribute to employees remaining with their enterprises (Hausknecht *et al*., 2008).

Employee attitudes towards training (Bartlett, 2001) and training effectiveness (Kontoghiorghes and Bryant, 2004), have been found to be positively related to organisational commitment (Igbaria and Greenhaus, 1992; Smeenk *et al*., 2006). Chandler and McEvoy (2000) and Dalziel (2010) noted that enterprises that invested in the training of their employees and engaged in regular performance appraisal were likely to benefit from lower employee turnover with lower turnover costs. Moreover, Dalziel (2010) suggests that staff retention is greatly enhanced if an enterprise offers a learning environment and career paths that support staff in their personal development and recognises their learning attainments.

While the previous literature referred to offers a positive perspective on the association of employee training and their retention, it may not necessarily be the case. That is, the fear of skilled labour being taken by competitors could also act as a potential barrier to staff learning (Hendry, 1995). As clearly put in Dixit and Prakash (2011, p. 83), who state:

> "*It was observed that after the completion of ERP training provided to the staff and within some days of the system going live, many of the trainees from the organization quit the company causing great losses to organization in the form of shortage of key resources i.e. trained staff. This was a big percentage of employee attrition rate and it is not possible for a company to hold back any of its employees even with the most stringent contract*."

With such observations it is not surprising that Glen (2006) offers a description of employee retention, in terms of key skill retention, likening it to a war.

The discussion on employee retention given here demonstrates the two edged sword notion of how training may lessen employee turnover, but could also increase turnover, potentially to competitor enterprises. It follows, this study considers SME training in with respect to two facets of employee retention, greater employee loyalty (Birdthistle and Fleming, 2007; Talhiya, 2012) and losing employees to competitors (Dalziel, 2010; Wood, 2009).

Data and Sample

Data was taken from the 2008 Federation of Small Businesses (FSB) survey. It is a bi-annual survey of the FSB's SME members to examine their performance, key issues and challenges. SMEs were considered the unit of analysis with the owner/manager the main spokesperson.

In this study, it is the relationship between the levels of satisfaction SMEs have towards their employees' training needs met by a diverse range of TAs and the perceived levels of impact the training has had on two forms of employee retention that is the focus of importance. Brown's (2000) study suggests, however, that owner/managers are often over-optimistic about business performance, not least because the self-worth of the owner/manager is to some extent at stake. It must be recognised, therefore, that owner/managers' perceptions of business performance are not always entirely accurate, and the results must be seen in this context. The questions related to training in the FSB survey refer to the business as a whole and are best interpreted as applying to the employees of the SME generally. The issues of training satisfaction were explored in Question 37 of the FSB survey see Figure 1.

See Figure 1 here

Within Figure 1, acknowledging the novelty of the RCARBS analysis later undertaken (its underlying research methodology later described), an interpretation to these questions (and response structure) is next expressed. For each TA satisfaction question, T1, T2, .., T9, the response allowed encompasses two separate issues (for a single SME):

i) Whether or not a specific TA was utilised by a SME, with a cross in the 'Did not use' box indicating that particular TA was not utilised.
ii) If a TA was utilised, the 'Did not use' box is left empty, and the level of satisfaction of the employees' training needs met, is indicated on a five point Likert scale, ranging from 'Very dissatisfied' (1) to 'Very satisfied' (5), is given.

In a RCARBS analysis (explained later), one data entry is used to represent both of the above issues, either a numerical value (1 to 5) for the level of satisfaction is used or a '-' simply registering the TA was not utilised.

The issues of employee retention were explored in Question 38 of the FSB survey see Figure 2.

See Figure 2 here

In Figure 2, the two retention outcome variables R1 - 'Greater employee loyalty to the business' and R2 - 'Losing a member of staff to a competitor' are considered separately. The respondents were specifically asked to rate the extent to which these forms of employee retention had occurred within their business as a result of training in the previous two years, using a 5-point Likert scale ranging from 'No impact from training' (1) to 'Strong impact from training' (5).

Of the original 8,742 responses (from 200,000 members), 3,075 (35.18%) were usable in our analysis. These were the SMEs with greater than zero and fewer than 250 employees, both two years ago and currently. They also had usable response details for both for 'did not use' or satisfaction level with the nine TAs (T1, T2, …, T9 - see Figure 1) and also for the two employee retention variables (R1 and R2). The condition to have both employee retention outcomes responded to, allow direct comparison of the analysis results across the two retention facets, since same sample used in both sets of RCaRBS analyses later undertaken.

It is noteworthy, that of the 3,075 SMEs considered, the breakdown of them, based on the number of different TAs an SME utilised, was (in ascending order of number utilised –

shown in brackets); 622 (1), 950 (2), 668 (3), 414 (4), 205 (5), 108 (6), 45 (7), 31 (8) and 32 (9). On inspection, 32 had utilised all nine TAs during the last year, suggesting that many SME owner/managers are not afraid to use a range of TAs if they can access them. The relevant sparsity of the training-retention data set is illustrated by the sample SME responses shown in Table 1.

See Table 1 here

In Table 1, six SME responses presented show the data to be analysed. The two cases S1 and S2 clearly demonstrate the sparsity issue, with them representing SMEs who utilised one TA each, so only have one TA satisfaction value and the rest '-'. The other cases shown have different numbers of satisfaction level present, including S5 and S6 who represent SMEs who utilised all the different TAs.

3. Description of RCaRBS and Ability to Analyse Sparse Data

This section introduces the fundamentals of the RCaRBS technique (Beynon *et al*., 2010a; 2010b), a development on the nascent CaRBS technique (Beynon and Buchanan, 2004; Beynon 2005a; 2005b), subsequently employed in the analysis of the previously described SME training-retention data set. As described in the previous section, with the sparse nature of this data set, RCaRBS is able to effectively analyse such sparse data (see later).

The RCaRBS technique is concerned with the multivariate regression-type analysis of objects (SMEs S_j $j = 1, \ldots, n_S$) to between the limits of a hypothesis $\{x\}$ (strong impact on employee retention (R1 or R2) labelled *mpt*) and not-the-hypothesis $\{\neg x\}$ (no impact on retention (R1 or R2) labelled $\neg$*mpt*), and a level of concomitant ignorance $\{x, \neg x\}$, using SME owner/managers' response values from a series of survey questions on satisfaction towards different TAs (TA_i $1 \leq i \leq n_{TA}$). In RCaRBS, the associated evidence for a single SME owner/manager (S_j) and their response values on the satisfaction of a single TA (TA_i), is formulated in a *training* BOE, defined $m_{j,i}(\cdot)$ (see Dempster, 1967; Shafer, 1976, for descriptions of fundamentals of Dempster-Shafer theory on which the RCaRBS technique is based, see also Beynon *et al*., 2010a; 2010b).

A training BOE is made up of the mass values, $m_{j,i}(\{x\})$ and $m_{j,i}(\{\neg x\})$, that denote the levels of exact belief in the association of a SM, in this case, to x and $\neg x$, and $m_{j,i}(\{x, \neg x\})$ the concomitant level of ignorance (all from a single response value). A *mass value* is associated with a function m: $2^{\Theta} \rightarrow [0, 1]$ such that $m(\varnothing) = 0$ ($\varnothing$ - the empty set) and $\sum_{s \in 2^{\Theta}} m(s)$

= 1 (2^{Θ} - the power set of Θ) within a BOE. Any proper subset s of the frame of discernment Θ, for which $m(s)$ is non-zero, is called a *focal element*, with the respective mass value $m(s)$ representing the exact belief in the proposition depicted by s.

