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THE RISK OF BUSINESS TRAININGS IN RELATION TO PRODUCTIVITY AND PROFITABILITY OF SMALL AND MEDIUM SIZED ENTERPRISES. AN EXPLORATORY ANALYSIS

Introduction

The business environment is characterised by increasing competitiveness, globalised trading markets and technological enhancements (Aragon-Sanchez et al., 2003; Lin and Jacobs, 2008). Organisational working practices have become increasingly sophisticated and as a consequence training provision and requirements have evolved. Birdthistle (2006) and Lin and Jacobs (2008) acknowledges the increasingly significant role undertaken by training and its association with enhanced business success and longevity. Kitching (2008) has noted that in contrast to larger organisations, the small and medium enterprise (SME) sector has been characterised as having, fewer dedicated training departments and budgets (Kitching and Blackburn, 2002), inferior levels of work based training provision (Hoque and Bacon, 2006) and lower numbers of qualified employees and limited participation in training schemes (Matlay, 2004).

Patton et al. (2000), Huang (2001) and Dewhurst et al. (2007) suggest, however, that there is a lack of quantifiable empirical evidence demonstrating a conclusive link between training impact and business performance. Indeed for SMEs with limited budgets there is a significant risk associated with investing in training if they are uncertain regarding its impact thereafter on business performance. Moreover, the existing evidence is inconclusive and somewhat contradictory (Heraty and Morley, 2003; Storey, 2004) especially in terms of the TA offered within SMEs. In a global recession, SMEs play a critical role in driving economic growth of due to their numerical significance and their contribution to

global economies (Birchall and Giambona, 2007). For example, in a UK context, SMEs account for 99.8% of enterprises, over 4.5 million enterprises and 52.4% of employment. Europe's population of SMEs accounts for 99.8% of all enterprises and 66.2% of employment (SBS, 2008). Indeed it is estimated that the SME sectors contribution to national economies accounted for 80% of all global economic growth (Jutla et al., 2002). Unfortunately, SMEs remain characterised by high failure rates (Dutta and Evrard, 1999), with a survival rate of 92% after one year and 66% after three years trading (SBS, 2005).

Walker et al. (2007) attribute small business failures and poor business performance with inferior management competencies, including a lack of preparedness and a failure to control operational running costs. Birchall and Giambona (2007) also suggest that SMEs are restricted in technological and management learning due to limited financial resources and size,. This is supported by Jayawarna et al. (2007) who noted the shortage of management skills and training provided within SMEs. Rigby (2004) suggests that adequate training will not occur within the SME sector without external intervention. In the SME sector, the skills and commitment of employees within the enterprise is significant to the success of the enterprise (Matlay, 1999a). Jayawarna et al. (2007) suggests more research needs to be undertaken to strengthen this link and inform SME Owner/Managers.

Motivated by the need to produce more empirical evidence, this study considers the relationship between the satisfaction SMEs have towards their training needs being met by a diverse range of training alternatives (TAs – for example training at a local college or distant learning), and the levels of impact the training being met has had on business performance (such as enterprise productivity and profitability business outcomes). One issue within this type of problem, and an antecedent to the general difficulty in studying the impact of training on SME productivity and profitability business outcomes, is that not all SMEs would have opted for training from all potential TAs. It follows, a survey data set including details on SME training satisfaction and productivity and profitability business outcomes could be sparse, since not every SME would have answered each of the individual TA based questions. The consequence being, traditional analysis techniques, such as regression and neural networks, would be unable to handle the inherent sparsity of the data (without some level of external management of the data). This study, in an analysis of a sparse data set, employs the nascent RCaRBS technique, since it is able to fully analyse a sparse data set, such as that described previously.

The RCaRBS (Regression-Classification and Ranking Believe Simplex) technique was introduced in Beynon et al. (2010), as a development on the CaRBS technique (Beynon, 2005a; 2005b), to undertake regression-type analyses. It is a technique whose analysis approach is based on 'uncertain reasoning'

(Roesmer, 2000), through 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 anyway the incompleteness of the survey data studied.

Prior to the RCaRBS analysis, correlation analyses are undertaken to quantify the level of interdependence of training satisfaction from TAs and productivity and profitability business outcomes. The focus of RCaRBS, like regression in general, is to analyse the dependence of each of the productivity and profitability business outcomes (dependent variable) on the levels of satisfaction on training needs met by different training providers (exploratory/independent variables). Comparisons between the results from correlation and RCaRBS analyses offer strength to findings, and support for a new methodological approach in this area.

The structure of the rest of the chapter is as follows; in section one, a review of the literature related to SME TAs and outcomes is presented. In section two, the methodological issues involved (including the definitions of the variables and RCARBS method) are outlined. The results section then presents the RCaRBS analyses, one for productivity and one for profitability. In section four, the policy implications of the results are discussed.

1. The Experience of Training within the SME Sector

SMEs require resources, knowledge and skills to grow, enhance efficiency and operational effectiveness. Dollinger (1995) developed a typology that classified these resources as financial capital, human capital, social capital, technological resources, reputational capital and organisational resources. The human resource or employee represents a significant enterprise asset and a source of potential competitive advantage to any business (Rumelt, 1984; Wernerfelt, 1984, 1995; Barney 1986a, 1986b, 2001). The value of the human resource within the enterprise can be linked to Becker's (1993) research on human capital in its recognition of the individual skills, knowledge and competencies. Thus study focuses on the human resource within the enterprise and the impact of training to enhance organisational development.

Huang (2001) and Aragon-Sanchez et al. (2003) have identified the importance of training as a tool to assist enterprises grow and develop. Cassell (2002) suggests that training is offered to provide a tactical solution to business problems. Indeed, Patton and Marlow (2002) posit that training demand is linked to improving the enterprise efficiency, reducing costs and knowledge regarding protocols. Aragon-Sanchez et al. (2003) notes that the human resource within an enterprise possess specific characteristics namely knowledge, skills and attitudes (Barney and Wright, 1998), and enterprise knowledge (Lee and Yang, 2000; Alavi and Leidner, 2001) which can be exploited to provide competitive advan-

tage. Thus the training of the human resource is critical to have appropriately qualified, flexible, skilled and motivated employees (MacDuffie and Kochan, 1995).

