Title: Developing SME performance management practices: Interventions for improving productivity

Abstract

Purpose

The paper is a proof of concept (PoC) intervention study for developing performance management practices in manufacturing SMEs with the longer-term aim enabling the SMEs to improve their productivity. The intervention was designed and deployed by a collaborative Quartet of academics, management consultants, accountancy firm and a commercial bank manager.

Design/methodology/approach

The paper firstly musters a set of initialising performance management (PM) practices aligned to productivity improvement. These are utilised to design a knowledge transfer intervention for deployment with a set of manufacturing SMEs incorporating some associated productivity tools. The evaluation of the intervention utilised a case study approach founded on a logic model of the intervention to assess the development of the PM practices.

Findings

The intervention contributed to a partial development of the mustered practices and the productivity diagnostic based on the Multifactor productivity abstraction and a data extraction protocol had the strongest impact. The study revealed the importance of the three interlaced factors: Depth of engagement, feedback opportunities and the intervention gradient (the increase of independent action from the participating SME's and the diminishment of the external intervention effort)

Research limitations/implications

The case study is based on a limited number of individual SME's, and within just the manufacturing sector.

Practical implications

SME businesses will require a more sustained programme of interventions than this pilot to develop PM capability, and depth of engagement within the SME is critical. Professional stakeholders can be utilised in recruitment of firms for intervention programmes. Business can start developing PM capability prior to PMS implementation using the tools from this programme.

Originality

The productivity diagnostic tool, based on a synthesis of multifactor productivity and the performance pyramid, an array of potential initialising practices for PM capability and discovery of potential mechanisms for PM practice development.

1. Introduction

Small and medium-sized enterprises (SMEs) are a dominant aspect of the population of firms in the UK (Hughes and Spring, 2021) and low productivity in SMEs has been identified as an important element of the overall productivity gap of the UK economy (Cette *et al*. ,2015; Harris & Moffatt, 2017; Owen et al, 2020). Data from government surveys suggests that productivity is not evenly distributed across the economy (BEIS 2019), with a long tail of low productivity firms, particularly SMEs (Goodridge *et al*., 2013). The economic significance of SMEs has stimulated successive governments to fund programmes to attempt to develop SME productivity (Done *et al*., 2011, Galbraith *et al*., 2017), but robust evidence of the efficacy of these programmes is scant (Henley, 2018), and the issue is still prescient. Much of this activity centres on diffusion of management best practices (Bloom *et al.*, 2020) including a large body of work on process improvement (Mcgovern *et al.*, 2017), but explicit productivity improvement is less typical (Jones et al, 2021).

Bhari *et al.* (2011) find that *performance management* (PM) is contributory factor for higher productivity, but adoption is not heterogenous, and many studies review the problems in developing performance management in the SME context (from Cassell et al., 2001; Cocca and Alberti, 2010; Sardi *et al*., 2020). Performance management can have different connotations, but one can cleave the body of work into three overlapping but distinct areas; *people* performance management (Forth and Bryson, 2019), *operational* performance management (Bloom *et al.,* 2016a) and the wider aspect of *business* performance management. Bittici *et al*. (2011) had already postulated that the 'managerial' process of PM of core business processes drives long term sustained productivity growth: Bloom *et al*. (2020, p. 6) re-articulates this as "How well do organizations monitor what goes on inside the firm, and use this information for continuous improvement?

Performance management systems (PMS) can be utilised for this aim (Ahmad and Alaskari,2014) but the deployment of PMS in SMEs is problematic with limited success (Garengo *et al*., 2005; Sardi *et al*., 2020). The issue has numerous antecedents; lack of including human and financial capital, a reactive unstructured approach to management, alongside a reliance of tacit knowledge over managerial processes. Implementing a PMS therefore is no small undertaking for an SME and involves a high risk of falling short of success. Furthermore, as Bourne *et al*. (2018, p. 2013) identifies a PMS "operate through practices and routines in organisations……. If we reflect on the current theories used to inform [PMS] research, it can be argued that they ignore the mechanisms by which the [PMS] operates".

Routine dynamics (Feldman and Orliowski, 2011) typically adopt a practice turn to organisational routines. As such organisational routines and practices are synonymous, and they are conceptually the building blocks of dynamic [organisational] capabilities (Salvato and Rerup, 2010). Therefore, one avenue of possibility for SMEs is the development of 'performance management capability'. This would consist of an assemblage of performance management practices a priori to an implementation of a fully-fledged PMS system, but with the explicit goal of productivity improvement. Jones et al (2019) refer to this type of inaugural assemblage as 'initialising practices'.

SMEs face barriers of lack of exposure to some of these performance management practices because they are often isolated and insular (Valenza *et al*., 2021 Wang and Ahmed, 2009). It is no surprise therefore that research in this area shows that SMEs need external assistance in developing PM capability (Ahmad and Alaskari, 2014; Bahri *et al.,* 2011; Rojas-Lema *et al*., 2020).

This paper aims to address the gap in knowledge that precedes the development of a fully-fledged PMS; to see if a knowledge transfer type of intervention can initiate the development of productivity development PM practices in a set of SMEs. This would be a derived Proof of Concept (POC) intervention targeted at developing a set of PM practices. The research aim for the study is hence expressed as follows: Can the PoC affect the development of the performance management practices in SMEs?

1.1 Study Overview

This study is a substantial one and figure 1 illustrates the overall programme of work and how this paper is structured accordingly. The programme consisted of three main phases, with substages, and figure 1 shows these and the corresponding sections of the paper in the header row.