From Safranek *et al*. (1990), and used in RCaRBS (see Beynon *et al*., 2010a; 2010b), the triplet of mass values in a training BOE are given by the expressions (for one of a SME owner/manager's response values v):

$$m_{j,i}(\{x\}) = \frac{B_i}{1-A_i} cf_i(v) - \frac{A_i B_i}{1-A_i}, \; m_{j,i}(\{\neg x\}) = \frac{-B_i}{1-A_i} cf_i(v) + B_i$$

$$\text{and } m_{j,i}(\{x, \neg x\}) = 1 - m_{j,i}(\{x\}) - m_{j,i}(\{\neg x\}),$$

where $cf_i(v) = 1/(1 + \exp(-k_i(v - \theta_i)))$, with k_i, θ_i, A_i and B_i the control variables incumbent in RCaRBS, which require value estimation for its configuration (optimum configuration). Importantly, if when calculated, either $m_{j,i}(\{x\})$ or $m_{j,i}(\{\neg x\})$ are negative they are set to zero, and the respective $m_{j,i}(\{x, \neg x\})$ then calculated.

Further exposition of the analytical process underpinning the construction of a *training* BOE is given in Figure 3, along with the later representation of a *training* BOE as a simplex coordinate in a simplex plot. Also shown and described later are the details that enable a *training* BOE to be transformed into a single value in the domain 0 to 1, hence allowing multivariate regression-type analysis to be undertaken (the 0 to 1 domain is analogous to the limits $\neg x$ and x).

See Figure 3 here

In Figure 3, an example SME owner/manager's response variable value v is first transformed into a confidence value $cf_i(v)$ (3*a*), from which it is de-constructed into its associated training BOE $m_{j,i}(\cdot)$ (3*b*), made up of the triplet of mass values, $m_{j,i}(\{x\})$, $m_{j,i}(\{\neg x\})$ and $m_{j,i}(\{x, \neg x\})$, using the expressions given previously. Stage (3*c*) then shows a training BOE $m_{j,i}(\cdot)$; $m_{j,i}(\{x\}) = v_{j,i,1}$, $m_{j,i}(\{\neg x\}) = v_{j,i,2}$ and $m_{j,i}(\{x, \neg x\}) = v_{j,i,3}$, can be represented as a simplex coordinate ($p_{j,i,v}$) in a simplex plot (equilateral triangle). That is, a point $p_{j,i,v}$ exists within an equilateral triangle such that the least distance from $p_{j,i,v}$ to each of the sides of the equilateral triangle are in the same proportions (ratios) to the values, $v_{j,i,1}$, $v_{j,i,2}$ and $v_{j,i,3}$ (see Canongia Lopes, 2004). In the case of a simplex plot with unit side, with vertices (0, 0), (1, 0) and (0.5, $0.5\sqrt{3}$), the $p_{j,i,v}$ simplex coordinate (x_p, y_p) is given by $x_p = v_{j,i,1} + 0.5v_{j,i,3}$ and $y_p = 0.5\sqrt{3}\, v_{j,i,3}$.

The set of training BOEs $\{m_{j,i}(\cdot),\, i = 1, \ldots, n_C\}$, associated with a SME S_j, found from its variable values across the different TAs, can be combined using Dempster's combination rule into a *retention-impact* BOE, defined $m_j(\cdot)$. Moreover, considering $m_{j,i}(\cdot)$ and $m_{j,k}(\cdot)$ as two independent training BOEs, $[m_{j,i} \oplus m_{j,k}](\cdot)$ defines their combination (on a single focal element), and is given here by (in terms of a newly created BOE made up of three mass values):

$$[m_{j,i} \oplus m_{j,k}](\{x\}) = \frac{m_{j,i}(\{x\})m_{j,k}(\{x\}) + m_{j,k}(\{x\})m_{j,i}(\{x,\neg x\}) + m_{j,i}(\{x\})m_{j,k}(\{x,\neg x\})}{1-(m_{j,i}(\{\neg x\})m_{j,k}(\{x\}) + m_{j,i}(\{x\})m_{j,k}(\{\neg x\}))},$$

$$[m_{j,i} \oplus m_{j,k}](\{\neg x\}) = \frac{m_{j,i}(\{\neg x\})m_{j,k}(\{\neg x\}) + m_{j,k}(\{x,\neg x\})m_{j,i}(\{\neg x\}) + m_{j,k}(\{\neg x\})m_{j,i}(\{x,\neg x\})}{1-(m_{j,i}(\{\neg x\})m_{j,k}(\{x\}) + m_{j,i}(\{x\})m_{j,k}(\{\neg x\}))},$$

$$[m_{j,i} \oplus m_{j,k}](\{x,\neg x\}) = 1-[m_{j,i} \oplus m_{j,k}](\{x\}) - [m_{j,i} \oplus m_{j,k}](\{\neg x\}).$$

This process is then used iteratively to combine all the training BOEs describing the evidence in a SME's training satisfaction response values, into its associated retention-impact BOE. This combination process is graphically shown within the simplex coordinate representation of the combined BOE $m_C(\cdot)$ $(= [m_1 \oplus m_2](\cdot))$ presented in Figure 3*c* (with evaluated simplex coordinate (0.622, 0.268)). The BOE $m_C(\cdot)$, potentially representing a retention-impact BOE, includes the evidential information to calculate the associated predicted value over the domain ranging from $\neg x$ to x (as would be found from a regression-type analysis), where each SME S_j has an actual known value in this domain. Returning to Figure 3*c*, this predicted value is found by projecting the associated simplex coordinate for $m_C(\cdot)$ onto the base line of the simplex plot (projected using a line from the $\{x, \neg x\}$ vertex through the simplex coordinate of $m_C(\cdot)$). Representing the simplex coordinate of $m_C(\cdot)$ as (x_C, y_C), and considering an equilateral triangle of unit side (as previously), the projected value is given by $(\sqrt{3}\, x_C - y_C)/(\sqrt{3} - 2y_C)$, over a domain 0 to 1 (see Beynon *et al.*, 2010).

The projected value evaluated for each SME (in our study), found this way, is considered their respective predicted value, defined Rp_j, on impact on employee retention (R1 or R2) In keeping with the use of the equilateral triangle with unit side in RCaRBS, the original SME retention value (see later), are *a priori* formatted into the same 0 to 1 domain - through normalization (see Kim, 1999). For the example considered here, using $m_C(\cdot)$, with $x_C = 0.622$ and $y_C = 0.268$ found previously, the projected value from $m_C(\cdot)$ is 0.6758 (see Figure 3*c*). One feature of this projection is that the evaluated predicted value is devoid of an associated ignorance value (existing in the associated retention-impact BOE). Importantly

also, the roles played by $\{x\}$ and $\{\neg x\}$ are different to that in the original CaRBS (hypothesis and not-the-hypothesis), now they are associated with the limits on some variable term (here from the strong impact to no impact on employee retention response values).