Skinner et al. (2003) and Walker et al. (2007) state that the need for training provision is understood and accepted by the majority of SME Owner/Managers provided that they recognise its relevance. Aragon-Sanchez et al. (2003) identifies that enterprises typically adopt an ambiguous position regarding investing in training for their employees. Walker et al. (2007) suggest that SME Owner/Managers participate in training options for their employees provided they are accessible. The SME sector is characterised by under investment in training (Matlay, 1999b; Holden et al., 2003) due to the perception of risk associated with the financial investment in the training provision. Kitching and Blackburn's (2002) study supports this theory whereby they found that 52% of SMEs felt no need to offer training and 48% noted supply side reasons for not providing further training.

Employee training is accepted as a mechanism to improve enterprise business performance through enhanced profitability and productivity (Chandler and McEvoy, 2000; Litz and Stewart, 2000; Reid and Harris, 2002), organisational performance and capabilities (Chandler and McEvoy, 2000; Kotey and Folker, 2007), business survival and enable growth (Ibrahim and Ellis, 2003). Moreover, Kroon and Moolman (1992) have noted that training assists SME Owner/Managers in problem solving which would in turn reduce costs and increase profitability and knowledge of relevant legislature which would potentially improve operational efficiency. Chandler and McEvoy (2000) noted that enterprises that invested in training of their employees and engaged in regular performance appraisal were likely to benefit from lower employee turnover. However, Perren et al. (1999) has noted that the issue of improving SME training is complex and must be aligned to Owner/Managers immediate requirements providing relevant and practical business solutions.

Typically, SME training provision is subject to rigid cost control, reduction or even removal particularly during economic recession. Such a mindset suggests that SME Owner/Managers do not appreciate the value that training offers to business productivity and profitability (Aragon-Sanchez et al., 2003). Davidove and Schroeder (1992) posit that training evaluation is not undertaken in a professional or rigorous manner if at all. Where the experience and value of training is not effectively evaluated it is difficult to understand its impact (Carrier, 1999). This can potentially result in wasted or misallocated resources (Foot and Hook, 1996). Hallier and Butts (1999) confirmed that business performance can be constrained by neglect of training activity. Moreover, Storey and Westhead (1997) have suggested that SME Owner/Managers are making the decision not to invest in training opportunities The training construct has been defined by

Kitching and Blackburn (2002) and Jayawarna et al. (2007, p. 324) as: "Any attempt, within or outside the organisation, to increase job related knowledge and skills of either managers or employees".

The training requirements of the individual SME may be determined by the nature of that enterprises operation (Jayawarna et al., 2007). Hill and Stewart (2000), Anderson et al. (2001) and Jayawarna et al. (2007) notes that SMEs are more likely to prefer informal and reactive training provision for operational issues as opposed to formal strategically planned training initiatives. Patton and Marlow (2002 p. 261) define formal training as: "(…) initiatives which can be identified by both recipients and deliverers as an intervention which has a structured mode of delivery, where the aim is to impart new awareness or knowledge of a workplace process or activity".

Jayawarna et al. (2007) describe informal training as ad-hoc, fragmented and flexible. Hill and Stewart (2000) and Kotey and Folker (2007) describes informal training as unplanned, reactive with a short term focus. Jayawarna et al. (2007) found, that formal training was more significantly associated with enhanced business performance than informal training. Reid and Harris (2002) identified that enterprises operating in growing markets with increasing product/service demand would presumably be more likely to invest in TAs. The most effective formal training methods were recognised as use of outside providers for in-house courses and in-house designed and delivered courses. However, informal training was considered more relevant. Indeed the most effective informal TA was identified as attendance at seminars.

Kotey and Folker (2007) noted that SME training was typically undertaken in an informal on-the-job basis with minimal provision for employee development as confirmed by Marlow and Patton (1993) and Storey (1994). Hill and Stewart (2000) and Kotey and Folker (2007) claim that informal training is consistent with the strategic focus of the SME in that it is informal and flexible. Anderson et al. (2001) suggests SMEs have a preference for informal training provision through activities such as feedback, experience and social interactions between employees. Kitching and Blackburn (2002) identified three groupings of SME training behaviour. Firstly, 15% were classified as low or restrictive trainers which involved training as a last option if at all. Secondly, 55% were identified as tactical trainers whereby training was utilised as and when required. Finally, 30% were identified as strategic trainers with a positive and systematic approach to training deployment.

Kotey and Folker (2007) note SMEs are reluctant to engage in formal training which is exacerbated by limited evaluation and analysis of training requirements (McMahon and Murphy, 1999). This study considers both formal and informal training provision. Lynch (1992) distinguishes three training methods:

on the job training, training as an apprentice and off the job training. These classifications are transferable to the analysis provided by Aragon-Sanchez et al. (2003) who identified the following TAs, labelled T1, T2,.., T9, see Table 1.

Table 1

Provision Types of Training Methods

Training Methods	Training Provision
Learning at a local college (T1)	Formal
Through government programme (T2)	Formal
Learning provided by local college but within the workforce (T3)	Formal
Employee providing on the job training (T4)	Informal/Formal
Learning by doing (T5)	Informal
Private training provider in the workplace (T6)	Formal
Private training provider outside of the workplace (T7)	Formal
Distance Learning (T8)	Formal
E-Learning (T9)	Formal

Kotey and Folker (2007) identified on the job training was the predominant training method for SMEs. Westhead and Storey (1996), Hill and Stewart (2000), Kitching and Blackburn (2002) identified that in-house training could also be perceived as informal, flexible, relevant and convenient and also provided the benefit of being low cost. Aragon-Sanchez et al. (2003) noted a positive impact from in-house training with regard to productivity, quality, labour turnover and financial results. Dewhurst et al. (2007) noted such advantages as being particularly attractive to SMEs and their strategic imperatives. Westwood (2001) however, adds a note of caution claiming that in-house training is neither cost effective nor creative solution and lacks credibility with employees.