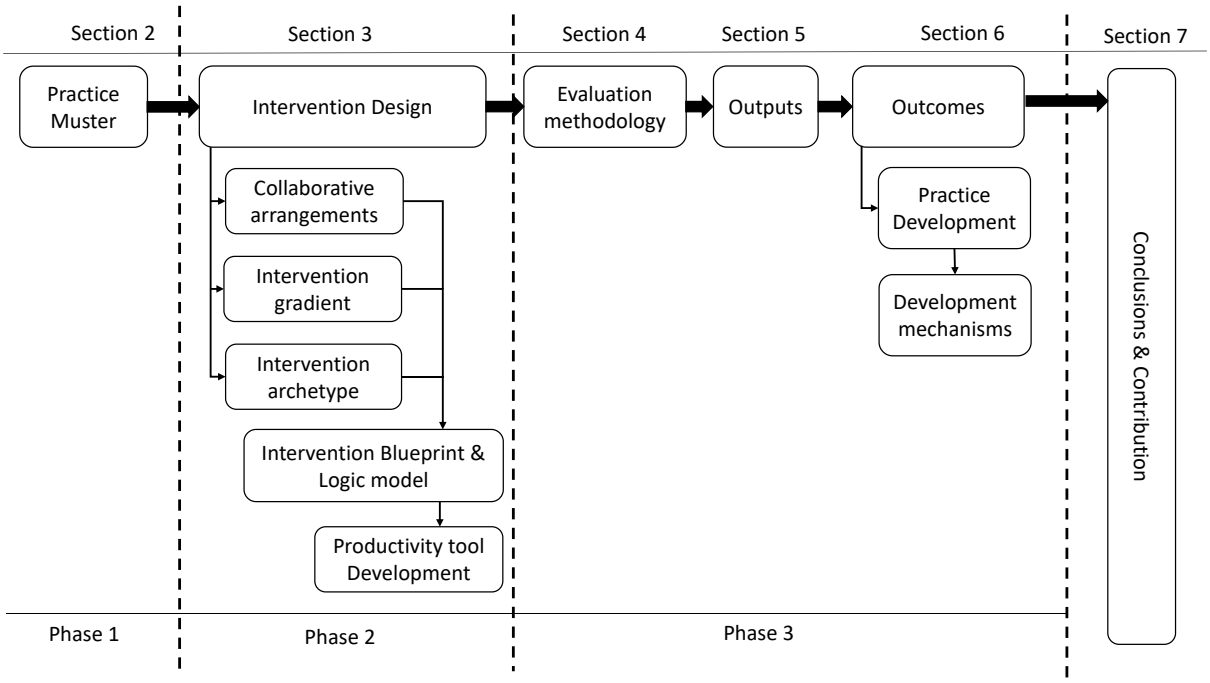

Figure 1: Overall Study and paper structure

Section 2 of the paper (Phase 1) consists of a review of the PMS literature to 'muster' a set of initialising PM practices.

Section 3 describes Phase 2 which was is the development of the intervention design of the PoC, which had a number of distinct stages. The first substage is the collaborative arrangements and the emergence of the 'Quartet'. This is followed by discussion of two further key design aspects. Firstly, the 'intervention gradient', which is the changing of independence between the external knowledge transfer agents and the SME 'clients'. Secondly the archetype – which is the nature and form of the intervention activities which the SME's engage in. The principles within these three design aspects were utilised to derive a design of the intervention, aligned to the target practices mustered from Phase 1. The intervention design was in the form of a logic model in order to facilitate a suitable

deployment and appropriate evaluation, which also enabled derivation of the detailed research questions for the study. The logic model includes utilisation of some original productivity tools, and **Section 3** culminates with the outlining the development of these tools, and shows how these were derived from the relevant literature.

Section 4 outlines the methodology for the programme evaluation, which is based on case study with the SMEs on the programme as the unit of analysis. **Section 5** is a small report on the outputs of the programme, essentially the numerical account of the SMEs engagement with the programme. **Section 6** details the focus of the programme results in two separate stages. The first of these is the evaluation of which practices were developed and the relative impact of the different elements of the PoC on the individual practices. The subsequent analysis section discusses the key mechanisms behind the practice development outcomes.

The paper concludes in **Section 7** with a summary of the contribution and the implications for policy and practice.

2. Literature review: Practice muster

The first stage was to identify some potential performance management practices from the literature. A literature search protocol (appendix 1) was developed to search for relevant sources on performance management and the SME context over the last 20 years. This resulted in 58 papers of relevance. These were then thematically coded for potential practices. Some of the papers contain outright references to PM practices eg Bellisario and Pavlov (2018), others use 'behaviours' (Elzinga *et al.,* 2009). Many papers determined Critical Success factors (CSF's) for PM in SME or PMS implementation. These were scrutinized to look for where the CSF could be transposed as patterns of ongoing 'informed action': Marchand and Raymond (2018) classify this as the enablement of SME managers to maintain and improve their firm's performance i.e. a PM practice.

A key aspect of the intervention aim was to focus on PM practices that could be conceived as at the forefront of the development of PM capability, rather than those which were more prevalent as the implementation gained maturity, for example initiating a comprehensive PMS. This differentiation exercise also excluded those practices out of the initial scope, in particular those relating to HRM or people performance management. The full list of excluded practices is shown in table 1.

Table 1: Excluded practices

However, during the coding exercise, some practices emerged that could be considered as secondary practices. These had potential to be incorporated near the end of the intervention as 'next on the list' for SMEs to further develop their capability. These are shown below in table 2

Table 2: Secondary Practices

The results of the coding and the exclusion exercise resulted in 8 potential 'initialising practices' and these are listed in Table 3. For potential simplicity in terms of engaging SMEs and designing the PoC two sets of practices (3) and (4) were conglomerated and the phraseology simplified. This resulted in the nomenclature of the source practices being labelled 3a, 3b etc. This approach also yielded the insight that the four conglomerated practices revealed a potential dependency, so each explicitly flows from a preceding practice, illustrated by the arrows in table 3.

Table 3: Initialising PM practices

The source coding was used to develop an amalgamated working definition for each practice, and explication of this and the dependency of the four conglomerated practices follows thereafter.

The first theme covers practices related to understanding productivity (Pritchard *et al.,* 2012), its manifestation and measurement at different levels of the firm (Tangen, 2004). The actual measurement of productivity within SMEs is often sparse to non-existent (Hughes and Spring, 2021). Forth and Bryson (2019) identify the importance of measuring performance related to productivity goals in SME's; Cocca and Alberti (2010) confirms the difficulty that SME's have in this regard. Therefore, the definition includes the translation of productivity measures to the individual SME context.

The second theme related to the practice of process orientation (Garengo and Bheradi, 2007) and being able to identify how process performance within the firm impacts higher level performance (Huttton and Eldridge, 2019; Lucianette, 2019) whilst aligning to business and strategic goals (Bellisario and Pavlov, 2018; Cocoa and Alberti 2010). This deterministic aggregated hierarchy of impact has been refereed to within a PMS context as 'integrity' (Bittici, 2002); Integrity is however a practice that Garengo *et al.* (2005) identifies that SMEs have difficulty with.

To attune to the productivity focus, and provide a link to the first identified practice, this was articulated in Table 3 to concentrate on the impact of business process on productivity in particular. A number of studies in this theme used the lens of process improvement (Bellisario and Pavlov, 2018) to highlight the importance of identifying causal factors within processes and their impact on performance (Bhari *et al*., 2017; Garengo *et al*., 2005). This aspect was noted and added to the secondary practice catalogue.

The theme of sourcing data included gathering relevant data; particularly noteworthy was the paradoxical availability of large amounts of data within firms' IT systems (Garengo *et al.,* 2005) and the difficultly SMEs experience in extracting suitable and valid data sets to analyse (Bianchini, 2019). A substantial number of manufacturing SMEs have adopted Enterprise Resource Planning, [ERP] and Manufacturing Resource Planning [MRP] systems (Jain *et al*., 2008; Zach *et al.,* 2014). Many of the implementations achieve operational success, in the sense that orders are fulfilled and transactions automated. However, these types of systems are often underutilised in terms of data capture and are not utilised to drive performance improvement (Raymond *et al.*, 2007). Therefore, this practice definition attempts to encapsulate the importance of extracting *meaningful* data, and again link to preceding practice #2 by focusing on process data.