One feature of the RCaRBS technique, pertinent in this study, is the way it deals with missing values. The unique three mass values used in a training BOE which represents the evidence from a response value v, includes $m_{j,i}(\{x, \neg x\})$ the mass value associated with ignorance. It follows, a missing value such as the '-' values considered in the training-retention data set (see Table 1) is able to be represented in a training BOE $m_{j,i}(\cdot)$ by the mass values, $m_{j,i}(\{x\}) = 0$, $m_{j,i}(\{\neg x\}) = 0$ and $m_{j,i}(\{x, \neg x\}) = 1$. This is an important development, since it shows a numerical formulation to a missing value. This formulation also has a position in a simplex plot (at the $m_{j,i}(\{x, \neg x\})$ vertex in Figure 3c). Hence, for a RCaRBS analysis, operating on a sparse data set, each missing value is retained using the previously expressed training BOE. The term ignorance here is technical in description and in no way has a negative connotation in quality of information.

As with the original CaRBS, the required configuration of a RCaRBS model depends on the assignment of values to the incumbent control variables (k_i, θ_i, A_i and B_i, $i = 1, \ldots, n_C$). In RCaRBS, this configuration is defined by minimizing the error between the respective actual and predicted retention-impact values (through its objective function - defined OB). The specific measure (OB) employed will focus on using the well known sum of squares error term, see Radhakrishnan and Nandan (2005). With the SME actual retention-impact values Rv_j ($j = 1, .., n_O$), and respective predicted retention-impact values Rp_j from a RCaRBS configured model, the fit is measured by $\text{OB} = \sum_j (Rv_j - Rp_j)^2$.

The RCaRBS control variables contribute directly to the construction of the variable BOEs $m_{j,i}(\cdot)$, which are combined to produce the respective retention-impact BOEs $m_j(\cdot)$. A RCaRBS configuration is considered a constrained optimisation problem, solved here using Trigonometric Differential Evolution (TDE - see Fan and Lampinen, 2003; Storn and Price, 1997). TDE takes account of the associated OB values of potential solutions (sets of control variable values), to hasten the convergence to an optimum solution. The necessary operating parameters used in TDE, were (*ibid.*): amplification control $F = 0.99$, crossover constant $CR = 0.85$ and number of parameter vectors $NP = 200$. The domain of TDE is the continuous space made up of the number of RCaRBS control variables considered. For a series of control variable values they are represented as a point in this continuous space (member

vector). In TDE, a population of vectors is considered at each generation of the progression to an optimum solution, measured through the defined OB.

4. RCaRBS Analyses of Training-Retention Data Set

This section of the study presents results from the RCaRBS analyses of the training-retention data set. With two outcomes, the two facets of employee retention considered, greater employee loyalty (R1) and losing employee to competitor (R2), two RCaRBS analyses are undertaken. In each analysis, results based on model fit and TA contributions are presented, with emphasis on their graphical elucidation (for exposition of the intermediate technical calculations present in a RCaRBS analysis, see Beynon *et al*., 2010a; 2010b).

Greater Employee Loyalty (R1)

Allen and Grisaffe (2001) describe employee loyalty as a psychological state that characterises the relationship between an employee and the enterprise for which they work. Employee loyalty has implications for the employee's decision to remain with the enterprise (Wu and Norman, 2006; Turkyilmaz *et al*., 2011). Kemelgor and Meek (2008) identify that if an enterprise provides training, or education support and growth through employee empowerment the likelihood of loyalty is significantly enhanced (Delaney and Huselid, 1996; Payne and Huffman, 2005). Farrell and Rusbult (1992) describing training in terms of investment, provide evidence on a positive link with employee loyalty. Birdthistle and Fleming (2007) offer insights into training and employee loyalty in family run SMEs, highlighting the training here is often informal and ad-hoc and that this unique environment will bring its own loyalty from its employees. Massey *et al*. (2006) notes the importance of retaining staff as opposed to developing them.

Following on from this work on employee loyalty, the RCaRBS analysis performed here, with 3,075 SMEs, undertakes a regression-type analysis to see the connection between satisfaction towards TAs used and their perceived impact on greater employee loyalty (R1). To undertake the first RCaRBS analysis the respective control variables k_i, θ_i, A_i and B_i are needed to be assigned values. This is undertaken using TDE, with the values found based on minimising the difference between predicted and actual impact values, as defined in the objective function OB (see previously). Referring to Figure 3, the control variable values specifically enable the construction of training BOEs, and subsequent retention-impact BOEs (one for each SME), and here relating to greater employee loyalty. The first results presented

are with regard to model fit of a configured RCaRBS system, see Figure 4, which shows the representation of retention-impact BOEs in a simplex plot (as per Figure 3c) and their mapping to the base line of the simplex plot to create predicted impact values.

See Figure 4 here

The results in Figure 4 are next described. Each vertex shows one of the focal elements {mp} (= {x}), {¬mp} (= {¬x}) and {mp, ¬mp} (= {x, ¬x}), for which each retention-impact BOE has mass values associated with them.[1] Each point inside the simplex plot represents a SME's final retention-impact BOE. As described in the labelling surrounding the simplex plot, the height of the retention-impact BOEs in the simplex plot is an indication of the level of TA utilisation by the SMEs. That is, as the number of TAs a SME uses increases there is less technical ignorance associated with the relevant retention-impact BOE, so its position further down the simplex plot. This reference to ignorance is technical in that it is not an inference to ignorance in the evidence but is a consequence of the technique's ability to allow missing values, so effectively acknowledging the level of 'did not use' of TAs by SMEs.

Within the simplex plot each line going down from the {mp, ¬mp} vertex through each retention-impact BOE is mapping (regressing) a SME to its predicted impact value (along the base of the simplex plot). Below the simplex plot are the individual SMEs actual impact response values labelled 1 to 5 (see Figure 4), and here normalised to fit the same domain as the predicted values (this normalised actual impact values were the values used in the optimisation process – based on minimising the OB function). The spread of the simplex coordinates of the retention-impact BOEs horizontally across the simplex plot domain directly infers the spread of the predicted impact values (along the base line). The observed slight positive skewness of the predicted impact values towards the {¬mp} vertex is a direct consequence of the skewness of the actual impact values (as evidenced in the frequency of response values 1 to 5 also shown at the bottom of Figure 4 – refer to Figure 2 for interpretation of 1 to 5 response values).

Although an RCaRBS analysis does not derive explicit parameters for modelling model fit, it can nevertheless provide information on individual TAs 'training needs met' contribution. In particular, as in Beynon *et al*. (2010a; 2010b), graphs can be constructed formulating the evidence in a training BOE directly from the 'training needs met' question

[1] The mp and ¬mp terms relate to the limits of thought on whether the training has had strong impact (mp) or no impact (¬mp) on employee retention (here greater employee loyalty).

values describing the responses from SME owner/managers, see Figure 5 (the graphs drawn are a combination of the stages shown in Figure 3a and 3b with respect to the RCaRBS technique).

See Figure 5 here

In Figure 5, each graph denotes a visual elucidation of the contribution of one 'training needs met' question, one for each TA, T1, T2, .., T9. In each graph, three lines joining circles are drawn showing the mass values $m_{j,T?}(\{mp\})$ and $m_{j,T?}(\{\neg mp\})$ denoting evidence towards strong impact and no impact of a TA to greater employee loyalty, respectively, and $m_{j,T?}(\{mp, \neg mp\})$ neither strong impact or no impact (lines show the underlying structure of the evidence change from one response value to the next – see earlier and Beynon *et al*., 2010a, for technical details). Shown at the top of each graph are the number of responses to a TA question (not 3075 since not all SMEs use each TA), and the breakdown of these responses across the Likert scale domain (1 to 5).