Aragon-Sanchez et al. (2003) noted a positive impact from training performed inside the enterprise with outside trainers had a positive impact in terms of productivity, quality, labour turnover and financial results. Chi et al. (2008) note that training requirements should be professionally undertaken and if the SME is not able to effectively internally resource should be externally sourced. Stewart and Beaver (2004) notes that government training schemes have actively promoted growth within SMEs and provided resources to support training provision. Smith et al. (2002) suggests that the SME sector remain unconvinced regarding the value of outside training provision and are deterred and constrained by the higher cost and associated risks of such provision (Lange *et al.,* 2000). Matlay's (2004) study of SMEs investigating supporting initiatives identified a high level of awareness amongst Owner/Managers but low usage rates. Kotey and Folker (2007) and Kotey and Slade (2005) found that the adoption of formal training provision increased with enterprise size.

In terms of the experience of distance training provision, a category including e-learning the SME experience was mixed (Matlay, 1999b). E-learning offers the SME significant advantages of anytime anyplace learning (Birchall and Giambona, 2007). Training through E-learning provision has held significant prominence in UK and European economies with numerous initiatives encouraging uptake (Blackburn and Athayade, 2000). Birchall and Giambona (2007) notes it suffers from the known disadvantages of self directed e-learning where a lack of priority and isolation can be significant inhibitors to effective learning. Blackburn and Athayde (2000) recognised the provision of training through government initiatives although Matlay (1999b) notes that the impact of such provision is mixed.

In cases of successful formal and informal training provision, the basis of the intervention was a tactical reaction to a crisis which thereafter impacted upon business performance. Kitching and Blackburn (2002) and Fielding (2008), suggest that SMEs were likely to be strategic trainers if they were larger, younger organisations that were innovative in their business practices and growth focused. Garavan et al. (1995) concurs with this perspective arguing that SMEs cannot achieve sustained competitive advantage without trained employees. Aragon-Sanchez et al. (2003) survey of SMEs considering the effects of training on business performance in terms of effectiveness and profitability and identified evidence of a significant relationship. Boothby et al. (2010) identified that enterprises that adopt new technologies and invest in training achieve productivity gains.

Literature supports the argument that training positively influences business performance through enhanced productivity, quality, labour turnover and financial results. However, there is also both inconclusive and contradictory evidence (Westhead and Storey, 1996; Wong et al., 1997; Devins and Johnson, 2002; Aragon-Sanchez et al., 2003), which Jayawarna et al. (2007) notes discourages policy makers and SME Owner/Managers from investing in training. Foreman-Peck et al. (2006) study found no association between skills/training with growth or profitability. Tharenou et al. (2007) research found that training was associated to human resource outcomes and business performance but only weakly related to financial performance. Garavan et al. (1995) and Stewart and McGoldrick (1996) indicate that SMEs are unable to achieve a potential sustained competitive advantage through a highly trained workforce from informal training approaches.

In conclusion, the extant literature is contradictory (Jayawarna et al., 2007) and disagreement remains in terms of which training type has the most significant impact (Aragon-Sanchez et al., 2003). Aragon-Sanchez et al. (2003) noted that both on the job and training provided by outside trainers had a positive impact. Conversely, specific training activities were not found to significantly impact the organisation although this depended on the nature of the training. They

concluded that on the job training had the most significant impact. Aragon-Sanchez et al. (2003), Jayawarna et al. (2007) and Walker et al. (2007) posit the need for further research to explore the impact of TAs on the SME sector. Figure 1 provides an insight into the variables that we are trying to connect, namely whether opinions on the satisfaction of the meeting of training needs from different TAs with their possible impact on business outcomes (increased profitability or increased profitability) of the training.

The key research questions that emerged from the literature analysis are therefore:

1. The perceived value of individual TAs towards business outcomes.
2. Is there a perceived positive relationship between the impact of specific training needs met towards increased productivity.
3. Is there a perceived positive relationship between the impact of specific training needs met towards increased profitability.

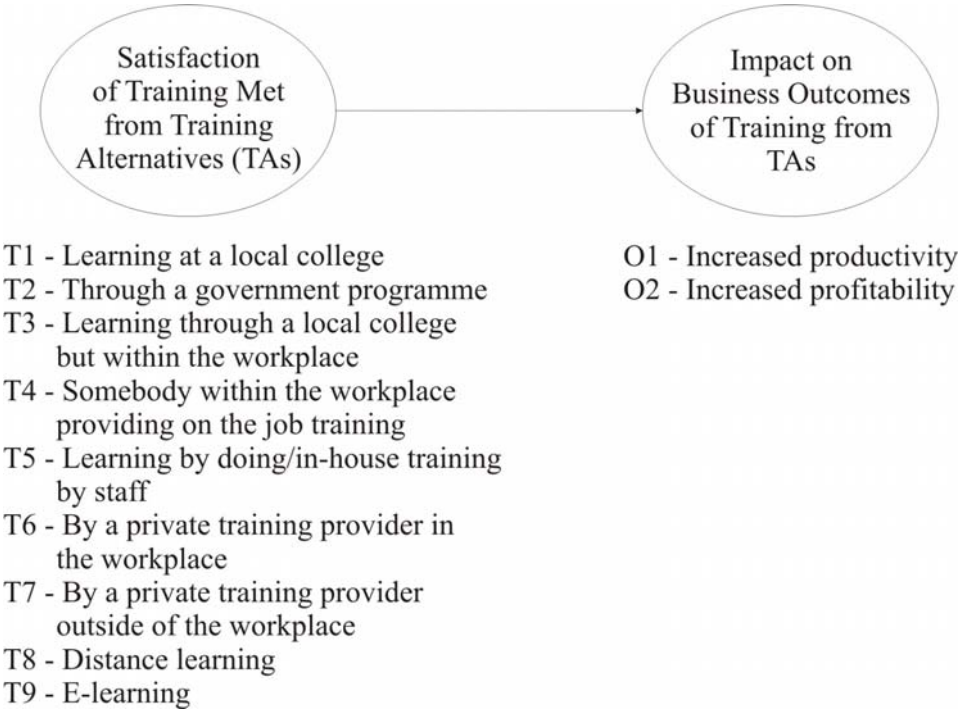

Fig. 1. A conceptualisation of the research analysis undertaken

2. Method

This section begins by defining the key concepts within this study, namely SME business performance and training. The chapter considers two measures of business performance namely productivity and profitability, and collectively