The next practice theme of data analysis (Alexander *et al.,* 2014; Cocoa andAlberti, 2010;) is clearly sequential to data sourcing. Bianchini *et al., (*2019) and Franco (2003) link data analytic practices to interpretation and evaluation of the analysis, and de Waal (2007) is explicit about the need for SME managers to be involved and understand the analytic process. To that end practice #3a is identified as the use of data analytics to produce management information.

Visualisation was a key in a number of papers, it was defined by Bittici *et al.,* (2016) by citing (Lengler and Eppler 2007, p.84) "Visualisation concerns the representation of data, information and knowledge in a graphic format which is conducive to acquiring insights, creating a vivid picture, developing an elaborate understanding". In this intervention context, the visualisation is not related to visual management of production such as is found in lean systems (Bellisario and Pavlov, 2018) nor related to visual management tools for strategic development as applied by Bittici *et al*. (2016).

Hence the practice 3c was defined as the production of management information stemming from the data analysis of the process performance.

Bianchi (2019) identifies the relatively simple management practice of 'prioritising effort' when it comes to managing performance. However, Hutton and Eldridge (2019) and Jagoda *et al.* (2013) centre this on prioritising 'improvement' effort. Therefore, the practice #4a refers to identifying priorities for improvement, while also referring back to practice 3b in using the management information, and capturing the improvement aspect noted in practice 3c. Bourne *et al.* (2018) underscored that the prioritisation of improvement should align to the strategic business goals, and this aspect was carried forward into the secondary practice catalogue for potential use later in the intervention design.

Many papers revealed the importance of the practice of identifying performance measures (Bourne *et al*., 2018; Franco *et al.,* 2003; Pavlov et , 2017). Further critiques highlighted the need to define and develop the measures (Garengo *et al.,* 2005; Jagoda *et al.,* 2013) as well as selecting the most appropriate ones (Pavlov *et al*., 2017; Hughes and Spring, 2021). As the practices #2 and 3# were centred on sourcing and analysing process data, the development of measures is encouraged therein, so the definition for practice #4b is on *defining* the 'right' performance measures.

The final practice set prevalent in the literature pool relates to Continuous Improvement (CI) (Cocca and Alberti, 2010) with various studies express different modes of action orientation; '*stimulating'* (de Waal, 2007; Pavlov et al, 2017), '*supporting'* (Garengo *et al.,* 2005), and '*informing'* (Hutton and Eldridge 2019). Many SMEs have some experience and at least awareness of CI (Carpinetti et al, 2007; Matthews et al., 2017). Marchand and Raymond (2018) identify the close dependency between PM practices and SME CI programmes or aspirations. The emphasis within the potential PoC was to focus on improving the business processes that impact productivity, so inclusion of the PM/CI axis was deemed important. A key aspect for SME CI programmes, is identifying the most appropriate process improvement methodologies (Aqlan and Al-Fandi, 2018; Kumar *et al.,* 2009; Singh and Singh, 2013) for the problem at hand, which is hindered by the lack of expertise in of PI tools and techniques (Matthews *et al.,* 2017; Moeuf *et al.,* 2016). These aspects are therefore key goals for the practice development within the PoC, hence practice 4c is defined as 'Choosing and customising improvement methodologies'. This was deemed a suitable level of both and progression and abstraction for this initial stage of developing PM capability. The scope boundary was hence set such that particular improvement methodologies, eg Lean (Knol et al, 2018) nor the granular level of specific tools and techniques, eg SMED (Singh and Singh, 2013) would form part of the study. Development of these practices would occur at a latter stage of PM capability development.

The paper now moves onto the design of the intervention to develop the mustered practices.

3. Intervention Design

This section outlines the development of the intervention, firstly by outlining the need for collaboration and how this led to emergence of the 'Quartet' partnership arrangement. Sections 3.1 and 3.2 outline how the design principles were informed from the relevant literature on interventions of this type.

Section 3.4 details how these the principles were utilised to derive a blueprint design of the intervention, aligned to the target practices mustered from Phase 1. This section concludes by with the outlining the development, in more detail, of the productivity tools that form part of the intervention logic model, again based on the literature on productivity development.

3.1 Intervention Collaborative arrangements

Universities struggle with searching and selecting SMEs for knowledge transfer (Perkmann and Walsh, 2007; De Wit-de Vries *et al.,* 2019) often relying on pre-existing partners (Mcgovern et al., 2017 or) or more competent SME's that seek out assistance (Kurdve *et al*., 2020). Jones *et al*. (2020) identifies potential stakeholders for SME productivity development who have both access and influence, and Mole (2002) ranks the relative power to show that accountants, commercial bank managers and management consultants all had higher 'power rankings' than others. Agostino *et al.* (2021) found high levels of trust that can develop between SMEs and commercial bank managers, mitigating agency problems for SMEs about finding the right collaborative partner for productivity improvement. Accountants and bank manages possess 'insider' knowledge of the SME capabilities (Mole et al, 2002), which can help identify potential SME participants who have the need, but also, a current level of ability to engage in knowledge transfer activity. Management consultants are important transfer agents and can exert some isomorphic pressures on firms to conform via a legitimisation of relevant practices (Mcgovern *et al*., 2017). Hence the first aspect of the intervention design was to create collaborative expert 'Quartet' of an accountancy firm, a commercial bank manager, a management consultancy firm and academics. This was in order to blend commercial expertise with academic knowledge to develop and deploy the intervention, and to use the partner's commercial networks and insight of their clients for search and selection of suitable SMEs for the programme.

At this point funding for the intervention programme was sought and gained from round two of jointly funded Business basics programme (Innovate UK and BEIS). The Manufacturing sector was selected as a key target for productivity improvement (Industrial Strategy) and the funding package was sufficient to allow for twenty SMEs to form the programme cohort.

3.2 Intervention gradient

Practice development requires firms to develop 'independent internalisation' (Done et al., 2011) and Kurdve (2020) identifies that to achieve this several interactions are required within an intervention, but these should be interspersed with gaps for sufficient reflection. Several studies (Farukh *et al.,* 2019; McGovern *et al.,* 2017; Salazar *et al.,* 2012) indicate a continuum of independence initiated with externally driven activity followed by joint efforts between the external agent and the SME, towards more independent actions by the firm. This then leads to ongoing patterns of actions and subsequent embedding of the practice. Therefore, the second aspect of the design was that interventions were contrived to incorporate an 'intervention gradient'; shown in Figure 2.

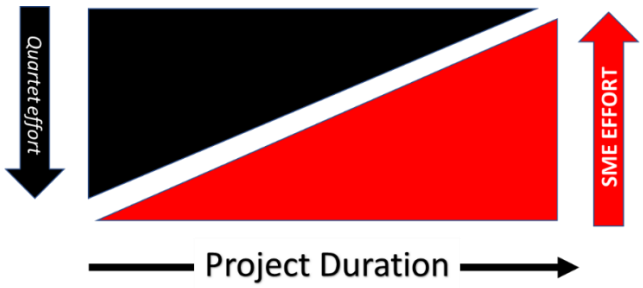

Figure 2: Intervention Gradient

The design would therefore have initial interventions be led by the Quartet partners, followed by interventions with co-production, culminating in the SME 'client' producing the outcomes themselves.