To further understand these graphs, the Figure 5a is next fully described. In Figure 5a, the evidential contribution of the 'training needs met' question for T1 (Learning at a local college) is reported in respect of the impact on greater employee loyalty. There are two lines 'with circles' signifying the mass values of belief towards their being strong impact ($m_{j,T1}(\{mp\})$) and no impact ($m_{j,T1}(\{\neg mp\})$) from the TA towards greater employee loyalty. The increasing value of $m_{j,T1}(\{mp\})$, belief in it having strong impact, over the scale values 1 (Very dissatisfied) to 5 (Very satisfied), signified by the circles, indicates a positive contribution of this TA. That is, as the level of satisfaction increases towards the training needs being met by TA T1, there is an associated increase in the overall impact training offered by the SME to greater employee loyalty.

Comparing the results for T1 against T2 (Through a government programme), for T2 there is a much more steeper increasing line of circles representing $m_{j,T5}(\{mp\})$ (in Figure 5b) than for $m_{j,T1}(\{mp\})$ considered previously (in Figure 5a). The implication here is that the T2 has a stronger positive contribution since it is more discerning in the evidence from the different response values to the 'training needs met' question T2 to impact on greater employee loyalty (R1). For the TAs T7 (Private training provider outside of the workplace) and T8 (Distance learning), the graphs 5g and 5h suggest they are negatively associated with greater employee loyalty.

Losing Employee to Competitor (R2)

As mentioned earlier, the concern SMEs have on losing employees to competitors has been likened to a war. Clearly, the training of employees can improve their expertise, but such expertise could potentially benefit a new employer while decreasing the human capital of the former enterprise (Wood, 2009). A solution advocated in Dalziel (2010), was for SMEs to create a form of training which 'develops the right skills for the right staff', hence his employees are developing firm-specific skills, so that the firm grows and does not have to be concerned about workers being poached by competitors. Somaya and Williamson (2008) suggest that employer training provision is a valid defensive strategy to retaining employees on the basis of providing an appealing workplace that reduces the threat of seeking alternative employment opportunities.

Following the same approach as for R1 (Greater Employee Loyalty), a visualisation of the model fit in this analysis is reported in Figure 6, found from the configuring of a RCaRBS system, this time for R2.

See Figure 6 here

The results in Figure 6 show the same simplex plot domain as considered for the R1 retention facet. Most noticeable is the heavily skewed nature of the findings, as before, the skewed retention-impact BOES and predicted impact values are a consequence of the skewed actual impact values. Even with the skewed nature of the results, it is possible to gauge the contribution of the individual TAs and their impact on the R2 employee retention facet, see Figure 7. A note on association when comparing these results with those from investigating R1, with respect to the SME owner/manager, the retention facets Greater Employee Loyalty and Losing Employee to Competitor are positive and negative connotations, respectively, to the SME.

See Figure 7 here

The results in Figure 7 are similar in nature to those presented in Figure 5. However, the directions of the TAs are predominantly the reverse of what was found in the previous analysis, as expected from previous comment. For example, for TA T1 (Learning at a local college), as the level of satisfaction increases towards the training needs being met by TA T1, there is an associated decrease in the overall impact training offered by the SME to losing an

employee to a competitor. One exception of this is T7 (Private training provider outside of the workplace), which has a negative direction of contribution (see Figure 7g), the same direction as in the analysis of R1 (see Figure 5g).

5. Interpretation of RCaRB findings on TAs and Employee Retention

The results presented in the previous section enable the elucidation on the individual employee retention facets of greater employee loyalty and losing an employee to a competitor, and the impact different TAs have on them. Inspection of the graphs shown in Figures 5 and 7 show differences in contribution of the different TAs, in this section we briefly compare the differences between the contributions of the TAs over the different facets of employee retention, see Figure 8.

See Figure 8 here

In Figure 8 the range and directions of contribution of the nine TAs, T1, T2, …, T9, are shown for their evidence towards the retention facets, 'Greater employee loyalty to the business' and 'Losing a member of staff to a competitor'. The notion of range is simply the level of difference between the level of evidence towards a TA impacting on employee retention (R1 or R2) when the response values of TA satisfaction 1 and 5 are considered. Referring to Figures 5 and 7, the values shown in Figure 8 are simply the difference between the values of $m_{j,i}(\{\text{mp}\})$ from the left-hand and right-hand sides of the individual contribution graphs. Since the difference is calculated by $m_{j,i}(\{\text{mp}\})(5) - m_{j,i}(\{\text{mp}\})(1)$, the direction of contribution follows the same inferences as shown in the individual contribution graphs in Figures 5 and 7.

To demonstrate, for T1, from Figures 5a and 7a, its directions of contribution are shown to be positive and negative towards its impact on 'Greater employee loyalty to the business' and 'Losing a member of staff to a competitor', respectively, from Figure 8 its point is in the bottom right hand corner of the graph in Figure 8 (partitioned based on dashed lines in graph), which also shows it is associated with positive and negative contributions.

Clearly looking at the groupings of the range and direction points of the nine TAs in Figure 8, the majority of them, T1, T2, T3, T4, T6 and T9, are associated with positive and negative associations to 'Greater employee loyalty to the business' and 'Losing a member of staff to a competitor', respectively (bottom right hand region). The three exceptions to these are T5 (positive, positive), T7 (negative, negative) and T8 (negative, positive).

T5 (Learning by doing) is perceived as both contributing to employee loyalty but also potentially encouraging the departure of an employee to a competitor. This may seem paradoxical. If we take the 'Resource Based View' of the firm (Barney, 2001), or Porter's (1990) 'Competitive Advantage of Nations Theory', however, then it is ultimately firm specific advantages that are the key to sustained competitive advantage. An employee who has just attained this knowledge would therefore be a more attractive proposition for another firm aiming to acquire such knowledge, whilst simultaneously the imparting of this would make the employee more valued.

Conversely, T7 (Private training provider outside of the workplace) is negatively associated with both employee loyalty and risk of losing an employee. Using the same theories as above implies that such non firm specific training is less attractive to competitors and also to encouraging employee loyalty. The fact that T8 (Distance learning) is seen as negative for employee loyalty but positive for the potential to lose staff is potentially puzzling when compared to the result for T7. One explanation, however, is that distance learning may be perceived as too general to be of use in increasing employee loyalty to the firm specifically. Instead, it may be seen as assisting in the development of new skills of use to the individual in finding a new job (in the short term at least).

6. Conclusions

This paper has considered the important issue of how attitudes to different training alternatives (TAs) may impact differently on the retention of employees. As discussed, employee retention in SMEs is an important issue, impacting on SME performance and growth potential. With their being a range of different TAs an SME could choose to utilise for its employees, discerning their impact on the employee retention facets of 'Greater employee loyalty to the business' and 'Losing a member of staff to a competitor', is an important and novel direction of research in this area.

Overall, the results support there being a perceived positive association between the provision of training and employee retention (Dalziel, 2010), but this is most strongly focused on certain TAs. In terms of employee loyalty, both training through government programmes and learning by doing have a strong positive relationship with greater employee loyalty.

They therefore place greater value on these types of training whilst TAs such as distance learning and private training outside of the workplace, are regarded as providing less benefit. Thus, these results confirm the findings of Somaya and Williamson (2012), in the

value of training provision in enhancing employee loyalty, and provides greater insight into the value of the specific training alternatives that generate such benefit. When the relationship examined is that between training needs being met and losing employees to competitors it can be seen that the association is less positive. Positive associations were only apparent with learning by doing and distance learning towards losing employees to competitors.