analyses them as business performance. Foreman-Peck et al. (2006) notes productivity (how much input is required to produce the businesses output) and profitability (relationship between cost and revenue) are standard objective measures of business performance, which SME Owner/Managers utilise to measure their operational performance. As indicated in the chapters introduction, SMEs play a significant role in the global economy. Kotey and Folker (2007) identified that SME attitudes to training can be influenced by enterprise size. Whilst Skinner et al. (2003) and Webster et al. (2005) note that micro SMEs, with no employees, face additional barriers to training due to their limited resources, restricted time, deficiency of off-the-shelf training packages and lack of training engagement. The European Commission (EC) produced a widely utilised definition of SMEs (EC, 1996), subsequently updated in 2003 (EC, 2003), as identified within Table 2. This study focuses on SMEs with between 1 and 249 employees in line with the EU definition (Downie, 2003). SMEs with no employees are excluded due to the limited applicability of employee training to such enterprises as previously noted by (Kotey and Sheridan, 2004; Kotey and Folker, 2007).

Table 2

European Community Definitions of SMEs

Criterion	Micro	Small	Medium
Maximum Number of employees	< 10	< 50	≤ 249
Maximum annual turnover	2 million Euros	10 million Euros	43 million Euros
Maximum annual balance sheet total	2 million Euros	10 million Euros	27 million Euros

Source: EC, 2003

Data and Sample

Data was taken from the 2008 Federation of Small Businesses (FSB) survey. The survey is a bi-annual survey of the FSBs 200,000 plus SMEs members to examine their business performance, key issues and challenges. The 2008 survey was conducted by the University of Glamorgan Business School staff. The questionnaire itself was developed over a number of months, in consultation with a number of the FSB's committees, and was piloted with FSB members and academics prior to finalisation, to try to ensure both that the correct mix of questions were being asked and that these were clearly understood by respondents. This survey was sent out to the FSB's 200,000 plus members and received 8,742 responses. SMEs were considered the unit of analysis with the Owner/Manager the main spokesperson for the company.

In this study, a sample of 3,521 SMEs was considered representing 40.28% of the full dataset. The sample selected was drawn from SMEs with between 1 and 249 employees as indicated in the previous section. Moreover, a further selection criterion was imposed whereby the individual SME had to have em-

ployees both two years ago and currently. This was imposed to ensure that an equal comparison was made between all SMEs in the survey and focused on only SMEs who had employees who could receive some form of training. In examining the issue of representativeness, the FSB data was compared with that of the two most recent BERR's UK Small Business Surveys (2007, 2008). Where available, data for firms under four years was also compared. Table 3 summarises the results which indicate that it is reasonable to assume that the enterprises in the FSB dataset are broadly representative of UK SMEs as a whole in terms of these variables.

Table 3

Comparison of FSB and BERR Survey Datasets

Variables	FSB Survey (2008) n = 8,742	BERR's Small Business Survey (2006)	BERR's Small Business Survey (2007)
Whole sample			
Age SME owners are under 45	25%	n/a	30%
Age between 45 and 54	32%	n/a	33%
Over the age of 55	43%	n/a	36%
Industry: primary industries	3%	4%	n/a
Industry: production industries	11%	10%	n/a
Industry: construction	12%	10%	n/a
Industry: services	74%	76%	n/a
Firms under four years old	19.8%		18%
Young firms in sample			
Gender (female)	29.1%	26%	n/a
Anticipated growth	85.2%	82%	n/a
Young firms with fewer than 10 employees	91.4%	89%	n/a

Areas of Inquiry

In this study it is the relationship between the levels of satisfaction SMEs have towards their training needs met by a diverse range of TAs, and the levels of impact the training needs influence on certain business outcomes. These related issues were explored in specific questions (Questions 37 and 38) within the FSB research instrument (see Figure 2 and Figure 3).

Due to the novelty of the RCaRBS analyses later undertaken, an interpretation to these questions (and response structure) is next expressed. Within the RCaRBS analysis, the 'training needs met' questions, T1, T2,.., T9, form the independent variables consistently employed (and also correlated against a SME business performance measure). For each TA question, the response allowed encompasses two separate issues (for a single SME):

i) Whether or not a specific TA was utilised by a SME, where a cross in the 'Did not use' box indicates not utilised.

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	☐	☐	☐	☐	☐	☐

Fig. 2. Description of FSB Research Question 37

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
O1- Increased productivity	☐	☐	☐	☐	☐
O2- Increased profitability	☐	☐	☐	☐	☐

Fig. 3. Productivity or Profitability Impact Due to Training (Question 38)

ii) If a TA was utilised, the 'Did not use' box is left empty, then what was the level of satisfaction felt about the SME's training needs met, where a response to indicate their opinion on a five point Likert scale ranging from 'Very dissatisfied' (1) to 'Very satisfied' (5) is given.

Clearly, these two issues cannot take place at the same time. In a RCaRBS analysis, one data entry is used to represent both of the above issues (either a numerical value (1 to 5) or a '-' simply registering the TA was not utilised). Of the 3,521 SMEs considered in this study, the breakdown of them, based on the number of different TAs they utilised, was (in ascending order of number utilised); 747 (1), 1110 (2), 757 (3), 463 (4), 226 (5), 110 (6), 44 (7), 33 (8) and 31 (9). From this breakdown of numbers of TAs employed, the limits include 747 and 31 SMEs who utilised only one and all nine TAs, respectively.

For each business outcome question, increased productivity (O1) and increased profitability (O2), a numerical value of 1 to 5 is expected, denoting the qualitative expressions of, no impact from training (1) up to strong impact from training (5)*. To aid the reader in understanding the type of data analysed in this study, the response details of six respondents (SMEs) are next reported, see Table 4.

