Investigating the relationship between formal time management practices and business performance of UK SMEs

Dr. LakshmiNarasimhan Vedanthachari

Senior Lecturer, Middlesex University Business School, The Burroughs, NW4 4BT, UK

L.N.Chari@mdx.ac.uk, 0044 (0) 20 8411 3020

Dr. Rob Baldock

Senior Research Fellow, Centre for Enterprise and Economic Development Research (CEEDR), Middlesex University Business School

Objectives

This research aims to investigate the relationship that exists between time management practices and business performance.

Prior Work

Terziovski's (2009) research into formal and informal SME management practices concluded that formal structure and innovation strategy are the key drivers for innovation leading to high performance. This builds on previous work (Patel, 2005; Prakash and Gupta, 2008) arguing that formal structures add clarity to employees' roles, leading to greater employee commitment and overall organizational effectiveness. Others, such as Fiegenbaum and Karnani (1991), Appiah-Adu and Singh (1998), Narayanan (2001) and Qian and Li (2003) argue that SMEs are competitive because of flexible organisational structure and centralised decision making which supports informality. Hence a theoretical tension exists between formality and informality in SMEs.

Approach

An online management questionnaire was e-mailed to 10,000 UK employer SMEs, evenly stratified across the manufacturing, distribution and business services sectors, in October 2014, yielding 757 usable responses. The questionnaire contained three sections: business and management characteristics, operational efficiencies and time management efficiencies, based on Kaplan and Norton's (1992) balanced scorecard approach. Addressing the fundamental hypothesis that "Formal time management practice (TMP) is positively associated with improved business performance", five associated hypotheses relating time to TMP and business performance were tested to explore their interrelation, controlling for business and management characteristics, using binary logit regression analysis.

Results

Adoption of formal time management systems is significantly associated with business size (<.001). There is a positive correlation between formal time management systems and employment growth and future sales turnover. Micro businesses are less likely to use formal time management practices (only 74% adopted software for this) when compared with businesses of other sizes (95% adoption rate). Moreover micro businesses that did adopt a formal time management system have a negative association with business growth thus highlighting the lack of suitability for micro businesses. Above average business efficiency is a significant factor that is strongly associated with future business growth (<0.001); projected employment growth (<0.05); projected sales growth (<0.05) and adopting Cloud technologies (<0.01) is positively associated with above industry average efficiency.

Implications

The findings of the research are timely as it contributes to the productivity puzzle which is a major concern for the UK economy. The findings indicate that organisations with formal time management systems and latest technologies like Cloud computing enjoy higher efficiency levels highlighting the need for driving digitisations amongst SMEs.

Value

The findings support the need for formality in SME business practices, suggesting a key area for business support, alongside the need for further research to understand the relationship between TME and competitive advantage.

Introduction

In 2014, the UK's GDP experienced 2.6% growth (Worldbank data, 2105), coinciding with a gradual drop of unemployment levels from 6.9% in January 2014 to 5.5% in December 2014 (Eurostat, 2014). However, economists argue that productivity in the United Kingdom has been exceptionally weak, with the whole-economy output per hour remaining around 16% lower than during the 2007-08 global financial crisis period (Barnett et al., 2014a). Popularly termed as "The productivity Puzzle", it has gripped the main stream media, economists and Government policy makers (BBC, 2015; Wintour, 2015). Various theories have been postulated to examine the loss of productivity. They include 'labour hoarding' theory wherein organisations cut output but keep labour force in reserve for deployment during recovery, however this theory would be appropriate during the initial recession period and not several years later. Other theories include cyclical conditions leading to increasing proportions of low-skilled jobs and measurement errors. SMEs which are considered to be the lifeblood of the UK economy have witnessed a drop in productivity levels when compared to larger firms (Barnett *et al.,*, 2014b). An RSA (Dellot, 2015) report on micro-businesses indicated a steep increase in the number of micro-businesses who are perceived to be less productive when compared to larger counterparts. Despite these perceptions they argue that micro-businesses are more productive by excluding sole proprietors and focussing on long standing firms. Since productivity is measured by using time as the base unit, our research aims to study the relationship between time management practices and business performance of UK SMEs by undertaking a UK wide survey involving 757 SMEs. The findings have both theoretical and practical implications. It contributes to the formality versus informality debate and also identifies the areas for business support for SMEs. This paper is structured as follows: The paper starts with the discussion on the drivers for SME competitiveness followed by the tension that exists between formal and informal management practices. The next section discusses the relationship that exists between time management and business performance wherein the research framework and hypotheses are derived. This is followed by methodology, findings, discussion and conclusion.

SMEs Competitiveness

SMEs are characterised by small size, limited resources and skills when compared against larger counterparts. Despite their size, they tend to be competitive due to owner-manager networks and staff competencies, alongside factors such as cost differentiation, innovation, marketing differentiation and personalised service which result in customer loyalty and organisational growth (O'Donnell et al., 2002). Fiegenbaum and Karani (1991) argue that small firms are competitive due to their capability to fluctuate their outputs hence confirming the hypothesis that output flexibility can lead to competitive advantage. Vossen (1998) compared the relative strengths of small and large firms and conclude that the strengths for large firms lie primarily on resources whereas small firm's strengths lie in their behavioural characteristics. Low bureaucracy resulting in rapid decision making, flexibility in outputs and willingness to take risks are some of the behavioural characteristics that contribute to the competitiveness of the small business. Eisenhardt and Martin (2000) assert that sustained competitive advantage is not possible in dynamic and rapidly changing markets. They also argue that sustained competitive advantage is possible only on instances where the competing firms apply their capabilities dynamically i.e. organisations which are more nimble and can change quickly to respond to changing operating environment. Also termed as Strategic Flexibility, it helps organisations to sense environmental changes (Grewal and Tansuhaj, 2001), overcome organizational inertia (Zhou and Wu, 2010), reallocate resources (Sanchez, 1995), stimulate creativity and innovation (Hitt *et al.,* 1998), and explore new business opportunities (Bock *et al.*, 2012). It emphasises flexible use of resources and re-configuration of business processes. Adkins (2005) argues that slack resources i.e. spare capability enhances organisational flexibility which drives performance improvement. One way of achieving flexibility is by informal working practices.

Terziovski's (2009) research into formal and informal SME management practices concluded that formal structure and innovation strategy are the key drivers for innovation leading to high performance. This builds on previous work (Patel, 2005; Prakash and Gupta, 2008) arguing that formal structures add clarity to employees' roles, leading to greater employee commitment and overall organizational effectiveness. Others, such as Fiegenbaum and Karnani (1991), Appiah-Adu and Singh (1998), Narayanan (2001) and Qian and Li (2003) argue that SMEs are competitive because of flexible organisational structure and centralised decision making which supports informality. Hence a theoretical tension exists between formality and informality in SMEs.

Further to the development of resource based view of the firm by Penrose (1959), Barney (1991) argues that firm's internal resources are a significant contributor for competitive advantage and identifies resources as assets, capabilities, processes, attributes, knowledge. It is widely accepted that time is an independent universally constant resource and effective time management is an important source for firm's profitability, business performance and competitive advantage. The importance of time as a competitive resource is highlighted by Fedex VP's quote "We engineer time" in response to the question "What business are you in?"(Milburn, 2011).