This result might indicate that employees who undertake independent training see less association with their enterprise as a consequence and a greater tendency to seek alternative employment opportunities. Training provided outside of the workplace also demonstrated a strongly negative association with losing an employee to a competitor enterprise. Conversely, several TAs demonstrated a negative association, including e-learning, employee providing workplace training, learning at a local college and through a government programme and losing employees to competitors. These results imply that the provision of such TAs is a positive for the enterprise and enhances employee retention.

There is also an important technique point exposited in this study, namely the ability of a a nascent technique, namely RCaRBS, to analyse sparse data, where there are missing values, due here to the case of SME owner/managers not having utilised certain TAs, hence have not asserted a Likert scale based level of satisfaction to the TA. The ability to not have to manage in anyway the understandable missingness in the considered training-retention data set removes a layer of pre-processing often necessary using traditional analysis techniques, which generally transform in some way the original data to be analysed, not the case here.

References

Alavi, M., & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, *25*, 107-136.

Allen, N. J., & Grisaffe, D. B. (2001). Employee commitment to the organization and customer reactions: mapping the linkages. *Human Resource Management Review*, *11*, 209-236.

Aragón-Sánchez, A., Barba-Aragón, I., & Sanz-Valle, R. (2003). Effect of training on business results. *International Journal of Human Resource Management, 14,* 956-980.

Baptiste, N. R. (2008). Tightening the link between employee wellbeing at work and performance: A new dimension for HRM. *Management Decision*, *46*, 284-309.

Barney, J. B. (2001). Is the Resource-Based Theory a Useful Perspective for Strategic Management Research? Yes. *Academy of Management Review*, *26*, 41-56.

Barney, J. B., & Wright, P. M. (1998). On Becoming a Strategic Partner: The Role of Human Resources in Gaining Competitive Advantage. *Human Resource Management*, *37*, 31–46.

Bartlett, K. R. (2001). The relationship between training and organisational commitment: a study in the health care field. *Human Resource Development*, *12*, 333-352.

Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* (3rd Ed.), Chicago: University of Chicago Press.

Beynon, M. J. (2005a). A novel technique of object ranking and classification under ignorance: An application to the corporate failure risk problem. *European Journal of Operational Research*, *167*, 493-517.

Beynon, M. J. (2005b). A novel approach to the credit rating problem: Object classification under ignorance. *International Journal of Intelligent Systems in Accounting, Finance and Management*, *13*, 113-130.

Beynon, M. J., & Buchanan, K. (2004). Object Classification under Ignorance using CaRBS: The Case of the European Barn Swallow. *Expert Systems with Applications*, *27*, 403-415.

Beynon, M. J., Andrews, R. A., & Boyne, G. (2010a) Evidence-based Modelling of Strategic Fit: An Introduction to RCaRBS. *European Journal of Operational Research*, 207(2), 886-896.

Beynon, M. J., Moutinho, L., & Veloutsou, C. (2010b). Supermarket choice as a gender classification problem: An expositional analysis in the presence of ignorance using CaRBS. *European Journal of Marketing*, *44*, 267-290.

Birchall, D., & Giambona, G. (2007). SME Manager Development in Virtual Learning Communities and the Role of Trust: A Conceptual study. *Human Resource Development International*, *10,* 187-202.

Birdthistle, N., & Fleming, P. (2007). Under the microscope: a profile of the family business in Ireland. *Irish Journal of Management*, *28*, 133-168.

Brown, D. (2000). Corporate performance: the paradox of UK PLCs' management perceptions. *International Journal of Business Performance Management, 2*, 194–209.

Canongia Lopes, J. N. (2004) On the classification and representation of ternary phase diagrams: The yin and yang of a T–x approach, *Phys. Chem. Chem. Phys.*, 6, 2314-2319.

Chandler, G., & McEvoy, G. (2000). Human Resource Management, TQM and Firm Performance in Small and Medium-sized Enterprises. *Entrepreneurial Theory and Practice, 25*, 45-58.

Cosh, A., Duncan, J., & Hughes, A. (1998). Investing in training and small firm growth and survival: an empirical analysis for the UK 1987-97. *DfEE Research report RR36*, HMSO, London.

Dalziel, P. (2010). Leveraging Training Skills Development in SMEs: An Analysis of Canterbury Region, New Zealand, Local Economic and Employment Development (LEED), http://www.oecd.org/dataoecd/7/39/45538500.pdf, Accessed 10-04-2012.

Delaney, J. T., & Huselid, M. A. (1996). The impact of human resource management practices on perceptions of organizational performance. *Academy of Management Journal*, *39*, 949-969.

Dempster, A. P. (1967). Upper and lower probabilities induced by a multiple valued mapping. *Ann. Math. Statistics 38*, 325-339.

Di Nuovo, A. G. (2011). Missing data analysis with fuzzy C-Means: A study of its application in a psychological scenario. *Expert Systems with Applications*, *38*, 6793–6797.

Dixit, A. K., & Prakash, O. (2011). A Study of Issues Affecting ERP implementation in SMEs. *Journal of Arts, Science & Commerce*, II(2), 77-85.

Dollinger, M. (1995). *Entrepreneurship: Strategies and Resources*. Boston, MA: Irwin.

Fan, H.-Y., & Lampinen, J. (2003). A trigonometric mutation operation to differential evolution. *Journal of Global Optimization*, *27*, 105-129.

Farrell, D., & Rusbult, C. E. (1992). Exploring the exit, voice, loyalty, and neglect typology: The influence of job satisfaction, quality of alternatives, and investment size. *Employee Responsibilities and Rights Journal*, *5*, 209-225.

Glen, C. (2006). Key skills retention and motivation: The war for talent still rages and retention is the high ground. *Industrial and Commercial Training*, *38*, 27-45

Hausknecht, J. P., Rodda, J. M., & Howard, M. J. (2008). Targeted Employee Retention: Performance-Based and Job-Related Differences in Reported Reasons for Staying. *Working Paper Series, Cornell University*, School of Industrial and Labour Relations, Centre for Advanced Human Resource Studies, Working Paper 08 – 06.

Hendry, C. (1995). *Human Resource Management: A Strategic Approach to Employment.* London: Butterworth-Heinemann.

Hoque, K., & Bacon, N. (2006). The antecedents of training activity in British small and medium-sized enterprises. *Work, Employment and Society*, *20*, 531-552.

Huisman, M., Krol, B., & Van Sonderen, E. (1998). Handling missing data by re-approaching non-respondents. *Quality & Quantity*, *32*, 77-91.

Ibrahim, A. B., & Ellis, W. (2003). *Family Business Management, Concepts and Practices*. Dubuque, IA, Kendall/Hunt.

Igbaria, M., & Greenhaus, J.H. (1992). Determinants of MIS employees' turnover intentions: A structural equation model, *Communications of the ACM, 35,* 35-49.

Jayawarna, D., Macpherson, A., and Wilson, A. (2007). Training commitment and performance in manufacturing SMEs incidence, intensity and approaches. *Journal of Small Business and Enterprise Development*, *14*, 321-328.

Jutla, D., Bodorik, P., & Dhaliqal, J. (2002). Supporting the e-business readiness of small and medium sized enterprises: approaches and metrics. *Internet Research: Electronic Networking Applications and Policy, 12*, 139-164.

Kar, B. P., Sharma, A., & Borah, S. B. (2011). Attrition in SMEs: The Causes. *European Journal of Business and Management*, *3,* 5-16.

Kemelgor, B., & Meek, W. (2008). Employee Retention in Growth-oriented entrepreneurial forms: an exploratory study. *Journal of Small Business Strategy*, *19*, 74-86.