Table 4

Response details of six SMEs

Variable	T1	T2	T3	T4	T5	T6	T7	T8	T9		O1	O2
S1	-	-	-	-	-	3	-	-	-		3	3
S2	1	-	-	-	-	-	-	-	-		4	4
S3	2	-	-	3	4	5	5	-	-		4	3
S4	3	3	-	3	3	-	3	-	3		3	3
S5	3	1	4	5	5	5	5	5	5		4	4
S6	2	2	2	2	2	2	2	1	1		3	3

In Table 4, each row represents the response details of a single SME to the training T1, T2,.., T9 and performance questions. Inspection shows a number of values to the TA questions are denoted by '-'. The two extreme cases of SMEs shown in Table 3, are when they utilised only one available TA (S1 and S2) or when they used all the available TAs (S5 and S6), in the last two years.

3. Analyses of Business Training and Productivity and Profitability Data Set

* In this study, without loss of generality, only those SMEs which gave responses to both business outcomes were considered (to allow across business outcome comparison of results).

This section undertakes two forms of analyses on the productivity and profitability data set, firstly a correlation analysis and secondly a RCaRBS analysis.

Correlation

The correlation analysis undertaken here, considers separately the 'training needs met' questions T1, T2,.., T9, against the increased productivity and increased profitability business outcome measures. Since this analysis needs to work on complete data, for each TA question, only the SMEs who answered the respective question are considered. Here, Spearman's rank correlation is initially intended to be employed, where the SMEs S1, S2 … are first ranked based on their Likert scale. Clearly there is will a large amount of ties, since only the 1 to 5 scale values used, in this circumstance Pearson's correlation coefficient can be used, see Table 5.

Table 5

Pearson's Correlation (and Significance) Analysis of SME Training and Productivity and Profitability Data Set

Training Alternative	Increased Productivity (O1)	Increased Profitability (O2)
T1 (940)	.1612 (.7675 10-6)	.1385 (.2161 10-4)
T2 (346)	.1825 (.6867 10-3)	.1330 (.1334 10-1)
T3 (556)	.1633 (.1176 10-3)	.0897 (.3443 10-1)
T4 (2054)	.2223 (.7235 10-23)	.2028 (.3851 10-19)
T5 (2661)	.2402 (.2943 10-34)	.2264 (.1647 10-30)
T6 (835)	.2172 (.3491 10-9)	.1697 (.9364 10-6)
T7 (1229)	.2165 (.3229 10-13)	.1655 (.6530 10-8)
T8 (505)	.1586 (.3639 10-3)	.1610 (.2976 10-3)
T9 (605)	.2647 (.7457 10-10)	.2218 (.4858 10-7)

In Table 4, the correlation results are presented between each TA question and the productivity and profitability business outcomes. The variation in the numbers of SMEs considered is noticeable, with 346 SMEs in the considered data using T2 training (Through a government programme), in contrast 2,661 out of the 3,521 used the T5 training (Learning by doing/in-house training by staff). These results (and significance values in brackets) are reported in the discussions and conclusions section of this paper.

These correlation results offer findings on the presence of interdependence between individual TAs and productivity and profitability business outcomes, the RCaRBS analysis next undertaken, as with regression based analyses, looks at dependence of the individual business outcomes on the TAs.

RCaRBS Analysis of Productivity and Profitability

Two RCaRBS analyses are undertaken in this section, one for Increased productivity (O1) and one for Increased profitability (O2). The type of data represented in Table 4, for all considered SMEs, is employed without any further external management of the '-' no values present. Put simply, with RCaRBS, the presence of a '-' no value is a level of ignorance in the information describing that SME, and that the technique can accommodate such ignorant pieces of evidence.

Results with business outcome 'Increased productivity'

This subbsection considers the business outcome increased productivity (O1). The first set of results presented concern the level of model fit of the configured RCaRBS system (model). That is, can the responses of the 'training needs met' questions T1, T2,.., T9 from SMEs be used to characterise the understood level of impact of the training on the business outcome increased productivity, see Figure 4.

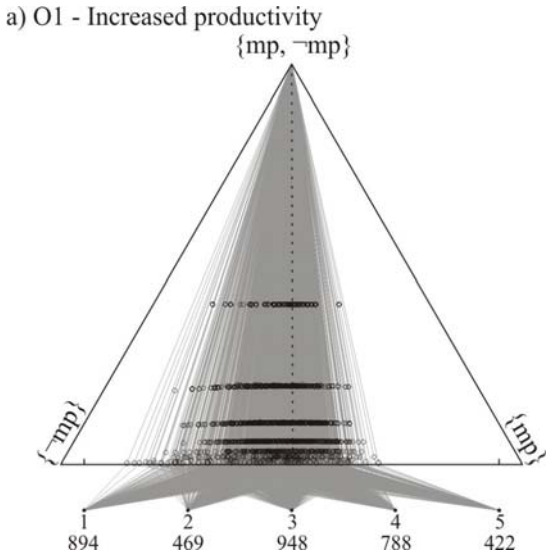

Fig. 4. Graphical elucidation of results from RCaRBS analysis on business outcome 'Increased Productivity' (O1), based on levels of training needs met by TAs

Figure 4 shows the simplex plot stage of the RCaRBS based modelling of the SMEs' increased productivity business outcome. Each circle shown in the simplex plot represents the simplex coordinate form of a SME's final business-outcome body of evidence (BOE), in this case increased productivity, found from the combination of its series of training-met BOEs (see Beynon, 2010 for technical details). For this simplex plot, the base vertices are labelled, from left to right, {¬mp} and {mp} (¬mp representing not-impacting), signifying the li-

mits of the domain, from not-impacting to impacting, of the impact response value (v_i) for O1, with the top vertex the concomitant ignorance {mp, ¬mp}. The predicted outcome value for a SME is then simply a mapping down from the {mp, ¬mp} vertex through the respective simplex coordinate down to the base line*.