Given the strategic importance of time in the competitiveness of an organisation, little research has been undertaken to explore the relationship between time management and overall business performance apart from Adebisi (2013) who explored the relationship between time management practices and business performance in Canadian SMEs. Our research builds on this by exploring the relationship that exists between time management practices adopted by SMEs and business performance.

Formality and Informality in SMEs

Mckiernan and Morris (1994) argue that imposition of formal planning systems despite its flexibility is incongruous with the dominant culture of SMEs as the formal mechanisms may restrict entrepreneurial flair and stifle innovation. This view is echoed by Sarasvathy (2001) and Brown et al., (2001). Wiklund and Shepherd (2005) undertook a meta analysis of past studies on business planning and organisational performance. They conclude that formal business planning has a stronger positive effect on established small firms than new firms. Leonidou and Katsikeas (1996, p. 535) identify a gradual shift from informal disjointed and unplanned approaches towards greater formalisation in SMEs export activities. In HR practices, Ram (1994, pp.161-2) notes, "the employment relationship (in smaller firms) is likely characterised by diffuseness, a high degree of informality and considerations beyond the cash nexus". Marlow and Patton (2002) investigated the employment relationships that exist between the owner and the employees of 45 small manufacturing businesses in the U.K. They identified blurred division between employees and employers wherein the owner takes the role of co-workers and develop a shared social relationship with no formal discipline policy which supports the notion of informality in employment relationship. Dex and Scheibl (2001) compared the flexibility of working arrangements of ten SMEs and four large organisations and small businesses. They identified that SMEs do not have formal policy about flexible working arrangements but did offer flexible working arrangements. From the literature it can be inferred that SMEs adopt an informal approach in business planning, employment relationships and flexible working arrangements.

Time Management and Business Performance

The philosophy of time management dates back to the 6th century AD after the invention of water clock and sun dials. It gained momentum after the introduction of trains where commuters were expected to be at the station at a specific time. Advances in time measurement have resulted in new business models such as High Frequency Trading wherein organisations trade stocks by holding them for milliseconds. The advent of industrial revolution has given birth to time allocation and productivity management. The need for time management has gained popularity as it is used for measuring employee performance and productivity. Time management has evolved constantly after Taylor's principles of scientific management which called for constant supervision and time measurement. Currently time management is used as a competitive tool by both individuals and organizations across the globe. The term "Time Based Competition" came into usage after the Stalks (1988) Harvard Business Review article titled "Time – The next source of competitive advantage". It is a broad based competitive strategy which emphasizes time as the major factor for achieving and maintaining sustainable competitive advantage. Various management philosophies such as Just in Time, Kanban, Activity Based Costing, PERT, and waiting line theory all attribute time as a source of competitive advantage. In the knowledge based economy, information is of no value if it is not timely. Hence it can be concluded that time management should be given utmost priority while managing a business. After a comprehensive review of literature on time management, Claessens et al., (2005) define time management as "behaviours that aim at achieving an effective use of time while performing certain goal-directed activities". Sim and Curatola (1999) after studying 83 American electronic manufacturing plants, conclude that firms can reduce manufacturing, warranty costs and increase their market share by effective time management. Lim and Seers (1993) identified a positive relationship between efficient allocation of time and business performance

through a survey involving 122 clothing manufacturing units in the USA. They used Gutek (1987) time dimensions and identified that efficient allocation of time is positively related to organizational performance.

Various studies have established the relationship between time management practices and job satisfaction, job stress and health (Orpen 1994; Macan 1996; Griffiths, 2003). Despite the importance of time management, Nonis and Ford (2005) argue that time is perceived differently across cultures. Western cultures view time as linear and separable, capable of being divided into units and emphasise 'doing one thing at a time' (Monochronics) where as eastern cultures view time as naturally occurring and emphasise 'doing many things at one time' (Polychronics). They conclude that the effects of time management practices will be more for Polychronics than for Monochronics. This is important as organisations are encouraging Polychronic behaviour due to intense competition. Brynjolfsson (2003) argues that a significant positive correlation exists between IT investment and productivity. In the context of SMEs, it is well documented that IT enhances productivity and competitiveness (Manochehri et al., 2012, Sabbagh et al., 2012). Governments across the world have allocated huge funds for digitising SMEs. Productivity is improved as these systems streamline business processes, improve information visibility, automate transactions and enforce discipline amongst employees, as it promotes standardisation and formalisation. Time Management can be accomplished by two ways: first,, at a personal level it relates to how employees manage their time effectively; second, from an organisational level, time management can be accomplished by adopting Information Systems which ensure that employees accomplish tasks within a given time period. Matthews (2007) group IT adoption in three categories; Basic, minimal use of IT; Substantial, using several applications and machines; and Sophisticated, integrated various systems and constantly developed use of technology. With the advent of Cloud computing, we have added more and hence categorised IT adoption as Cloud based applications, on site / hosted applications, basic spreadsheet applications and paper based systems. We argue that organisations that have implemented integrated software systems will have formal processes which would demand employees undertaking activities in specific time and hence more formal in managing their time. We undertook in-depth case studies of five SMEs and concluded that SMEs with Cloud computing systems, whilst not having formal time management systems (e.g. clocking systems), perceived their employees time to be better utilised.

Business performance is a multidimensional concept and an array of financial and non financial measures can be used as measures. Non financial measures can include factors such as satisfaction; contribution to society, better brand image etc., where as financial measures normally concern sales growth. Due to the multi dimensional nature of performance, a wide array of factors contribute to business performance such as entrepreneurial orientation (Wilklund and Shepherd, 2005), market orientation (Ali et al., 2005), gender (Kalleberg and Leicht, 1991), e-Business adoption (Wu et al., 2003), long range planning (Orpen, 1985), business support (Berry et al.,2006), leadership style (Yang, 2008), strategic flexibility (Guo and Cao, 2014).
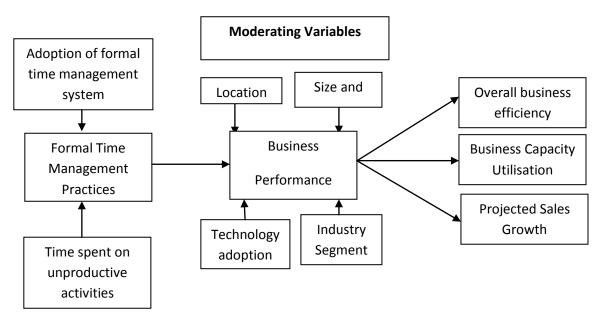
Development of hypotheses

The advent of the information age and globalisation has left organisations 'time scarce'. Hence organisations that can manage their time in an efficient way will enjoy improved business performance. Time can be managed efficiently if the organisation adopts a formal time management system; however, SMEs tend to adopt an informal approach in employee relationships, recruitment, planning and decision making. This paradox leads to the proposition of the following hypothesis:

"Formal time management practice is positively associated with improved business performance".