Kim, D. (1999). Normalization methods for input and output vectors in backpropogation neural networks. *International Journal of Computer Mathematics*, *71*(2), 161–171.

Kitching, J. (2008). Rethinking UK small employers' skills policies and the role of workplace learning. *International Journal of Training and Development, 12*, 100-120.

Kitching, J., & Blackburn, R. (2002). The nature of training and motivation to train in small firms. *Small Business Research Centre*, Kingston University, London.

Kontoghiorghes, C., & Bryant, N. (2004). Exploring employee commitment in a service organisation in the health care insurance industry. *Organization Development Journal*, *22*, 59-73.

Kotey, B., & Folker, C. (2007). Employee Training in SMEs: Effect of Size and Firm Type – Family and Non family. *Journal of Small Business Management*, *45*, 214-238.

Kuvaas, B., & Dysvik, A. (2009). Perceived investment in employee development, intrinsic motivation and work performance. *Human Resource Management Journal*, *19*, 217-236.

Lee, C. H., & Bruvold, N.T. (2003). Creating Value for employees: investment in employee development. *International Journal of Human Resource Management*, *14*, 981-1000.

Lin, Y.-C., & Jacobs, R. (2008). The perceptions of human resource development professionals in Taiwan regarding their working relationships with subject matters experts (SMEs) during their training design process. *Human Resource Development International*, *11*, 237-252.

MacDuffie, J. P., & Kochan, T. A. (1995). Do US Firms Invest Less in Human Resources? Training in the World Auto Industry. *Industrial Relations*, *34*, 147–168.

Matlay, H., (2004). Contemporary training initiatives in Britain: a small business perspective. *Journal of Small Business and Enterprise Development*, *11*, 504-513.

Massey, C., Lewis, K., Cameron, A., Coetzer, A., & Harris, C. (2006). Its the People that you know: a report on SMEs and their Human Resource Practices. New Zealand Centre for Small & Medium Enterprise Research, Massey University.

Nikandrou, I., Brinia, V., & Bereri, E. (2009). Trainee perceptions of training transfer: an empirical analysis. *Journal of European Industrial Training*, *33*, 255-270.

Olinsky, A., Chen, S., & Harlow, L. (2003). The comparative efficacy of imputation methods for missing data in structured equation modelling, What drives training in industrial micro-firms? Evidence from Greece. *European Journal of Operational Research*, *151*, 53-79.

Payne, S. C., & Huffman, A.H. (2005). A longitudinal examination of the influence of mentoring on organizational commitment and turnover. *The Academy of Management Journal*, *48*, 158–168.

Penrose, E. (1959). *The Theory of the Growth of the Firm*, New York: Wiley.

Porter, M. (1990). *The Competitive Advantage of Nation*, Basingstoke: Macmillan.

Radhakrishnan, T. & Nandan, U., (2005). Milling force prediction using regression and neural networks. *Journal of Intelligent Manufacturing*, *16*, 93–102.

Reid, R., and Harris, R. (2002). The determinants of training in SMEs in Northern Ireland. *Education and Training*, *44,* 443-450.

Roesmer, C. (2000). Nonstandard analysis and Dempster–Shafer theory. *International Journal of Intelligent Systems*, *15*, 117-127.

Safranek, R. J., Gottschlich, S., & Kak, A. C. (1990). Evidence Accumulation Using Binary Frames of Discernment for Verification Vision. *IEEE Transactions on Robotics and Automation*, *6*, 405-417.

Saunders, M. (2000). Understanding education and work: themes and issues. In S. Brown (Ed.), *International Encyclopaedia Dictionary of Education*. Routledge Press: London.

Small Business Survey (SBS) (2008). The Annual Survey of Small Businesses' Opinions 2007/08 (ASBS 2007/08). Department for Business Enterprise and Regulatory Reform (BERR), London.

Schafer, J. L. & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, *7*, 147-177.

Shafer, G. A. (1976). *Mathematical theory of evidence*. Princeton: Princeton University Press.

Somaya, D., & Williamson, I. (2008). Rethinking the 'War for Talent'. *MIT Sloan Management Review*, *49*, 29-34.

Smeenk, S. G., Eisinga, R. N., Teelken, J. C., & Doorewaard, J. A. C. M. (2006). The effects of HRM practices and antecedents on organizational commitment among university employees. *International Journal of Human Resource Management*, *17*, 2035-2054.

Storn, R., & Price, K., (1997). Differential evolution – A simple and efficient heuristic for global optimization over continuous spaces. *Journal of Global Optimization*, *11*, 341-359.

Talhiya, S. (2012). Trade Secrets and Employee Loyalty, E-newsletter, World Intellectual property Organisation (WIPO). http://www.wipo.int/sme/en/documents/trade_secrets_employee_loyalty.html, Accessed 10-04-2012.

Turkyilmaz, A., Akman, G., Ozkan, C., & Pastuszak, Z. (2011). Empirical study of public sector employee loyalty and satisfaction. *Industrial Management & Data Systems*, *111*, 675-696.

Walker, E., Redmond, J., Webster, B., and Le Clus, M. (2007). Small Business owners: too busy to train? *Journal of Small Business and Enterprise Development*, *14*, 294-306.

Wernerfelt, B. (1995). The Resource-Based View of the Firm: Ten Years After. *Strategic Management Journal*, 16, 171-174.

Wood, G. (2009). Human Resource Management: A Critical Approach. Routledge, UK.

Wu, L. & Norman, I. J. (2006). An investigation of job satisfaction, organizational commitment and role conflict and ambiguity in a sample of Chinese undergraduate nursing students. *Nurse Education Today*, *26*, 304-314.

List of Figures

Figure 1: Description of FSB Research Question 37

Question 37

How have the training needs of your business been met over the past two years and how satisfied were you with the results?

	Did not use	Very dissatisfied 1	2	3	4	Very satisfied 5
T1- Learning at a local college	☐	☐	☐	☐	☐	☐
T2- Through a government programme	☐	☐	☐	☐	☐	☐
T3- Learning through a local college but within the workplace	☐	☐	☐	☐	☐	☐
T4- Somebody within the workplace providing on the job training	☐	☐	☐	☐	☐	☐
T5- Learning by doing/in-house training by staff	☐	☐	☐	☐	☐	☐
T6- By a private training provider in the workplace	☐	☐	☐	☐	☐	☐
T7- By a private training provider outside of the workplace	☐	☐	☐	☐	☐	☐
T8- Distance learning	☐	☐	☐	☐	☐	☐
T9- E-learning	☐	☐	☐	☐	☐	☐

Figure 2: Description of FSB Research Question 38

Question 38

Please rate the extent to which each of the following outcomes have occurred as a result of training within your business in the last two years

	No impact from training 1	2	3	4	Strong impact from training 5
R1 - Greater employee loyalty to the business	☐	☐	☐	☐	☐
R2 - Losing a member of staff to a competitor	☐	☐	☐	☐	☐

Figure 3. Graphical representation of intermediate stage in RCaRBS for a response value *v*.