3.3 Intervention Archetype

The third aspect of the intervention design is the core pattern of how, when, and who is involved in the interactions, and the nature of this interaction, referred to here as the 'intervention archetype'. Done et al (2011) posit that best practice interventions (BPI) typically have a mixture of preparation activities, workshops, and follow up consultations supported by (Reid *et al.,* 2018). Farrukh *et al.* (2019) identify the resource implications of these interaction patterns, and stress the need for balance between *extensive*, lower cost interactions such as a 1-many workshops, versus the number of *intensive* of 1-1 consultations with individual firms. The use of intensive 1-1 consultations is important because fidelity; the customisation, adaptation and reconfiguration of 'standard' best practices, or 'templates' to the local business context, is critical to successful diffusion and development of practices (Alwazae *et al.,* 2020;; Done *et al.,* 2011; McGovern *et al.,* 2017). One common mechanism for achieving this is the use of expert transfer agents (Done *et al.,* 2011; McGovern *et al.,* 2017;; Reid *et al.,*2018), who act in a coaching mode (Salazar et al., 2012; Farukh *et al.,* 2019; Gray *et al.,* 2011).

3.4 Intervention Logic model

Simple logic models are useful as a foundation for understanding the impact of interventions (Funnel and Rogers, 2011; Smith *et al.,* 2020) and are often a requirement for government funded evaluation work. The three design aspects of the Quartet, the intervention gradient and the archetype were utilised in developing an intervention logic model for developing the mustered practices, with a mixture of extensive and intensive interactions. The overall design starts conventionally with a diagnostic process (Farukkh *et al.,* 2019; McGovern *et al.,* 2017; Salazar, 2012) but then becomes more distinct, culminating in the SME producing their own productivity improvement plan (PIP).

The Quartet identified the need for some new productivity tools to act as the aforementioned 'templates' to provide a degree of validated utility as well as similitude to the interventions, whilst allowing the customisation to the local individual SME context. These new tools would be developed by the Quartet, blending commercial expertise with academic knowledge (Farukkh *et al.,* 2019) and would be 'tested' as part of the PoC.

Figure 2 shows the logic model, conceived as a series of sequential and connected interventions, with interspaced requisites for SME action and reflection, identified as 'SME work'. This shown below alongside the **nomenclature** used in the Project delivery:

(1) Productivity mapping and data protocols	**Visit 1**
(2) Data Analytics and Visualisation workshop	**Workshop 2**[1]
(3) KPI review and PIP commissioning	**Visit 2**
(4) Review of PIPs and feedback	**Final Event**

Figure 3 shows the logic model with the alignment between the relevant intervention and the target PM practices. This illustrates the multi-faceted nature of the design, that interventions were both designed to impact more than one practice, and that the more complex practices had at least more than one source of interventionist input.

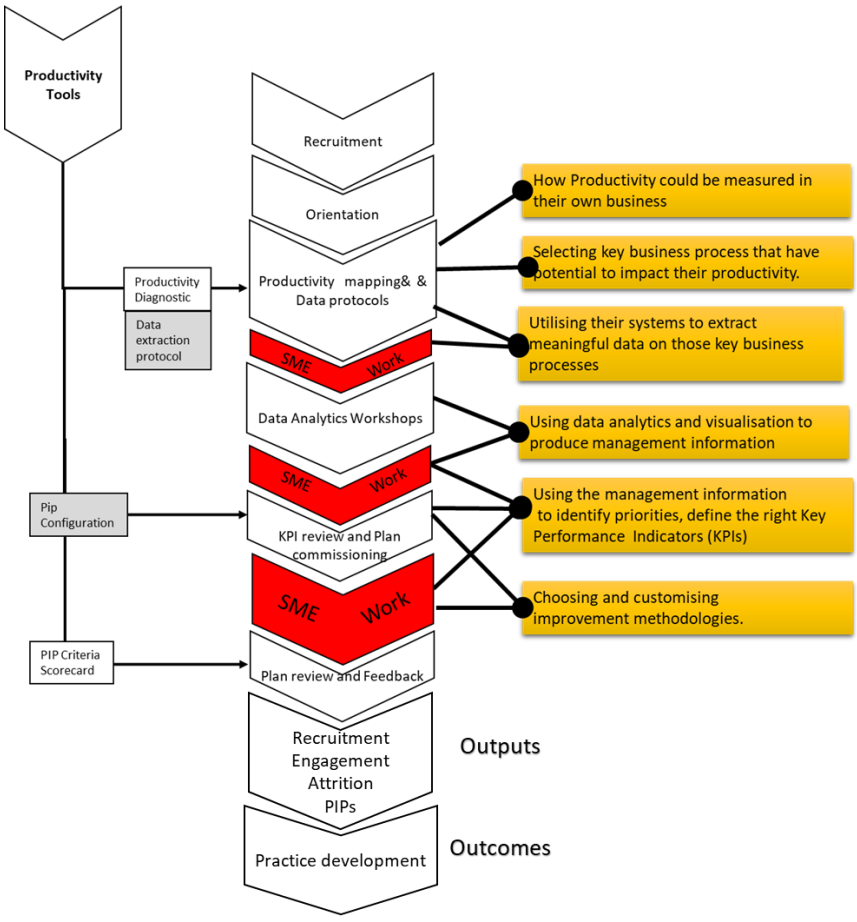

Figure 3: Intervention logic model

The first initial step is recruitment of suitable SMEs for the intervention programme, directly via the Quartet's own client and professional networks. This was followed by an orientation workshop for SME participants explaining the nature and design of the intervention programme, which Farukkh et al (2019) identifies as a critical success factor.

[1] Workshop 2 so called as the orientation event for SME participants was construed as workshop 1

[Visit 1] was an expert led *diagnostic dialogue* of productivity in the SME using a **Productivity Diagnostic tool**, facilitating discussion about how and where productivity could be measured in their firm, leading to the identification of focus areas of high impact and current weakness. The second part of the visit then consisted of a joint derivation between the specialist and the SME of a **data extraction protocol** for, locating, extracting, and cleaning relevant and appropriate process data related to the focus area. The SME was then furnished with the protocol and tasked with conducting the protocol to extract their data ready for analysis.

[Workshop 2] consisted of an articulation and exposition of core data analytical techniques and visualisation tools to guide the SME in analysing their key process data sets. The SME was then tasked with conducting their own performance analysis with their extracted data sets prior to the next intervention. This was made a pre-requisite of the second visit occurring to facilitate compliance with the set tasks, and to allow the Quartet specialists to review the analysis prior to the visit.