Mapping these simplex coordinates down to the base line of the simplex plot results in a predominantly narrow range of predicted values found for the impact of training on the business outcome increased productivity. The vertical spread of business-outcome BOEs is a direct consequence of the variation in the number of TAs utilised by the SMEs, see Table 4 and surrounding discussion. The fewer the number of TAs utilised by a SME the more ignorance in the resultant training-met BOE (the higher up in the simplex plot the BOE would be positioned). The purpose of presenting this simplex plot is to highlight that all SMEs (3,521) were considered in this analysis.

On the bottom of the figure are the actual business outcome response values. One way of offering a statistical measure of the model fit is by looking at the correlation of the predicted values to the actual impact response values from the 3,521 SMEs, here it was found that R = 0.276 ($0.4\ 10^{-59}$), indicating a positive correlation between the sets of values, and importantly, a very significant level of correlation. This correlation result suggests the RCaRBS model has captured the underlying trend of the actual impact of business response values, any understanding of the contribution of the training needs met questions to the business outcome increased productivity should have in mind that they have been able to follow the trend of the impact business outcome response values.

Although a RCaRBS analysis does not derive explicit parameters for modelling model fit, it can nevertheless provide information on TAs 'training needs met' contribution. In particular, graphs can be constructed formulating the evidence in a training-met BOE directly from the 'training needs met' question values describing the responses from SMEs, see Figure 5.

In Figure 5, each graph denotes a visual elucidation of the contribution of one 'training needs met' question, one of T1, T2,.., T9. In each graph, up to three lines joining circles are drawn showing the mass values $m_{j,T?}(\{mp\})$ and $m_{j,T?}(\{\neg mp\})$ denoting evidence towards impact and not-impact of the TA to increased productivity, respectively and ignorance $m_{j,T?}(\{mp, \neg mp\})$ (the lines are shown to exhibit the underlying structure of the progression of evidence change from one response value to the next – see Beynon, 2010 for technical

* With the business outcome questions' responses all based on a 1 to 5 scale, the tick marks on the base line, from left to right, signify these scale values. The 1 (left hand side) and 5 (right hand side) are just in from the left and right vertices to allow for a level of open bounds on these limiting values.

details). Shown at the top of each graph are the number of responses to this TA, and the breakdown of these responses across the Likert scale.

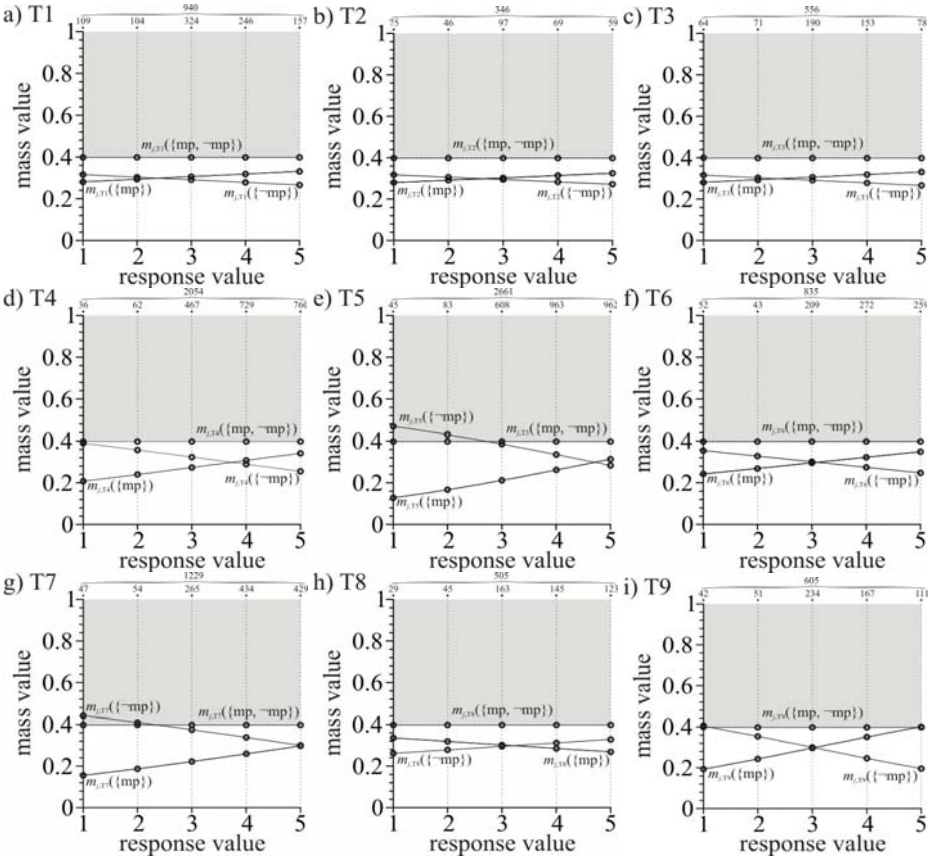

Fig. 5. Contribution graphs of how training needs have been met, over the training alternatives T1,.., T9, for the business outcome of 'Increased Productivity' (O1) (where 1 – Very dissatisfied up to 5 – Very Satisfied)

To further understand these graphs, the graph 5a is next fully described. In graph 5a, the evidential contribution of the 'training needs met' question T1 'Learning at a local college' is reported in respect of the impact on the business outcome increased productivity. There are two lines 'with circles' signifying the mass values of belief towards their being impact ($m_{j,T1}(\{mp\})$) and not-impact ($m_{j,T1}(\{\neg mp\})$) of the TA towards increased productivity. The increasing value of $m_{j,T3}(\{mp\})$ over the scale value 1 (Very dissatisfied) to 5 (Very satisfied) indicates a positive contribution of this TA. This positive contribution is supported by the respective correlation results shown in Table 4. Comparing the results for T1 against T5 (Learning by doing/in-house training by staff), shows for T5 a much more steeper increasing line of points representing $m_{j,T5}(\{mp\})$ (in Figu-

re 5e) than for $m_{j,T5}(\{mp\})$ considered previously. The implication here is that the T5 has a stronger contribution since it is more discerning in the evidence from the different response values to the 'training needs met' question T5.

Results with business outcome 'Increased profitability'

This section describes the RCaRBS analysis of the relationship between the levels of satisfaction towards training needs met by different TAs and the impact the training had on the business outcome increased profitability (O2), see Figure 6.