Since business performance is multi dimensional, we are proposing to measure performance in terms of overall business capacity utilisation, efficiency levels in comparison to industry average, time spent in non productive activities, time management efficiency and projected sales performance, Its worth emphasising that overall business performance is affected due to location, technology adoption, and industry segment and organisation size. In order to study the extent of formality in time management, we measured the following variables:

1. Time spent on non productive activities
2. Implementation of formal time management system
3. Adoption of Information and Communication Technologies

Figure 1 depicts the research framework developed for this study.

Figure 1: Conceptual framework highlighting the relationships between the variables

In order to fully explore the relationships, the original hypothesis has been dissected into the following:

The paper is based on the overriding hypotheses that:

H1: Formal time management practice (TMP) is positively associated with improved business performance relating to hard business growth measures for past (during the last year) employment and sales turnover and predicted business growth in terms of strong desire to grow and expectation for employment and sales turnover growth (in the next year).

There are three other measures of business performance which may be related to business growth and these are in-turn tested:
H2: Business efficiency which is at above the industry average will relate to (a) higher levels of TMP systems (e.g. Cloud and in-house software) and (b) will lead to improved business growth.
H3: Higher levels of Business capacity utilisation (at 90% and above) will relate to (a) higher levels of TMP systems (e.g. Cloud and in-house software) and (b) will lead to improved business growth.
H4: Lower levels of Non-productive time (10% or less of typical average weekly employee activity in the business) will relate to (a) higher levels of TMP systems (e.g. Cloud and in-house software) and (b) will lead to improved business growth.
The paper then specifically looks at the interrelationship between these four measures (Formal TMP, Efficiency, Capacity Utilisation and Non Productive time) to see which measures, controlling for other industry factors (e.g. business and management characteristics), impact most on business growth. Here we test one further hypothesis in five ways:

H5: That formal TMP, above average industry Efficiency, high capacity utillisation and low non-productive time, will positively assist business growth in terms of:

   (a) recent sales turnover growth (in the last year)

   (b) recent employment growth (in the last year)

   (c) predicted business growth (in the next year)

   (d) predicted sales turnover growth (in the next year)

   (e) predicted employment growth (in the next year)

Methodology

As indicated earlier, the main objective of this research is to explore the relationship between time management practices and business performance. Survey methodology was deemed to be appropriate as this research aims to identify relationships between variables. This research is based on self-reported data from the owner-managers of 757 UK SMEs with less than 250 employees, collected using Qualtrics online software. The sample was recruited through online channels (involving circa 10,000 emails to relevant businesses) promoted via relevant UK trade associations and promoted by the survey company on a pay per completion basis (ranging from £5 to £500, depending on the size, scale and quality of survey contributions). The survey was quota driven in order to ensure UK regional coverage, a minimum of 200 valid business responses in each of three broad sectors (manufacturing, wholesale and distribution, business services) that are the focus of the study, and sufficient responses across four broad employment size groups (micro businesses with 1-10 employees; 11-40 employees (small); 41-100 (smaller medium-sized businesses); 101-249 (larger medium-sized businesses), in order for sufficient larger medium sized business representation (avoiding micro/small size bias). Table A, presents the broad sector and employment size breakdown for the final survey sample. Surveys were initially piloted on a 5% sample, to ensure questions were consistently understood and that responses were as expected (there were no survey routing issues). The survey was completed in October 2014 and, after data checking, analysed in SPSS.

Table 1: Broad Sector by Employment Size

Sector	Manufacturing	Wholesale and Distribution	Business Services	Total
Employment	Col%	Col%	Col%	N=
1-10 employees	38	41	45	314
11-40 employees	30	37	40	273
41-100 employees	24	18	12	133
101-249 employees	8*	4	3	37
N=	250	293	214	757

Sig *<.05level

Table 1 presents the overall broad sector and employment group distribution in the survey. It suggests a sufficiently robust sampling for this analysis, but demonstrates a significantly greater proportional presence of larger employer businesses in the manufacturing sector, requiring controlling by regression analysis.

Approach

The survey instrument was designed to initially collect business profile information (sector, trading age, regional location, employment size, and annual turnover), management data (gender, number of managers) and growth orientation (employment and sales turnover change in the last year and predicted change over the next year). The survey then focused on four key measures which are hypothesised to contribute to business performance:

(i)   **Adoption of formal time management practices** (TMP) – which is measured in terms of the level of sophistication of the systems and practices currently in place in the business.

(ii)   **Business efficiency** – this is established through a symmetrical 5 point Likert type scale (explained fully later), which could also be used as baseline for further longitudinal research developing a balance scorecard approach (Kaplan and Norton, 1992);

(iii) **Business capacity utilisation** – calculated as the proportion of full capacity that the business is currently operating at.

(iv)   **Non-productive time** – calculated as the proportion of time currently in a typical working week spent by the labour force on non productive activities.

The paper proceeds by fully introducing and examining each of the four key measures and exploring them initially in terms of descriptive analysis of the key business, management and growth characteristics that they are associated with and, in terms of TMP, the degree of impact that this has had on improving each of the other measures. In order to better understand the interaction of various characteristics, binary logit regression models were used to sift out the strongest causal relationships (explanatory factors, see appendix tables), an

approach frequently adopted for such analysis (e.g. Baldock et al., 2006; North et al., 2013). Having completed the first part of the analysis, the paper then explores the more detailed interrelationship between the four measures and businesses growth by undertaking a series of binary logit regressions to explore which measures have greatest explanatory power.

1. **The adoption of formal time management practices (TMP)**

Our starting point is to examine the extent to which formal time management practices (TMP) have been taken up. The study contained two key measures; first a specific question asking whether the business currently uses formal TMP systems and, second, we asked the business managers to indicate what practices they undertake to manage business operations. This explored whether at the more formalised level they use Cloud software, or in-house software (e.g. business and financial software), more basic adoption of generic spreadsheet software (e.g. Excel) approaches, or informal manual *ad hoc*, 'pen and paper' and 'discussion approaches'. The headline finding is that **only 4% of businesses indicated that they use formal TMP systems** and these split evenly between Cloud and on-site software systems. However, when the managers were asked 'when it comes to managing your business and finances, what systems you mostly use', they indicated a far greater use of formal systems, and this would appear to be a more robust explanatory measure. Table 2 provides a breakdown of responses by business, management and growth orientation characteristics.

Here we see that Cloud based systems have been adopted by almost one fifth (19%), with on-premises software adopted by almost a further two fifths (39%), with generic spreadsheet approaches used by a further 29% and just over one in ten (11%) adopting informal *ad hoc* approaches and 2% indicated no systems or approach.