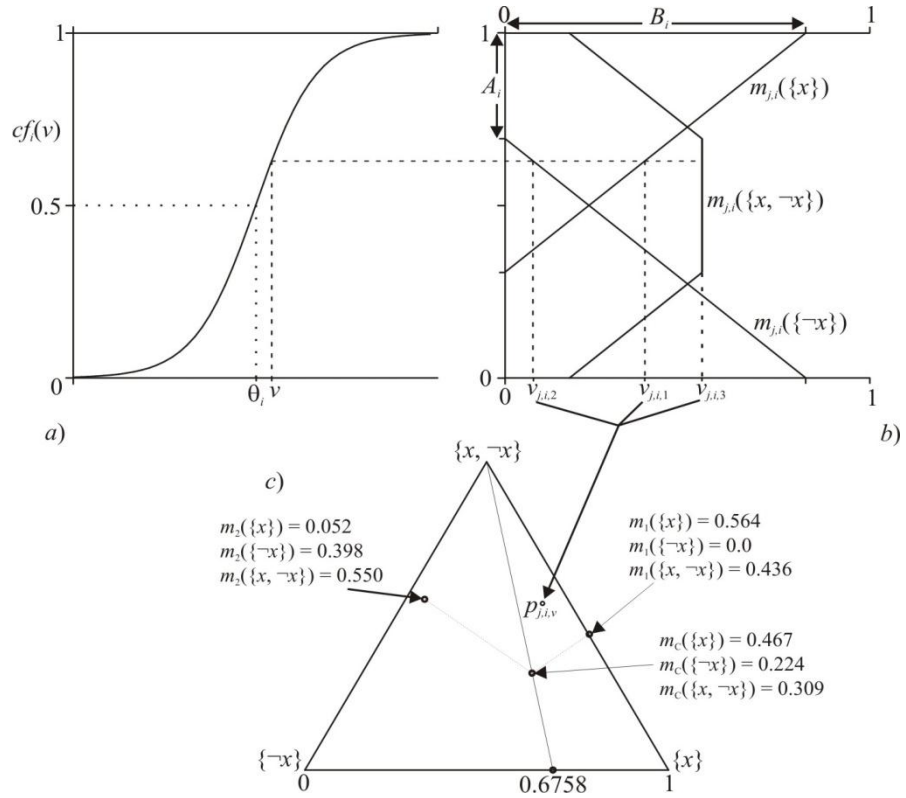


Figure 4: Graphical Elucidation of Model Fit Results from RCaRBS Analysis on SME Training, through TAs (T1, T2, …, T9) and Greater Employee Loyalty (R1) Impact

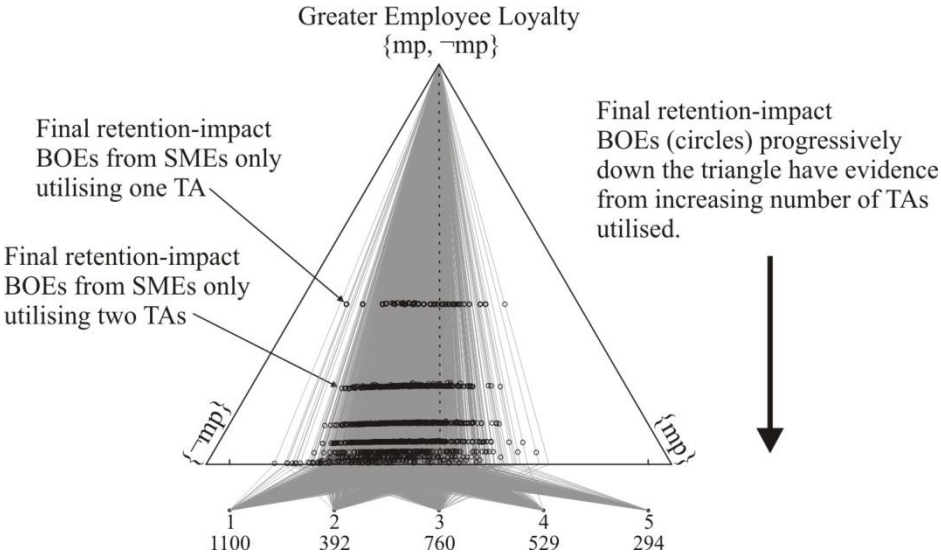
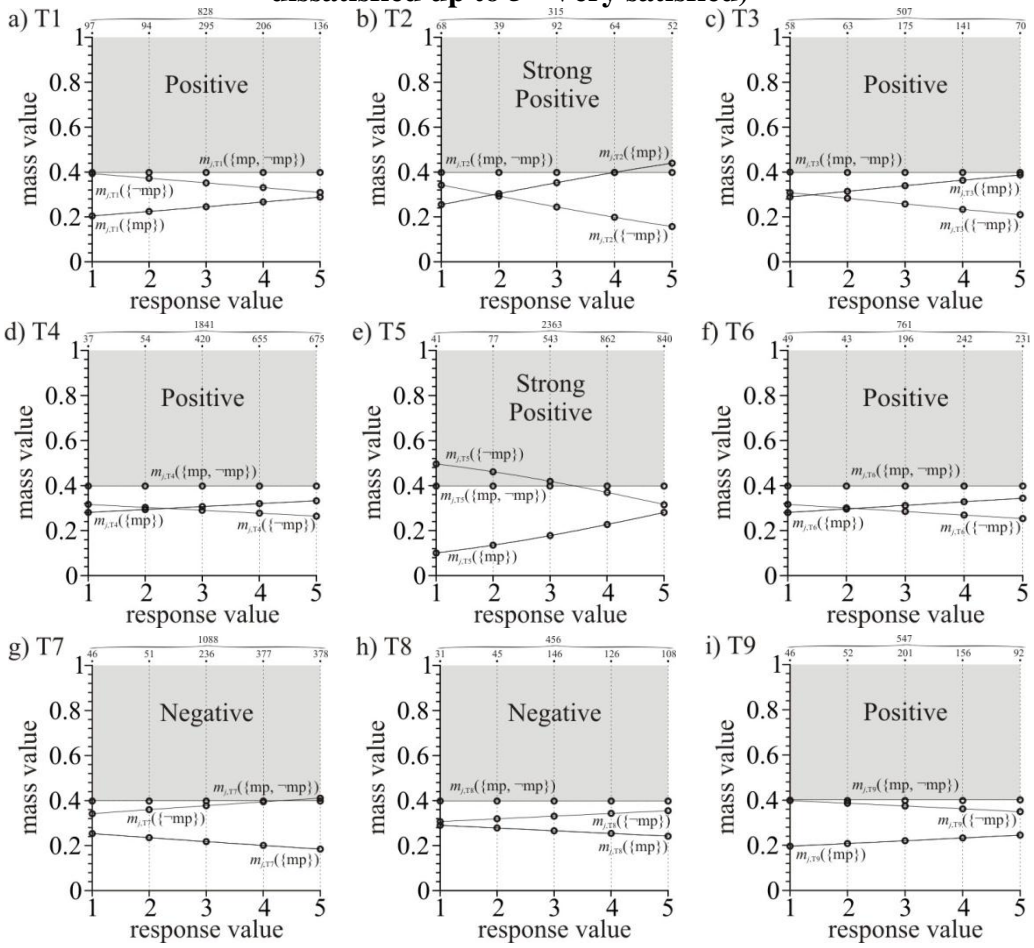


Figure 5: Contribution Graphs of How Training Needs Have Been Met, over the Training Alternatives T1, .., T9, for Greater Employee Loyalty (where 1 - Very dissatisfied up to 5 - Very satisfied)[a]



[a] T1 - Learning at a local college, T2 - Through a government programme, T3 - Learning provided by local college but within the workplace, T4 - Employee providing workplace training, T5 - Learning by doing, T6 - Private training provider in the workplace, T7 - Private training provider outside of the workplace, T8 - Distance learning, T9 - E-Learning.