[Visit 2] was also dual purpose; Firstly, a joint review of results of the performance analysis and any insights generated and an agreement of what the improvement focus should be. The second element of the second visit was the commissioning of the SME to construct a Productivity Improvement Plan (PIP) for their agreed focus area. This discussion utilised the third tool a **PIP configuration;** an outline of what a good Productivity Improvement Plan (PIP) should consist of, and associated criterion-based scorecard for evaluating the PIPs. The SMEs were then tasked and given a deadline of at least a month to complete their PIP prior to the final intervention.

Both Visits were conducted by at least two members of Quartet and led by one of the two members of the Quartet who were designated productivity improvement specialists. Once the PIP's had been received the Quartet conducted an evaluation process to ascertain the feasibility of the PIP using the PIP criterion scorecard. The programme concluded with opportunity for SME to discuss their PIP feedback.

The immediate outputs of the logic model include the number of firms recruited into the programme, the subsequent attrition of firms within the length of the programme, the number of employees in the SME who actively engaged with the different interventions, both numerically and as a proportion of indirect headcount. The final output was a count of how many PIPs were produced which was synonymous with the number of SMEs who successfully were seen to have 'completed' the programme.

The outcome of the logic model is directly related to the primary research aim, and results in a primary research question:

(RQ1) Does the PoC affect the development of the performance management practices in the SME participants?

The nature of the PoC design means that the impact and efficacy of the intervention(s) cannot necessarily be delineated from the relevant tool, they are often entwinned, but the evaluation strategy was to evaluate them as one, but where possible, to highlight the significant role of an aspect of the intervention or the tool resulting in a more granular level of two additional research questions:

(RQ2) Do the Interventions-tools as deployed in the PoC, assist in the development of PM practices in the SME participants?

(RQ3) What are the potential ‘context-mechanisms’ that affect the development of the practices?

The next section of the paper details the design and development by the Quartet of the relevant productivity tools.

3.5 Productivity Tool Design and Development

3.5.1 Productivity Diagnostic Tool

The productivity diagnostic was developed by combining two features, one from the literature on PMS, and the other from literature on firm productivity.

Total-Factor Productivity (TFP) (Owalla *et al.,* 2021) is often used at a firm level (Cusolito and Cirera, 2016) in order to capture the holistic impact of different inputs (Tangen, 2004). TPP is the inverse of the net profit margin accounting ratio. It is often delineated into multi-factor productivity (MFP) (Sahay, 2005) with the factors which form part of the MFP being the inverse of commonly used accounting ratios. Tangen (2004), Ahmad and Alskari (2014) and Garengo *et al.* (2005) all identify that performance management should have some form of hierarchical structure and link lower business process outcomes to higher level goals, in this case productivity. Bhari et al (2011) developed a hierarchical PMS model for Economic Value Added (EVA) which has similarities to the MFP calculation structure. The Quartet therefore conceptualised the productivity diagnostic tool by combining the MFP concepts with the hierarchal performance pyramid from Lynch and Cross (1991). This was because of clarity and simplicity (Garengo *et al.,* 2005) and the structural equivalence of the MFP with a pyramidic profile.

The high-level MFP were enclosed as the first layer of the performance pyramid providing an initial 'skeleton' framework of Performance Pyramid Diagnostic tool. The further down the pyramid a potential productivity measure would sit, the more locally defined the measure would be, but it would have a primary alignment to measures higher up the performance pyramid, with subsequent 'parent- child' relationships. This is illustrated in Figure 4 below:

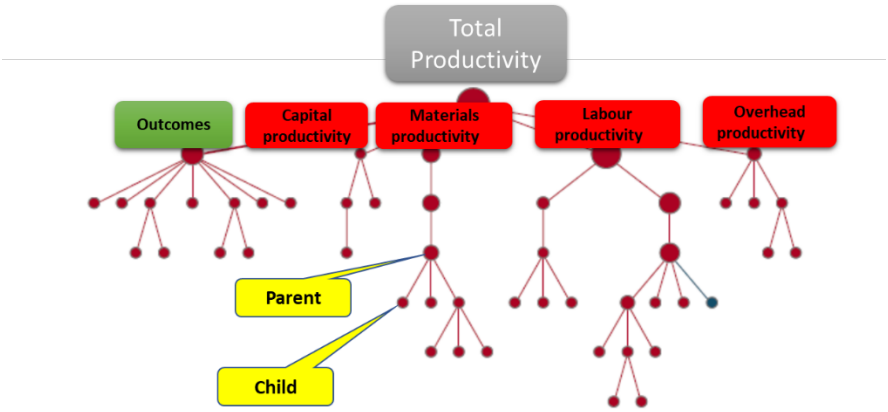

Figure 4: Initial pyramid skeleton framework

Over a series of meetings, the Quartet identified and refined the potential productivity measures to populate the framework and cluster the measures into MFP groups. The required dependent parent and child relationships for the measures were debated and codified. This resulted in 43 key productivity metrics and the resulting Productivity Performance Diagnostic Index (PPDI) is shown in Appendix 2. A glossary of working definitions for the metrics was constructed to aid the SME understanding (Hughes and Spring, 2021) and to provide a degree of constancy across the Quartet visits.

The Quartet then derived a diagnostic typology for the PPDI, focusing on two dimensions:

1. **Measurement capability**: How able is the business to capture the data and calculate the relevant productivity metric?
2. **Impact on productivity**: At the current level of performance what is the relative level of impact that this metric has on the business overall productivity?

A simple scoring index was then derived alongside some diagnostic criteria to attempt to develop a coherent evaluation system (Appendix 3). Although the evaluation was relatively subjective, there would be consistency within the individual visit/business, and others have found high correlation between subjective and objective measures of performance (Vij and Bedi, 2016). The results of the scores within the typology facilitated the identification of focus area for the business. This was in the quadrant of the typology in which measurement capability and ability is low, but productivity impact is high.

3.5.2 Data Extraction Protocol

The Data extraction protocol (DEP) was developed based on the Quartet partners expertise in extracting and cleaning data. The purpose of this was to ensure the SME client was able to collect the relevant, appropriate data with the maximum efficiency, and to alleviate and mitigate any potential hurdles or technical issues they might have. It was designed to be filled in during Visit 1 *in vivo* for the relevant priority productivity metric areas as intimated by the PPDI diagnostic. The DEP is shown in Appendix 4

3.1.3 PIP Configuration and Scorecard

The Quartet used the 'Delphi' technique to develop the PIP configuration and scorecard, a technique often utilised to garner the consensus to complex issues via a panel of 'experts' (Brady, 2015).

This was also the opportunity to include the secondary practices, of 'communication', 'Engagement', 'target setting', and 'feedback and evaluation' identified in the initial literature review into the PIP configuration to ascertain if this could stimulate the relevant patterns of action in SME towards establishment of those practices

The Delphi technique starts with locating an initial framework (Pawlowski, 2004); in this case a simple literature search yielded one appropriate study; "A bottom-up approach for productivity measurement and improvement" (Jagoda *et al.,* 2013). The model in the paper consisted of five core components for productivity planning, with linear dependency. Table 4 shows the original components from the paper together with the outcome of the first Delphi stage.