This descriptive analysis reveals some significant differences in the overall use of software systems (i.e. ranging from Cloud to Excel) for TMP, which could be a useful proxy indicator of formal TM practices. This is notable (significant <.001) with regard to the **size of businesses**, with smaller businesses less likely to have adopted formal software for TM: micro businesses with 1-10 employees had 74% adopters, compared to 95% plus for other size groups; only 71% of businesses with annual sales turnover under £100k were adopters, compared to 90% plus in other size groups; 98% of businesses with fives or more managers were adopters, compared to 84% with fewer managers. The **trading age** of the business also appears significant, with younger businesses being significantly (<.01 level) more likely to adopt; 86% plus of age groups under trading less than 20 years, compared to 69% for older established businesses.

The relationship between formal TM systems and growth

Overall, just over three fifths (62%) of surveyed businesses grew their sales in the previous year, with one in twelve (8%) declining in sales. Just over half (53%) increased their employment in this period (median growth 10 employees), whilst almost one in ten (9%) contracted in employment size (median decline of 9 employees).

We are particularly interested in exploring the relationship between the adoption of TMP systems and business growth. A key finding is that those businesses increasing their employment in the last year were significantly (<.001 level) more likely to be software adopters (94%) for TMP, although sales growth was not significantly associated. **Growth orientation,** however, appears to be a good predictor, with those aiming for significant growth in the next year far more likely to be adopters (92%) compared to those not aiming for growth (66%) (significant at <.001 level). Also, those predicting future sales turnover growth in the next year were significantly (<.05 level) more likely to be adopters (89% plus in sales growth groups, compared to 76% of static and declining sales predictors).

Undertaking a binary logit regression (Appendix Table A1 model(i)) to examine the potential growth impact of adopting TMP systems on growth, whilst controlling for other business and management characteristics, we find that higher level software adoption (Cloud and in-house, excluding spreadsheet software) **is positively significantly related (<.05 level) with employment growth and predicted sales growth (.1 level)**, but that the smallest businesses including micro businesses (<.01 level) and those with annual sales turnover of under £100k (<.001 level) are most influential in not adopting higher order software, along with female-led (<.01 level). Repeating the regression model (Table A1(ii)) for Cloud only extends the significant negative adoption correlation (<.01 level) to businesses with 40 or fewer employees, and is only significantly correlated (<.001

level) with future growth, whilst confirming that larger management teams (of 5 or more) are significantly (<.01 level for Cloud and <.05 level for Cloud and in-house) related to higher order software adoption for TMP.

Table 2: TM Practices by Business, Management and Growth Characteristics

	Cloud	On-premises software	Spreadsheet	Manual	None	Total
Sector	Row%	Row%	Row%	Row%	Row%	N=
Manufacturing	27	26	34	10	2	250
Wholesale and Distribution	13	43	32	9	2	214
Business Services	17	39	28	13	3	293
Employment Size						
1-10 employees	8	23	43	22***	4	314
11-40 employees	16	59	20	5	0	273
41-100 employees	42	35	19	2	2	133
101-249 employees	54	38	8	0	0	37
Sales Turnover Group						
<£100k	8	21	43	23***	6	256
£100k to £249k	22	45	23	9	0	202
£250k to £2.19m	24	50	23	3	0	240
£2.5m+	37	51	10	2	0	59
UK Region						
London	31	41	20	7	2	138
South East	13	41	34	10	2	88
East of England	22	24	38	14	3	37
South West	16	21	37	23	2	43
East Midlands	16	25	47	9	3	75
West Midlands	12	33	40	12	3	58
North East	26	53	14	4	3	73
North West	16	44	24	14	3	110
Yorkshire and Humber	8	58	23	12	0	52
Scotland	31	29	29	10	2	42
Wales	9	35	35	22	0	23
Northern Ireland	7	44	28	22	0	18
Trading Age						
<5 years	19	38	30	10	3	303
5-9 years	23	37	31	8	2	260
10-19 years	17	44	26	14	1	133
20+ years	10	36	23	26**	5	61
Management						
Female led	9	32	42	15	3	136
5+ managers	40	43	14	2***	0	141
Growth Orientation						
Sig seeking growth	37	33	22	6	2	189
To some extent	15	43	30	12	2	515
Not at all	4	17	45	26***	8	53
Performance in last year						
Increased employment	23	49	21	6	1	398
No change	10	27	40	19***	4	295
Reduced employment	36	30	23	8	3	64
Sales up >25%	26	36	26	8	4	132

Sales up 11-25%	21	44	27	7	1	138
Sales up 1-10%	21	48	24	6	1	195
No change	12	34	35	16	3	215
Sales down	21	25	31	22	1	77
Predicted performance in next year						
Increased employment	23	40	28	8	1	222
No change	10	33	38	18	5	280
Reduced employment	27	47	19	7	1	255
Sales up >25%	24	37	28	9	2	129
Sales up 11-25%	28	37	30	3	1	153
Sales up 1-10%	15	54	24	7	1	198
No change	15	31	30	19*	5	218
Sales down	15	24	37	22*	2	59

Note: * Sig <.05; ** sig < .01; *** Sig <.001

These findings suggest the need to consider how business and management characteristics interact with the growth performance of these businesses, also bringing into consideration linkages with other associated performance measures including business efficiency, capacity utilization and unproductive time. We proceed by considering each measure, before embarking on a series of binary logit interaction models to test our hypotheses.

2. Business Efficiency

Business efficiency has been self assessed by the respondent businesses, using a Likert type scale, following the balanced scorecard principles of Kaplan and Norton (1992). In our original study we examined 19 different forms of business operational efficiency ranging through management, marketing, procurement, administration and environmental management. Data were collected using a balanced five point rating scale where: 1= very poor (well below the industry norm), 2= poor (below the industry norm), 3= average (i.e. at the current industry norm), 4= good (above the industry norm), 5 very good (well above the industry norm – industry leading practices). At the end of the series of questions the surveyed owner managers were asked to consider their previous responses and to state their overall business efficiency position. By using the perceived industry 'norm' as a benchmark, the aim was to get an overall assessment of business efficiency.

Here we focus on the overall business efficiency assessment (Table 3), which may be considered more powerful in view of the preceding multiple line of questioning (Wilcox, 2005). It is notable that only 6% rated themselves at below their industry efficiency norm, whilst almost (47%) rated themselves at above the norm and one in ten rated their business as well above the norm. This may suggest a degree of reporting bias, but given the scale of the dataset, piloting of questions, and controls used in the analysis, the overall (within dataset) significant trend findings should be robust (Wilcox, 2005; Austin et al, 1998).

Binomial aggregate analysis of the positive (or negative) responses indicates a number of significant factors influencing business efficiency. **Growth** in sales turnover during the last year is significantly (<.05 level) related to above industry average efficiency (53% on average, indicated above industry average efficiency) and future growth orientation for those strongly seeking this is highly significant (<.001 level; 68% reported above industry average efficiency), along planning future increase in employment (<.01 level; 61% reported above industry average efficiency).