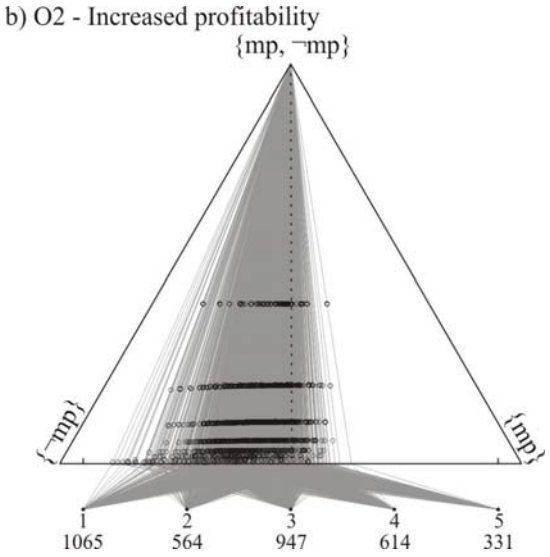

Fig. 6. Graphical elucidation of results from RCaRBS analysis on business outcome 'Increased Profitability' (O2), based on levels of training needs met by training alternatives

The correlation between the predicted values and actual impact response values was found to be R = 0.258 ($0.5\ 10^{-52}$), which, as in the previous analysis, indicates a strong significant correlation – but less than that with O1. This results, similarly, allows us to believe the RCaRBS model has captured the underlying trend of the training needs met response values to their impact on the increase profitability business outcome. Therefore, it follows, as in the previous analysis, but here with respect to the increased profitability business outcome, graphs can be constructed formulating the evidence in the training-met BOEs directly from the training needs met response values describing the responses from SMEs, see Figure 7.

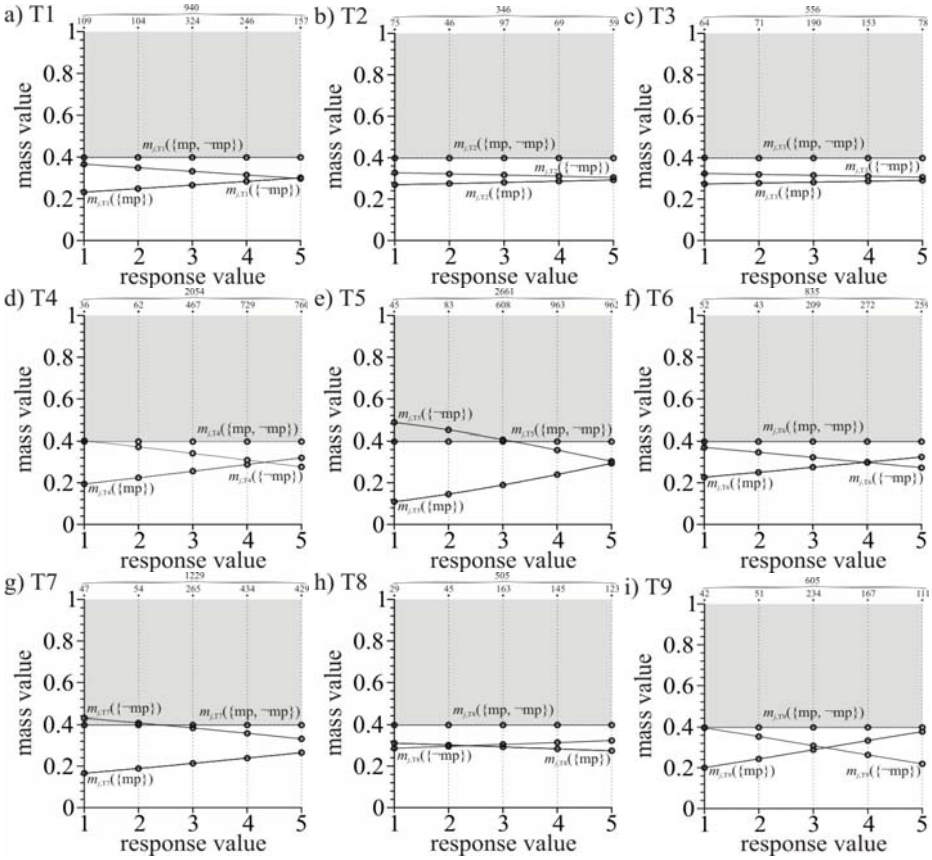

Fig. 7. Contribution graphs of how training needs have been met, over the training alternatives T1,.., T9, for the business outcome of 'Increased Profitability' (O2) (where 1 – Very dissatisfied up to 5 – Very satisfied)

The results in Figure 7 follow similarly the results in Figure 5.

4. Discussion

In summary, the key findings identified within this study suggest that Owner/Manager were able to discern differences between the impacts of TAs towards business performance. It is interesting to note the utilisation by SMEs of a range of TAs whereby a significant number of SMEs within the sample undertake, two (n = 1110), three (757), or even four (463) alternatives. Indeed, 31 had utilised all nine TAs during the last year. This suggests that SME Owner/Managers are not afraid to explore their TAs if they can access them. Owner/Managers recognised that some TAs provided benefit towards their business performance. However, the differences between the perceived value of TAs towards either increased profitability or increased profitability were not overly

apparent. Put more simplistically, the evidence suggests Owner/Managers choice of TA is not particularly discerning between either increased profitability or increased productivity business outcomes.

With regard to the increased productivity outcome, Owner/Managers considered "Learning by doing/in house training by staff" as the TA which contributed towards enhanced productivity. Other noticeable positive associations were identified between "Somebody within the workplace providing on the job training" and "By a private training provider outside of the workplace". It is interesting to note that greater importance was paid to informal training methods with the exception of external formal training provision. Owner/Managers were not convinced by the value of local college provision either within the workplace or college. This result suggests that local college provision is either not meeting the training requirements of the SME sector or they are not aware of their curriculum and the opportunities it offers. Moreover training provided through government programme was also judged by Owner/Managers to lack perceived value towards increased productivity.