Table 4: Productivity Improvement Plan (PIP) Configuration Development

Communication was conceptualised as a subset of the secondary practice of 'engagement' with employees. Step 3 was altered to align with the Visit 2 dialogue on the 'improvement' mode; how the potential innovations might be developed from the data and casual analysis. This Improvement step would sit prior to the engagement component within the framework, to align with primary practice dependency. As the PIP was future focused, the implementation element of Step 3 was removed, but some of the relevant aspects considered for the final step. The other secondary practices identified; those of feedback and target setting were both firmly prescribed within in the evaluation element alongside some consideration of implementation progress.

The 2nd stage of the Delphi technique led the Quartet to go through a number of iterative rounds to develop and refine both descriptors of the steps and potential subcomponents of the configuration. The Final version of the PIP configuration is shown below in Appendix 5 with the alignment against the primary and secondary practices. This provided a clear structure to construct the scorecard using a five-point scale for each step and associated criteria. The productivity expert members of the Quartet concurred that scale point 3 (60% achievement) was a 'target level' of **'feasibility'**, below which they would, in their own context, not sanction a commencement of the project. The Quartet also agreed that the scale point 2, (40%) would constitute a threshold level to signify the business had produce a **'suitable'** PIP.

The next section of the paper details the methodology used to evaluate the outcomes and outputs of Logic model as well as the impact of the different input elements.

4. Evaluation methodology

Case studies are often used for intervention programme evaluations (Crowe *et al.,* 2011; Fetters *et al.,* 2013; Yin, 2013). Kalua and Norman (2018) argue this can assist in overcoming criticisms of the logic model, in particular simplification of the context and lack of sophistication in assessing complex interactions (Jones *et al., 2020;* Funnell and Rogers, *2011;* Renger *et al.,* 2011).

In this instance the activity phase of the logic model is designated as the 'main case' whilst the individual SMEs are the 'units of analysis' (Yin, 2009). This is more appropriate than classifying the SME's as multiple cases for two main reasons. Firstly, because elements of the logic model (eg the workshops) are collective events, and secondly, multiple case study design uses a replication rather than a sampling logic (Yin, 2009) and in this intervention design the SME's are engaged simultaneously. Hence all the data collected within the case studies was classified by SME, facilitating the analysis of outcomes and outputs by SME.

Figure 5 shows a diagram of the high-level evaluation process which is aligned to the three previously derived research questions and shows the sequence of evaluation activity, with stage 2 being conducted after stage 1 was completed.

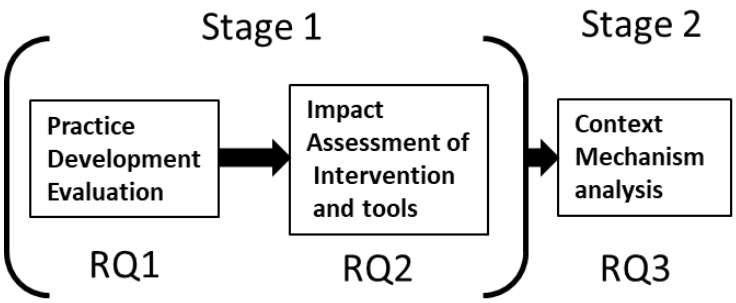

Figure 5: High level research method

A simple judgement framework was developed to provide an answer structure for both aspects of stage 1 and is shown below in table 5.

Table 5: Practice Assessment framework.

4.1 Case study Data sources

Figure 6 shows the data sources for the case study, and the units of analysis (SME) in relation to the activity phase of the PoC, the interventions and tools from the logic model.

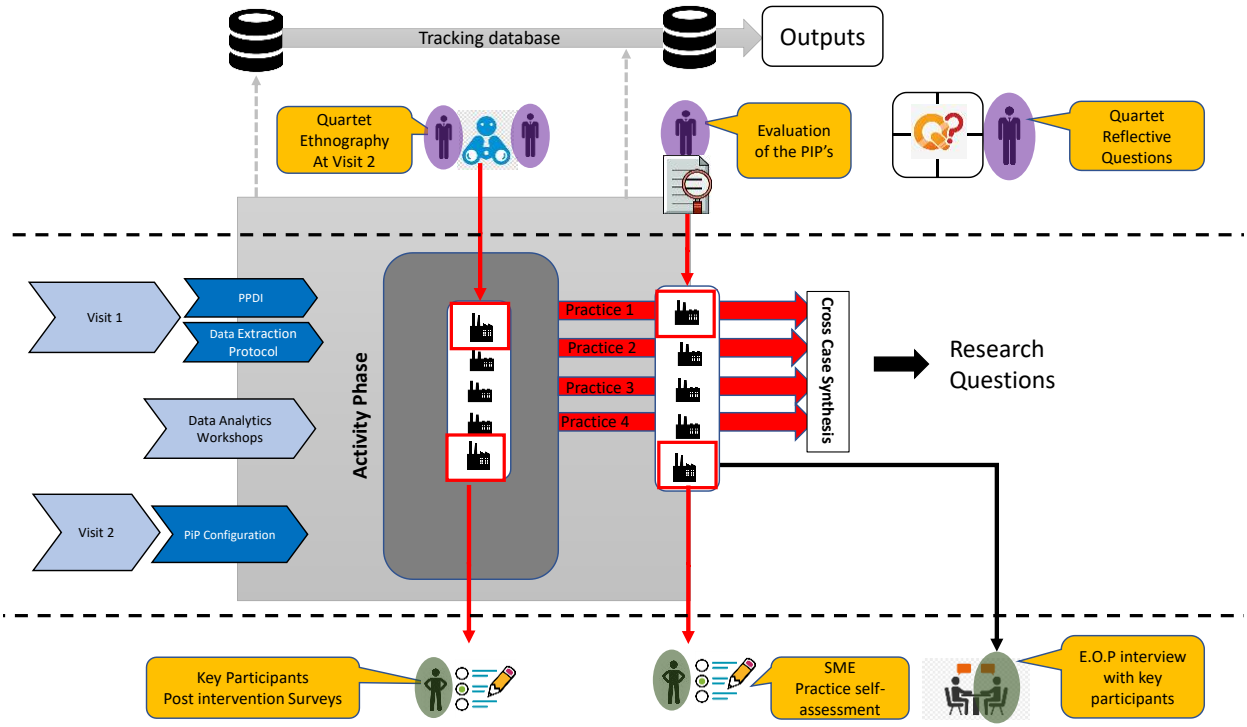

Figure 6: Case study data map

Figure 6 illustrates the range of data collection sources and data collection methods within and across the case, a requirement for validity via triangulation (Yin, 2009). The unit of analysis for the case study is the SME, but the diagram shows the delineation between data sourced direct from the SME at the bottom of Figure 6, with data sourced on the SME but *via* the Quartet partners at the top.