Examining the potential influence of **formalised TM systems** whilst the use of software is not a significant factor, the adoption of Cloud (68% of adopters reported above industry average efficiency) is highly significantly (<.001 level) associated with greater efficiency. However, these **findings are again nuanced** by other business factors, with manufacturing (54% reported above industry average efficiency) reporting significantly (<.05 level) greater efficiency than the other two sectors, whilst smaller businesses, with less than 40 employees (notably in the 11-40 employee category where just 38%, significant at <.001 level, reported above industry average efficiency) were less likely to report above average industry levels of efficiency than larger businesses. Conversely, the businesses with highest annual sales turnover, of above £2.5m, were

significantly (<.001 level) more likely to report above industry average efficiency (78%). Again, these nuances suggest a need to explore these data further, using regression analysis.

Undertaking a binary logit regression (Appendix Table A1(iii)) to examine the potential growth impact relationship of operating at above industry average efficiency, whilst controlling for other business and management characteristics, we find that it is **significantly positively associated with increased annual sales turnover** (<.05 level) **and a strong predictor of future growth** (<.001 level for those with strongest future growth orientation), including future employment increase (<.01 level). **Adoption of Cloud was also strongly correlated with above industry average efficiency** (<.01 level). There were also some significant business characteristics, including smaller businesses being significantly less efficient, notably those with annual turnover of under £100k (<.01 level) and those in the 11-40 employee group (<.05 level), as well as younger businesses trading for less than 5 years (<.05 level) and those located in the North East (<.01 level).

Table 3: Business Efficiency by Business, Management, Growth and TM systems

Rating scale:	1 (v poor)	2 (poor)	3 (norm)	4 (good)	5 (v good)	Total
Sector	Row%	Row%	Row%	Row%	Row%	N=
Manufacturing	0%	7%	39%	40%	14%*	250
Wholesale and Distribution	0%	4%	54%	38%	5%	214
Business Services	1%	4%	50%	35%	10%	293
Employment Size						
1-10 employees	1%	6%	49%	36%	8%	314
11-40 employees	0%	5%	58%	32%	6%***	273
41-100 employees	0%	4%	32%	49%	16%	133
101-249 employees	0%	3%	19%	51%	27%	37
Sales Turnover Group						
<£100k	2%	7%	53%	32%	7%	256
£100k to £249k	0%	5%	42%	43%	11%	202
£250k to £2.19m	0%	5%	53%	35%	8%	240
£2.5m+	0%	2%	20%	56%	22%***	59
Trading Age						
<5 years	0%	7%	52%	33%	8%*	303
5-9 years	0%	6%	43%	40%	10%	260
10-19 years	0%	1%	46%	47%	7%	133
20+ years	3%	2%	48%	30%	18%	61
Management						
Female led	0%	3%	56%	35%	7%	136
5+ managers	0%	6%	40%	38%	16%*	141
Growth Orientation						
Sig seeking growth	1%	4%	27%	48%	20%***	189
To some extent	0%	5%	55%	34%	5%	515
Not at all	2%	5%	43%	32%	17%	53
Performance in last year						
Increased employment	0%	5%	45%	41%	10%	398
No change	1%	6%	51%	34%	9%	295
Reduced employment	2%	5%	50%	33%	11%	64
Sales up >25%	1%	4%	42%	38%	16%*	132
Sales up 11-25%	0%	2%	44%	44%	9%*	138
Sales up 1-10%	1%	6%	42%	45%	7%*	195
No change	1%	5%	59%	30%	7%	215
Sales down	1%	12%	46%	29%	13%	77
Predicted performance in next year						
Increased employment	1%	3%	36%	51%	10%**	222

No change	1%	5%	53%	34%	8%	280
Reduced employment	0%	8%	51%	31%	11%	255
Sales up >25%	1%	4%	41%	40%	15%	129
Sales up 11-25%	1%	6%	37%	44%	13%	153
Sales up 1-10%	1%	2%	51%	40%	7%	198
No change	1%	4%	59%	30%	7%	218
Sales down	0%	19%	37%	37%	7%	59
TMP systems						
Use software	0%	5%	47%	38%	10%	656
Use Cloud	0%	2%	30%	46%	22%***	145

3. Business Capacity Utilisation and Non Productive Time

The third part of our analysis examines business capacity utilisation. The surveyed owner-managers were asked 'To what extent do you consider that your business is working to its full capacity?' Responses were recorded into percentage groups relating to the current overall capacity of the business. We also introduce the concept of non-productive time, which is calculated by the owner-managers as the estimated proportion of weekly time spent by staff on management and administrative tasks (e.g. dealing with regulations and taxes, rather than production, service and marketing to clients[1]).

The headline finding here is that **less than half of the surveyed businesses are currently at or close to full capacity**; 47% are at 90% or above capacity, with one in seven (15%) at full capacity and a similar proportion (16%) at below three quarters of capacity.

With regard to **growth performance**, capacity appears to be a less good indicator[2], with no significant findings in relation to growth in sales or employment in the last year. It is only **significantly** (<.001 level) associated with those strongly predicting growth in the next year (62% were at 90% or more capacity). It is **highly significantly** (<.001 level) associated with the adoption of **Cloud** (66% at 90% plus capacity were Cloud adopters). There is still **some nuance** found in respect of business characteristics, with smaller businesses performing less well and those in the 41-100 employee group performing significantly (<.01 level) better with 62% at 90% or above capacity. Also, those businesses with the highest annual sales turnover, at £2.5m and above, were significantly (<.01 level) more likely to be at 90% or above capacity (72%). Female-led businesses were significantly (<.1 level) less likely to be at or above 90% capacity, with just 42% achieving this. Although not significant, only 42% of the business services sector was at 90% or above capacity.

Undertaking a binary logit regression (Appendix Table A1(iv)) to examine the potential growth impact relationship of higher capacity utilisation (at 90% or above), whilst controlling for other business and management characteristics, we find that it is significantly positively related to strong predictions of future growth (<.05 level) and the adoption of Cloud (<.01 level), as well as in the Scottish, South West and West Midlands regions (all below .05 level). It is significantly negatively correlated with smaller annual sales turnover businesses (at below £2.5m), particularly those below £100k annual sales turnover (<.01 level).

Non Productive Time

Turning to non productive time, one quarter of surveyed owner-managers reported 5% or less non-productive time, whilst more than one third (37%) report this to be between 6-10% and just over one in eight (13%) report that it takes up over one fifth of the typical working week. Intriguingly, the upper quartile (5% or less no-productive time) is not a predictor for **growth**, however, those spending more than one fifth of their time on non productive activities are significantly (<.001 level) associated with declining sales turnover in the last year (27% declining sales turnover businesses) and significant (<.1 level) in declining employment (16%). When we examine predicted growth over the next year, it those the strongest growth aim that are significantly (.01 level) more likely to exhibit most non-productive time, although it is significantly (.01) associated with sales decline where one fifth have 20% or more non-productive activity. It is also evident that Cloud adopters are

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[1] Time during which useful work is performed during and operation or process (McGraw-Hill, 2003)
[2] Using binomial chi-square analysis for 90% plus capacity versus less than 90% capacity

significantly (<.05 level) associated with high levels of non-productive activity (only 18% of adopters have 5% or less non-productive time, whilst for 19% it represents over one fifth of their time).