When the result of the increased profitability outcome was considered in terms of their association with TAs the results were not dissimilar to that of the productivity outcome. Positive associations were apparent between "Somebody within the workplace providing on the job training", "Learning by doing/in-house training by staff" and "by a private training provider outside of the workplace" towards the business profitability outcome. Thus it is apparent that Owner/Managers have a preference for informal training provision with the exception of the private training provider provision outside the workplace. As previously only a limited association was identified between the more formal types of learning which included distance learning, local college provision and training through a government programme.

Conclusions

The evidence that has emerged within this study suggests SME Owner/Managers believe that TAs provide benefit towards business performance in the form of enhanced productivity and profitability. This result confirms the prior studies Birdthistle (2006) and Lin and Jacobs (2008) although conflicts with Foreman-Peck et al. (2006). This study makes a contribution to a limited literature (Dewhurst et al., 2007) in evaluating the impact of TAs on the SME sector. The study through the novel RCaRBS technique deployed, enables an evaluation of the effectiveness of individual TAs towards enhanced business performance namely productivity or profitability outcomes.

It was apparent that the differences between the perceived value of TAs towards either increased productivity or increased profitability were marginal and

there were similarities in the results. In response to the research questions stated in Section Four the evidence suggests that Owner/Managers choice of TA is not particularly discerning towards either profitability or productivity business outcomes but towards the overall outcome of enhanced business performance.

With regard to the increased productivity outcome it was apparent that there was greater belief that the informal TAs (e.g. learning by doing/in house training) offered greater benefit towards enhanced productivity. The exception to this was the training provided by a private training provider outside the workplace. The increased profitability outcome identified similar findings in that positive associations were apparent between "Somebody within the workplace providing on the job training", "Learning by doing/in-house training by staff" and "by a private training provider outside of the workplace" towards the business profitability outcome.

The results suggest that Owner/Managers have a belief that informal TAs (e.g. learning by doing) provide the most value towards enhanced business performance (in terms of productivity and profitability) in contrast to formal methods of delivery (e.g. local college). How informed and accurate this Owner/Manager perception is remains debateable and further research must be undertaken to fully explore it. External environmental influences such as a difficult economic situation may indeed influence Owner/Manager choices towards TAs.

The literature confirms that many SMEs especially micro-size classifications have limited financial resources (Birchall and Giambona, 2007) to access effective training solutions. In such cases, informal training options may take precedence over formal alternatives. Thus the informal option becomes the default selection without the alternatives being awarded due consideration. Owner/Managers are potentially making immediate operational and reactive decisions opting for low cost informal training options (Kotey and Folker, 2007). Such decisions might result in missed business opportunities and restricted growth aspirations. Previously, Walker et al. (2007) has noted that SMEs lack managerial competencies which would impact about Owner/Managers evaluation and adoption of TAs. However, it must be noted that there is undoubtedly good practice occurring in the provision of informal education within SMEs as noted by Aragon-Sanchez et al. (2003). This best practice must be captured and disseminated to the SME community and training providers.

The results of this study suggest that the experience and attitude of Owner/Managers towards formal TAs is unsatisfactory. There is also significant extant criticism (Westwood, 2001) towards the effectiveness of informal TA provision. This study presents notable evidence of uptake of formal training options including "Learning at a local college" (n = 940), "Through a government programme" (n = 346), "Learning through a local college but within the

workplace" (n = 556) and "Distance learning" (n = 505) suggesting SMEs will participate if the formal TA is available as claimed by Walker et al. (2007). The evidence within this study suggests that formal training options are failing to meet the expectations of SMEs (Smith et al., 2002) although it would be interesting to investigate the evaluation underpinning this response (McMahon and Murphy, 1999). Innovative and acclaimed formal TAs including distance learning, e-learning and work based learning alternatives all underperform (Matlay, 1999b; Birchall and Giambona, 2007). It is worth noting that formal training undertaken by private training providers were judged more beneficial than other alternatives (Reid and Harris, 2002). Therefore, if the appropriate formal training is provided it can indeed by viewed as beneficial (Reid and Harris, 2002). Such evidence would assist SME Owner/Managers assess the risk associated with both informal and formal TAs. Further research is required to explore these issues and provide evidence whether the problem is within the SME, associated with the formal provider or a combination of the two. In conclusion, SMEs must be made to understand the benefits and be able to effectively access formal TAs to appreciate there is a return on investment risk. Alternatively training providers to the SME sector must understand their market and provide appropriate and relevant training is an accessible manner.

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RYZYKO SZKOLEŃ W SEKTORZE MSP: ANALIZA EKSPLORACYJNA Z ZASTOSOWANIEM TECHNIKI RCARBS

Streszczenie

Środowisko biznesowe charakteryzuje się wzrostem konkurencyjności, postępującą globalizacją rynków oraz wzrostem skali usprawnień technologicznych. Działalność organizacji w tych warunkach staje się bardziej wyrafinowana, co skutkuje między innymi ewolucją usług szkoleniowych. Artykuł podejmuje problem ewaluacji szkoleń na rzecz sektora małych i średnich przedsiębiorstw. Analizie empirycznej poddano zależność pomiędzy satysfakcją ze szkoleń a zgłaszanymi potrzebami szkoleniowymi, a także pomiędzy wpływem odbytych szkoleń na działalność przedsiębiorstw sektora MSP. Studium opiera się na zastosowaniu pionierskiej metody analitycznej, tzw. RCaRBS (Regression-Classification and Ranking Believe Simplex), która pozwala na analizowanie rozrzuconej próby badawczej przy niekompletnych danych. W części pierwszej artykułu omówiono doświadczenia z zakresu szkoleń w sektorze MSP, w części drugiej przybliżono meandry zastosowanej metody badawczej, zaś w części trzeciej zaprezentowano wyniki przeprowadzonej analizy. Artykuł zamyka dyskusja nad otrzymanymi rezultatami, które wykazały, że właściciele bądź menedżerowie badanych przedsiębiorstw byli w stanie rozpoznać wpływ alternatyw szkoleniowych na wyniki ich działalności.