A **tracking database** was utilised to capture the descriptive data of the SMEs, their status as they were recruited and progressed through the programme, to record their engagement in the different interventions, and the status of their PIP submission. This was the main source for the 'outputs' element of the programme evaluation. For the purposes of reporting, the SMEs were given aliases. Any SME who dropped out of the programme was contacted and recorded by the relevant lead commercial partners and questioned as to why they had left.

The research data captured direct from SME participants included the following three elements: Firstly, a short **post intervention survey** about two of the interventions, visit 1 and workshop 2. These were conducted at the following intervention to allow the medium-term impact to be

evaluated, and to increase completion rates. Secondly a **self-assessment survey** on the SME participants' perception regarding their practice development. Thirdly, **semi structured Interviews** with the key SME participants. The latter two elements were deployed at the end of the programme shortly after their PIP feedback had been given.

The data sourced via the Quartet partners included appraisal of the 'client work' output produced by the SMEs and direct observation of the SME participants by the Quartet partners. The first of these was the **Visit 2 ethnography** by the Quartet partners at the SME, captured by a post visit field note template, this also encompassed observations on the client work produced up to that point including the SME's attempts at data analysis. The second data source was the **appraisal of the individual PIPs** by the productivity expert members of the Quartet from each SME using the criteria scorecard. Finally, during and after the programme the Quartet partners were all asked to complete a series of [open] **reflective questions** on each aspect of the PoC.

4.2 Data Analysis protocols

The research method steps for stage 1 and stage 2 are shown in Figure 7. All the qualitative data (from interviews, field notes and survey open comments, and Quartet reflective questions) were coded inductively to identify themes within the data. These were tagged according to the unit of analysis, the SME. These codes were then refined and grouped into categories. The groups of codes relating to potential causal factors implicated in practice development and impact were segregated for use in analytical stage 2.

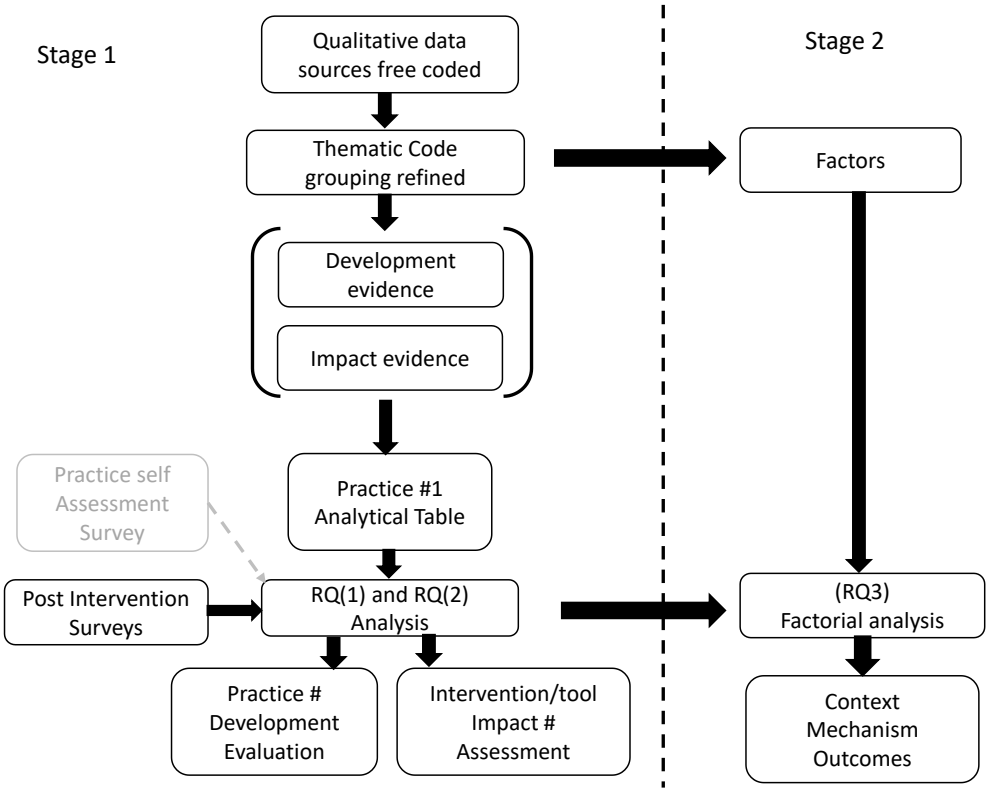

Figure 7: Evaluation method steps

The coded groups were then cross referenced against the first two research questions for evidence of practice development and of intervention/tool impact to produce analytical matrices *for each practice*. These were then analysed and synthesised across the main case in tandem with the quantitative data from the post intervention surveys. This step produced judgements on development and impact using the structure in table 5 for each of the eight practices. An example of this for the development of practice (2) and the potential impact of the various interventions and tools is shown in Appendix 5. The self-assessment survey data was deemed less reliable than the range of other sources, so this source was given less primacy in the derivation of the analytical judgements.

The EOP interviews asked the participants a range of questions about what they found difficult, what they wish they had done differently, and what advice they would give to future cohorts. This was a major data source for eliciting what the key factors were in developing the practices the interventions were designed to propagate. Stage 2 used this, the factor code groups and the analysis from stage 1 to conduct the analysis to answer RQ 3, and this is reported in Section 6.2.

Table 6 shows the means and degree of triangulation for each RQ from the case data sources.

Table 6: Practice evaluation data sources

5. Programme Results

5.1 Programme Retention and Attrition

This paper is primarily concerned with the practice development in SME's who completed the programme, rather than the analysis of the issues around recruitment and retention. However, a brief summary of the outputs is as follows; 18 SMEs started the programme from a diverse range of manufacturing sectors and business sizes (Appendix 5) which reduced to 7 by the end of the interventions, with 5 businesses successfully producing a PIP and completing the programme.

SMEs dropped out throughout the programme, for a range of reasons, and table 7 shows the distribution of these;

Table 7: Programme Attrition data

PPDI Misalignment was where the businesses felt that the metric areas that were within the PPDI diagnostic tool were not relevant or did not align to the businesses current strategic vision. Due to the commercial sensitivities within the Quartet partners and resource constraints, this area was not explored further. One business identified in their withdrawal communique that they found the Visit 1 Diagnostic Dialogue a highly pertinent and useful process and were using the outcomes to drive their productivity improvement and did not require any further support. Two businesses were just not able to complete a PIP for a combination of capacity and capability at that juncture, and subsequently withdrew themselves before the final event, which was termed PIP 'Balk'.

The main aim of the paper is the evaluation on practice development which is therefore focused on the 5 SMEs that had completed the intervention programme.

6. Programme Outcomes

Section 6.1 reviews the answers to the stage 1, and research questions (1) and (2). Section 6.2 considers the answers to the research question (3).