Table 4: Impacts on Non-Productive Time where 10% or less

Capacity:	100%	90-99%	75-89%	<75%	D/K	Total
Sector	Row%	Row%	Row%	Row%	Row%	N=
Manufacturing	20%	34%	24%	19%	2	250
Wholesale and Distribution	13%	36%	36%	12%	4%	214
Business Services	13%	27%	37%	17%	6%	293
Employment Size						
1-10 employees	17%	23%	39%	27%	8%	314
11-40 employees	9%	38%	44%	8%	2	273
41-100 employees	21%	41%	29%	9%	1%	133
101-249 employees	24%	30%	32%	14%	0%	37
Sales Turnover Group						
<£100k	18%	19%	22%	32%	9%	256
£100k to £249k	15%	38%	36%	10%	1%	202
£250k to £2.19m	10%	37%	42%	9%	3%	240
£2.5m+	25%	46%	25%	2%	2	59
Trading Age						
<5 years	16%	33%	31%	17%	4	303
5-9 years	15%	30%	37%	15%	3%	260
10-19 years	16%	33%	29%	18%	5%	133
20+ years	12%	33%	28%	16%	12%	61
Management						
Female led	16	24	35	20	4%	136
5+ managers	18%	33%	34%	9%	0	141
Growth Orientation						
Sig seeking growth	30%	31%	22%	15%	2	189
To some extent	9%	34%	37%	15%	5%	515
Not at all	23%	15%	21%	32%	9%	53
Performance in last year						
Increased employment	13%	36%	38%	12%	2%	398
No change	18%	26%	26%	22%	8%	295
Reduced employment	19%	33%	27%	20%	2%	64
Sales up >25%	31%	35%	20%	14%	1	132
Sales up 11-25%	11%	34%	40%	15%	0	138
Sales up 1-10%	9%	39%	42%	10%	1	195
No change	15%	26%	30%	18%	12%	215
Sales down	14%	22%	23%	35%	5%	77
Predicted performance in next year						
Increased employment	15%	39%	32%	13%	2	222
No change	17%	27%	25%	22%	8%	280
Reduced employment	14%	31%	40%	13%	2%	255
Sales up >25%	30%	32%	25%	14%	0%	129
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No change	17%	25%	28%	19%	11%	218
Sales down	8%	19%	29%	39%	5%	59

TMP systems						
Use software	16%	33%	34%	15%	2%	656
Use Cloud	25%	40%	23%	10%	2	145

These findings are clearly highly nuanced and the explanation may well be that smaller firms, which are generally poorer performing in the survey, are also those that significantly have less non-productive time; a high proportion (35%, significant at <.05 level) of micro businesses have only 5% or less non-productive time, and this rises to 39% (significant at <.001 level) for those with annual sales turnover of under £100k. The indication here is that larger businesses spend more time planning and actually set-aside time for this, whereas smaller businesses, which often only have one or two managers that are also actively engaged in a range of productive activities do not have time for strategic management which might lead to greater formalisation and efficiency; those businesses with five or more managers were significantly (.01 level) more likely to spend more than one fifth of their time on non productive activities (18%). This is to some extent underlined by the significantly (<.01 level) higher proportion (66%, compared to two fifths of other businesses) of the owner-managers of the largest businesses (with at least £2.5m annual sales turnover) stating that an important element of their management is to allocate sufficient time to consider operational improvements. Conversely, the smallest businesses are significantly (<.001 level) less likely to adopt any specific time management practices (19% of micro businesses, compared with 46% of larger businesses; 17% of those with less than £100k annual sales turnover, compared with 40% of larger businesses).

Since the relationship between the amount of time spent on non-productive activity has an unclear (complex) relationship with business growth, **it is unsurprising that the binary logistic model is very weak**, with the only significant finding for those businesses with less than 20% non-productive time being a negative correlation with micro businesses (<.1 level). Perhaps, unsurprisingly, there is also a negative relationship between those businesses with 5 or more managers and having less non-productive time (<.15 level), perhaps relating to the need for management meeting time.

Overall, our findings thus far suggest that business size and management structure, alongside the adoption of higher level TMP (notably Cloud) is likely to be a highly influential factor on the overall performance of the surveyed businesses (across all sectors).

4. Key Factors Influencing Business Growth

Having completed the first part of the analysis, we now explore in more detail the interrelationship between our four measures of factors potentially influencing businesses growth by undertaking a series of binary logit regressions to explore which measures have greatest explanatory power. Five regression models were run to test for significant relationships to: (i) sales turnover growth in the last year; (ii) employment growth in the last year; (iii) strong aims for business growth in the next year; (iv) predicted sales turnover growth in the next year; (v) predicted employment growth in the next year.

Turning first to sales growth during the last year, Table 5 (model (i)) demonstrates that, controlling for business characteristics, and our 4 measures (TMP – adoption of Cloud and Adoption of other in-house software, Efficiency – where above industry average, Capacity utilisation – where 90% or above, and Non-Productive activity time – where 10% or less), that this is positively significantly related to employment growth (<.01 level), predicted sales growth in the next year (<.001 level), younger businesses trading less than 5 years (<.05 level) and to above average industry levels of efficiency (<.1 level), whilst those located in Wales (<.05 level) and Scotland (<.1 level) are negatively correlated.

Our binary logit regression for **employment growth** (Table 5 (ii)) demonstrates that this is significantly related to sales growth (<.01 level) and predicted future employment growth (<.05 level). It is also **positively correlated with the adoption of in-house TMP software** (not Cloud), whilst above industry average business efficiency is the most strongly correlated of our other 4 measures (<.15 level). Businesses located in the North East are significantly related to employment growth (<.05 level), as are those that are **female-led** (<.05 level) and **younger businesses trading under 10 years** (<.01 level). Negative significant correlations were recorded for smaller businesses, including micro businesses (<.001 level) and those with annual sales turnover of under £100k (<.05), as well as manufacturing businesses (<.01 level).

The first of our predicted growth dependent variables refers to overall **strong expectation of growth during the next year**. This model (Table 5(iii)) reveals significant positive correlation with **efficiency** at above industry average levels (<.01 level), **capacity** at 90% or above (<.05 level), the adoption of **Cloud** (<.05 level), and with expectations for future sales turnover growth (<.05 level). With regard to business characteristics, there were positive significant correlations for **smaller sales turnover** businesses (<.01 level for those with annual sales turnover under £100k and <.05 level for those with annual sales turnover of between £100k-£499k), **younger businesses** trading for under 10 years (<.01 level for those trading under 5 years and <.05 level for those trading 5-9 years) and those businesses located in Scotland (<.1 level). However, smaller businesses, including micro businesses (<.001 level) and those with 11-40 employees (<.05 level) were negatively significantly correlated.

Unsurprisingly, the regression model for **future sales turnover growth** (Table 5(iv)) is positively significantly correlated with sales turnover increase in the last year (<.001 level), to strongly predicted growth (<.05 level) and predicted employment increase in the next year (<.01 level). The smallest annual sales turnover group (<£100k) exhibited a significant negative correlation (<.1 level).