Figure 6: Graphical Elucidation of Model Fit Results from RCaRBS Analysis on SME Training, through TAs (T1, T2, …, T9) and Losing Employee to Competitor (R2) Impact

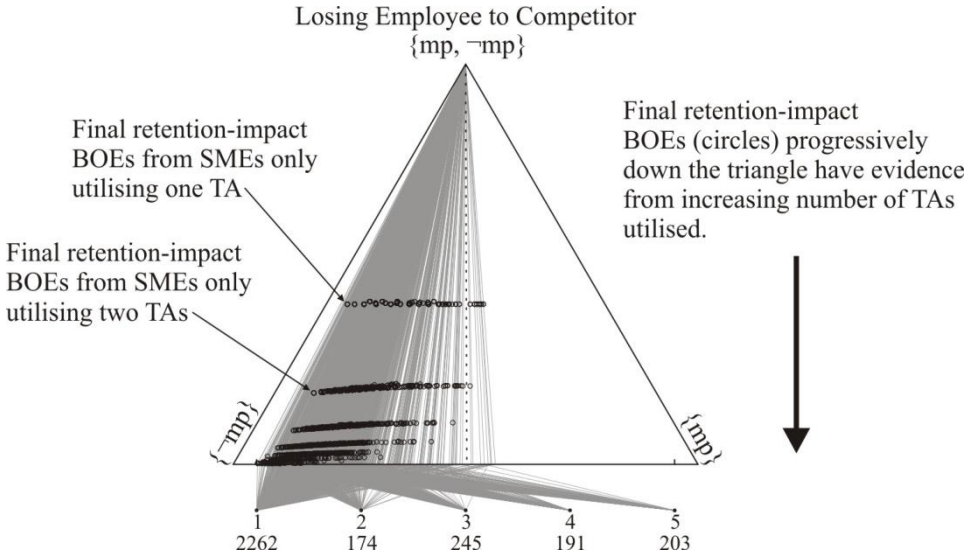
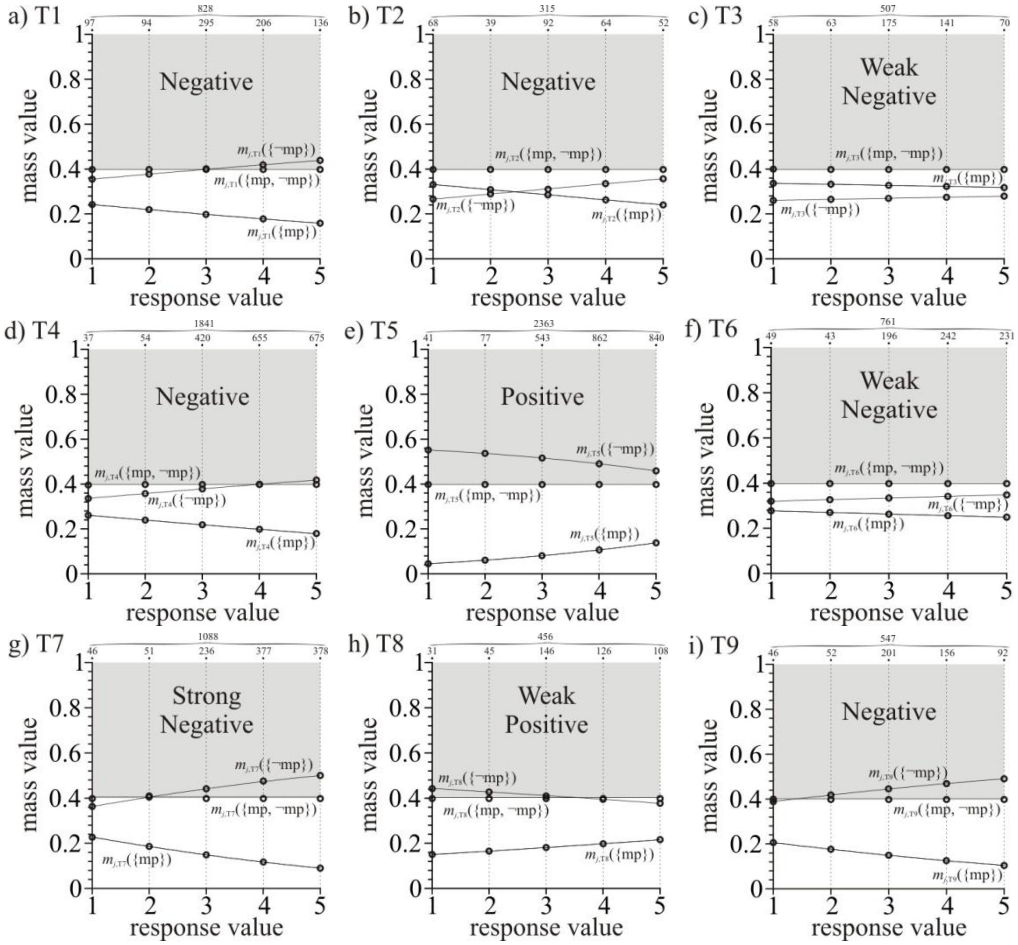
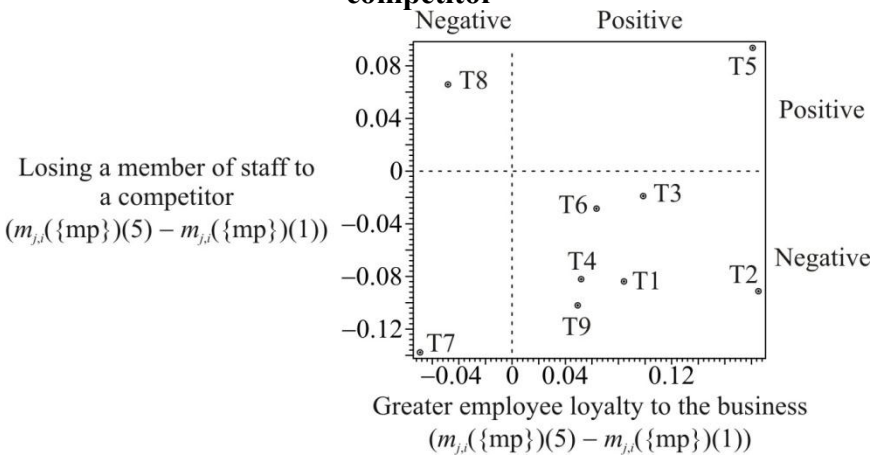


Figure 7: Contribution Graphs of How Training Needs Have Been Met, over the Training Options T1, .., T9, for Losing Employee to Competitor (where 1 - Very dissatisfied up to 5 - Very satisfied)[a]



[a] T1 - Learning at a local college, T2 - Through a government programme, T3 - Learning provided by local college but within the workplace, T4 - Employee providing workplace training, T5 - Learning by doing, T6 - Private training provider in the workplace, T7 - Private training provider outside of the workplace, T8 - Distance learning, T9 - E-Learning

Figure 8: Range and Direction of Contribution of TAs towards the employee retention facets 'Greater employee loyalty to the business' and 'Losing a member of staff to a competitor' [a]



[a] T1 - Learning at a local college, T2 - Through a government programme, T3 - Learning provided by local college but within the workplace, T4 - Employee providing workplace training, T5 - Learning by doing, T6 - Private training provider in the workplace, T7 - Private training provider outside of the workplace, T8 - Distance learning, T9 - E-Learning