Finally, turning to predicted employment growth during the next year, Table 5(v) presents the binary logit regression model indicating that this is positively significantly correlated with employment growth in the last year (<.05 level) and predicted sales turnover increase during the next year (.01 level), with above industry average efficiency the only one of our 4 measures that is significant (<.05 level). The manufacturing (<.01 level) and wholesale and distribution (<.05 level) sectors are both positively significantly correlated with future predicted employment growth, as are businesses trading for under 5 years (<.01 level). Smaller businesses, with sales turnover of below £2.5m are all negatively significantly correlated (those with under £500k <.05 level; those with £500k to £2.5m <.01 level).

Summary Findings, Discussion and Policy Implications

The individual hypotheses tests for each of these measures (using binary logit regression models) produced mixed results (Table 6). Appendix A2 provides a summary of the relationships (and significance of correlations) that exists between various variables.

The adoption of TMP (Only 4% have specific formal TMP) related software and notably Cloud is significantly related to business growth, but is impeded by non adoption amongst smaller businesses and in some regions. Business efficiency is significantly related to business growth and is enhanced by Cloud and in house TMP software. However, it is negatively correlated with smaller businesses, particularly in the 11-40 employment group, and by younger businesses trading less than 5 years. Higher business capacity utilisation is significantly related to Cloud TMP, notably in some regions, and is significantly related to strong future growth, but negatively correlated with smaller firms with under £2.5m sales and notably those with under £100k annual sales turnover.

Hypothesis four can be completely rejected on the basis that there is no significant relationship between TMP or growth orientation and proportionally lower levels of non-productive time. The descriptive findings suggest that this relationship is 'complex', due to larger firms with more than five managers significantly allocating more time to business planning and TMP, whilst smaller businesses where owner-managers are part of small management teams with active hands-on roles in delivering the business product or service are, therefore, unable to find the time to allocate to TMP.

Hypothesis five relating to the interrelationship between the four measures and past and future growth also reveals mixed results, but some key overriding and significant findings. Above average industry efficiency is the most significant factor in the study, contributing to most forms of business growth (past and future). This is significantly enhanced by higher order TMP, and notably Cloud, but Cloud appears to have most significant effect on future predictions. This might suggest that some Cloud users are relatively recent adopters and have yet to see the improvements that they expect to experience. This view is supported to some extent by five parallel case studies that were also undertaken for the research, where some early adopters mentioned that "*it was more upheaval and complicated transferring to a Cloud system than initially envisaged*", but that "*once in place and operating smoothly, the Cloud offered hugely improved real time management at distance.*"

		(i) Past Sales Performance (Regression Model is 82% correct; Nagelkerke R Square .473)		(ii) Past Employment Performance (Regression model is 78% correct and Nagelkerke R Square .446)		(iii) Strong aims for business growth (Regression model is 79% correct and Nagelkerke R Square .332)		(iv) Predicted Sales Growth (Regression model is 81% correct and Nagelkerke R Square .485)		(v) Predicted Employment Growth (Regression model is 74% correct and Nagelkerke R Square .213)	
		B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Step 1a	Emp_up	0.632	0.008	N/A	N/A	0.144	0.537	0.364	0.141	0.511	0.016
	Growth_strong	0.183	0.489	0.102	0.664	N/A	N/A	0.633	0.025	0.159	0.464
	Predict_emp up	0.349	0.144	0.474	0.025	0.184	0.394	0.725	0.004	N/A	N/A
	Predict_sales up	2.486	0	0.342	0.159	0.684	0.013	N/A	N/A	0.733	0.004
	Use_Cloud	0.042	0.896	0.102	0.723	0.637	0.029	0.003	0.992	-0.215	0.446
	Use_soft	-0.054	0.834	0.756	0.001	-0.151	0.57	0.391	0.136	-0.207	0.373
	Empgr1 (1-10)	0.075	0.892	-2.102	0	-1.993	0	-0.229	0.714	0.113	0.812
	Empgr2 (11-40)	0.412	0.417	-0.832	0.098	-1.12	0.012	-0.443	0.444	0.246	0.57
	Empgr3 (41-100)	0.343	0.499	-0.686	0.169	-0.361	0.411	-0.896	0.113	0.206	0.632
	Salesgr1 (<£100k)	0.351	0.476	-1.095	0.016	1.53	0.002	-0.9	0.089	-1.086	0.01
	Salesgr2 (100-499)	0.689	0.111	-0.464	0.246	0.833	0.041	-0.574	0.218	-0.831	0.021
	Salesgr3 (500-2.5m)	0.684	0.104	-0.023	0.953	0.147	0.716	-0.519	0.251	-0.967	0.006
	Tradinggr1 (<5yrs)	0.878	0.043	1.536	0.001	1.655	0.007	0.581	0.166	0.916	0.05
	Tradingr2 (5-9 yrs)	0.584	0.179	1.355	0.003	1.235	0.044	0.254	0.547	0.675	0.145
	Tradingr3 (10-19 yrs)	0.644	0.154	0.559	0.241	0.938	0.141	-0.353	0.42	0.123	0.803
	Female led	0.107	0.699	0.616	0.016	0.001	0.996	-0.165	0.551	-0.239	0.334
	Managers more (5+)	0.032	0.914	-0.11	0.684	0.243	0.398	-0.227	0.441	0.036	0.889
	Manufacturing	0.235	0.339	-0.659	0.005	0.2	0.407	-0.005	0.982	0.669	0.003
	Whole_dist	0.309	0.229	-0.417	0.086	-0.059	0.824	0.235	0.376	0.543	0.02

Table 5: Regression Model highlighting the relationships between controls and moderating variables

	Coef	p	Coef	p	Coef	p	Coef	p	Coef	p
East Mid (EM)	-0.717	0.161	0.773	0.094	-0.414	0.43	0.102	0.834	0.079	0.859
East Eng (EE)	-0.602	0.325	1.122	0.042	-0.224	0.708	0.982	0.139	0.598	0.244
London	-0.383	0.417	0.421	0.309	0.447	0.308	0.204	0.65	-0.112	0.781
N.East	-0.715	0.17	1.285	0.01	-0.419	0.421	0.476	0.353	-0.487	0.292
N.West	-0.488	0.306	0.346	0.422	-0.335	0.483	0.183	0.69	0.06	0.885
N.Ireland	-0.626	0.425	0.204	0.77	-1.749	0.12	0.593	0.444	0.588	0.351
Scotland	-1.123	0.051	0.267	0.61	1.029	0.056	0.11	0.849	0.11	0.828
S.East	-0.783	0.109	0.337	0.45	0.37	0.435	0.23	0.63	0.175	0.68
S.West	-0.529	0.379	0.384	0.491	0.025	0.965	-0.068	0.908	0.305	0.552
Wales	-1.5	0.024	-1.053	0.141	-0.746	0.339	0.744	0.268	0.649	0.283
W.Midlands	-0.1	0.853	0.413	0.395	-0.719	0.205	-0.016	0.976	-0.184	0.704
Capacity_top	0.105	0.62	-0.319	0.108	0.477	0.022	0.256	0.233	0.034	0.854
Efficiency_above	0.413	0.064	0.301	0.108	0.753	0.001	0.157	0.485	0.508	0.01
NonProductive10%<	-0.069	0.745	-0.045	0.148	0.056	0.786	-0.227	0.293		
Constant	-2.622	0.002	-0.578	0.479	-3.657	0	-0.878	0.32	-2.465	0.002
Sales_Up	N/A	N/A	0.638	0.007	0.232	0.386	2.498	0	0.394	0.105

Table 6: Summary of Hypotheses Results

H1: Formal time management practice (TMP) is positively associated with improved business performance (recent past and near future): Result: **qualified yes** – positive correlation with employment growth and future sales turnover, Cloud adoption a strong predictor of future growth, particularly in larger businesses with larger management structures. Negative correlation with smaller <£100k sales businesses, some regional variation (non adopters in East Midlands and East of England, adopters in London and Scotland).
H2: Business efficiency at above industry average will relate to (a) higher levels of TMP systems (e.g. Cloud and in-house software) and (b) lead to improved business growth. Results: **qualified yes** – (a) Cloud also a positive factor. (b)Positive correlation with increased sales and growth prediction including employment. Negative amongst smaller businesses with less than 40 staff, particularly 11-40 group, younger trading under 5 years and in N.East.
H3: Higher Business capacity utilisation (90% and above) will relate to (a) higher levels of TMP systems and (b) lead to improved business growth. Results: **qualified yes** – (a) Cloud positively related, particularly in Scotland, S.West and W.Midlands. (b) Predictor of strong aim for future growth. Negative correlation with smaller firms under £2.5m sales, particularly those under £100k sales.
H4: Lower levels of Non-productive time (10% or less) will relate to (a) higher levels of TMP systems and (b) lead to improved business growth Results: **rejected** – there is no clear indication of causal link between higher level TMP adoption or other measures and lower non productive time. The relationship is 'complex' with a negative relationship fro micro businesses, but also those with 5 or more managers.

H5: Formal TMP, above average industry Efficiency, high capacity utillisation and low non-productive time, will positively assist business growth re:
    (a) recent sales turnover growth (in the last year) – **qualifies yes**
    (b) recent employment growth (in the last year) – **qualified yes**
    (c) predicted business growth (in the next year) – **qualified yes**
    (d) predicted sales turnover growth (in the next year) - **rejected**
    (e) predicted employment growth (in the next year) – **qualified yes**
 	
Results: the iteration regression models demonstrated that **above average industry efficiency** is the most frequently significant factor in relation to past sales growth, future strong growth prediction and future employment growth. **Formal TMP** is significant in past employment growth (in-house software) and strong future growth prediction (Cloud). A common negative correlation is found for smaller businesses, notably with 40 or fewer staff and those with under £100k sales.

Policy implications

Despite the limitations of being a cross-sectional study, our findings have considerable policy implications. They strongly indicate that business efficiency is associated with improved sales and employment performance, and that formal TMP systems (notably utilising higher level in-house and Cloud software) can make a significant impact in this respect. At present these impact findings are skewed towards larger businesses, with smaller businesses struggling to find the time to consider and adopt improved TMP. It is particularly evident that larger businesses are more willing to allocate time to adopting new systems and refining them, whereas the owner-managers of those businesses in the 11-40 employment size group which are dynamic and striving to grow, but do not yet have the management capacity, struggle to find time for their TMP (two fifths of businesses in this category). Furthermore, the smallest micro businesses were twice as likely (more than one in six) to state that they have no idea where to go to for assistance. These findings, along with some of the UK regional nuances found, suggest key areas for policy which could raise the UK's level of productivity.

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		(i)Impacts of Cloud or In-house software adoption for TMP on growth Reg Model 76% Correct; Nagelkerke R Square .397		(ii) Impacts of Cloud adoption for TMP on growth Regression model is 84% correct and Nagelkerke R Square .303		(iii) Impacts on above industry average Efficiency Regression model is 69% correct and Nagelkerke R Square .263		(iv) Impacts on Capacity Utilisation where 90% plus Regression model is 63% correct and Nagelkerke R Square .138	
		B	Sig	B	Sig.	B	Sig.	B	Sig.
Step 1 a	Empgr1 (1-10)	-1.884	.006	-1.610	.001	-.214	.668	.338	.063
	Empgr2 (11-40)	-.843	.208	-1.443	.001	-.978	.036	.225	.344
	Empgr3 (41-100)	-1.089	.108	-.416	.323	-.271	.568	.489	.463
	Salesgr1 (<£100k)	-1.808	.000	-.942	.049	-1.384	.001	-1.381	.133
	Salesgr2 (100-499)	-.898	.060	-.450	.249	-.779	.048	-.889	.193
	Salesgr3 (500-2.5m)	-.759	.106	-.191	.612	-1.086	.005	-.863	.302
	Tradinggr1 (<5yrs)	.089	.814	1.045	.052	-.707	.036	-.186	.610
	Tradingr2 (5-9 yrs)	-.531	.166	.682	.195	-.264	.430	-.352	.180
	Tradingr3 (10-19 yrs)	.127	.751	.258	.644	-.106	.761	-.173	.753
	Female_led	-.718	.003	-.700	.050	.046	.835	-.159	.468
	Managersmore (5+)	.597	.038	.715	.007	-.184	.467	-.366	.103
	Manufacturing	.150	.501	.279	.270	-.093	.643	.318	.359
	Whole_dist	.090	.691	-.438	.138	-.326	.123	.259	.806
	East Mid (EM)	-1.312	.002	1.042	.114	-.610	.132	.645	.319
	East Eng (EE)	-1.258	.016	1.383	.057	-.231	.634	.267	.269
	London	.020	.960	1.382	.022	-.170	.636	.487	.878
	N.East	.100	.832	1.441	.025	-1.115	.009	.421	.996
	N.West	-.518	.199	.753	.232	-.270	.461	.341	.714
	N.Ireland	-.806	.208	.017	.989	-.899	.178	.648	.649
	Scotland	-.397	.433	1.407	.042	.299	.524	.963	.313
	S.East	-.116	.780	.846	.206	.346	.367	.230	.361
	S.West	-.954	.063	1.076	.147	.634	.170	1.314	.116
	Wales	-.574	.341	.266	.786	.296	.585	.130	.724
	W.Midlands	-.863	.056	.773	.274	-.279	.506	1.127	.554
	Sales_up	.039	.869	.206	.469	0.477	0.043	0.116	0.65
	Growth_strong	.286	.218	.793	.001	0.79	.000	0.521	0.539
	Emp_up	.500	.019	-.241	.332	.53	.244	-0.314	0.695
	Predict_sales up	.397	.097	-.125	.661	.200	.006	0.228	0.295
	Predict_emp up	-.195	.354	.069	.770	.53	.364	0.060	0.633
	Constant	2.774	.002	-1.904	.031	1.066	0.137	-0.153	0.110
	Use_Cloud					.762	.263	0.685	0.718
	Use_other i-h soft					.071	.209	0.209	0.735

Appendix A 1- Binary Logit Regression Analysis