6.1 Practice Evaluation and Intervention Impact

Research Question(s):

RQ1) Does the Intervention Programme overall assist in the development of PM practices in the SME participants?

RQ2) Do the Interventions-tools as deployed in the PoC, assist in the development of PM practices [capability] in the SME participants?

The emphasis emerging from the analysis is that there were strong similarities in the practice development, interventions impact, and mechanisms from the cross-case synthesis. This is outside of the idiosyncrasies and characteristics of the individual SME organisations.

The evaluation on the practice development focused on the 5 SMEs that had completed the intervention programme. Appendix 6 shows one example of the development and impact assessment for 1 of the practices, illustrating the triangulation of data from the EOP interviews, ethnographic data, participant survey data and feedback from the Quartet's assessment of the PIP itself. This analytical process was completed for all 8 practices and Table 8 shows the summary of this process mapped against the different interventions, using the judgement framework from table 5.

Table 8: Practice development and intervention impact summary table

Practice groups 1 and 2 and 3 are the most developed overall, except for the visualisation aspect, with Practice 4 being the weakest overall development. The areas in black indicate where the intervention was not designed to impact that practice, as identified in the initial logic model. The

arrows indicate where the interventions were progressively linked, so the second intervention helped build on the foundations of the previous one. Overall, this identifies that the PoC as a whole, was able to partially develop practices 1-3 in relation to PM capability, and that individual interventions had differing ranges of impact, both through design but also resulting from deployment variances.

On the whole, Visit 1 was the most impactful in terms of development of the relevant practices, and the data extraction protocol was the only intervention with a clear strong impact on the associated practice. It is however worth noting that both this practice (3a) and the intervention (Visit 1 data extraction protocol) are both highly bounded and tightly focused in relation to the other practices. Workshop 2 was the most mixed in terms of impact, and in one of the core practices (3b) it required additional intervention in Visit 2 to make meaningful impact on the development of that practice. It is worth noting that practice 3c has a dependent relationship on practice 3a, it is not possible to produce a good visualisation if the analysis has not been done or not been done well. Hence, it is not a surprise that this practice is underdeveloped in this scenario. The ethnographic records of Visit 2 reveal the dialogue appears in all cases to be consumed by addressing how to analyse the data, potential root cause analysis and how to develop more focus, diminishing any potential impact on the other practices.

6.2 Development mechanisms

This section is focused on the final research question:

RQ3) What are the potential 'context-mechanisms' that affect the development of the practices?

As identified in the methodology, the semi structured EOP interviews questions were designed to elicit issues affecting the development of the relevant practice(s). The responses were thematically grouped and are shown in Appendix 7, and a summary of the three key factors identified from the subsequent analysis are shown in Figure 8 and explicated below.

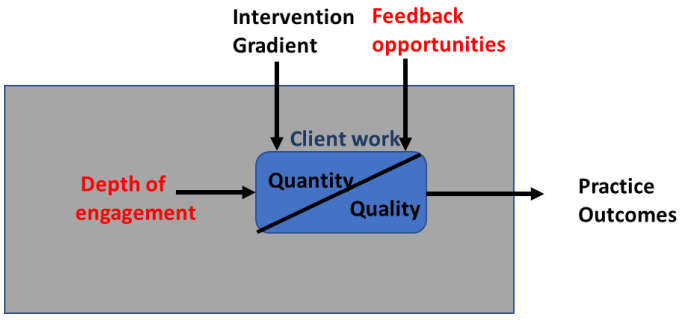

Figure 8: Content mechanism model

The analysis showed that quality and quantity of the client was synonymous with development of the practice within the SME.

All businesses were clear that they should have engaged more people in their organisation in their business, and this would have dispersed the client work, and improved the *quantity* and possibly the **quality** of the work produced. Although depth of engagement in the programme was encouraged, there were no formal conditions or structure design within the intervention to enforce a deeper level of engagement. In all cases, businesses only involved 1 or sometimes 2 people from their organisation, but this was typically 30% of their indirect headcount, highlighting the lack of management resource across all the SMEs.

Businesses were constrained in terms of *quantity* of work by requiring more feedback before they were confident to proceed. The feedback opportunities were constrained by the design requirement to establish whether the interventions (and associated resource requirement) within the PoC were sufficient; the answer is clearly they are not enough to fully develop the practices. The analysis matrix in appendix 7 shows the business' response to their feedback on the PIP. This suggests that the impact on the future development of all the practices would be significant. The businesses also reflect that more feedback between the final interventions, but also throughout the programme would have been beneficial in helping them improve the **quality** of their work within the intervention gradient. In this case the intervention gradient was therefore too steep and required more feedback interventions, which would provide more equivalent time to work on each iteration of each intervention component. Therefore, the intervention gradient design and number of feedback opportunities in the programme was clearly influential in the *quantity and* **quality** of client work, and ultimately affected practice development outcomes.

Additionally, evidence from the ethnographic analysis of the practice development showed that all businesses had not done enough analysis 'work' prior to the Visit 2 session, partly from commercial pressure but more from being unsure or unable to undertake the tasks in more depth. The reflective question analysis suggests that as well as the issues identified above the clients required a more prescriptive analytical pathway for this element. This suggests the balance of 'fidelity' (McGovern *et al.,* 2017) was not accurate enough in the case of the data analysis practice.

7. Conclusion and Contribution

7.1 Summary of findings and limitations

The paper answers the first research question and showed that the PoC intervention appears to contribute to a partial development of the four conglomerated practices, although less so for the strategic productivity improvement practice group.

The second research question on the direct impact on practice development by the intervention/tool showed that *construction* of the Data extraction protocol had the strongest impact on the development of one of the PM practices. The PPDI diagnostic *dialogue* had a moderate impact but over a wider range of the practices. In a significant number of instances, the aspects of the interventions had to be progressively repeated to develop the practices.

The third research question was what the potential mechanisms in an SME context that affected the development of PM practices. This revealed the importance of the three interlaced factors in performance management practice development: Depth of engagement, the intervention gradient, and feedback opportunities. The 'intervention gradient' was too steep for most businesses, both in terms of 'client work' and lack of capability, such that they required more feedback-based 'coaching' interventions to further develop the relevant practices. There was a lack of depth of organisational engagement across all the businesses in the programme, resulting in the diminishing distribution of the 'client work' within the business, which affected the development of the practices.

The study has two significant limitations, notably the relatively small number of SME's who were able to complete the programme, which did not allow any comparative analysis between degrees of practice development across the cohort. The data collection and subsequent analysis could only focus on the immediate empirical layer, for example depth of engagement without delving deeper into the potential organisational root causes and potential similarities and differences across the cohort also. Unfortunately, this paper does have space to report on the recruitment and selection process which is potentially valuable information to those engaged in knowledge transfer programmes.

7.2 Implications for theory, practice, and society

The paper provides an initial answer to Bourne *et al.* (2018)'s call for looking at PM capability through a practice lens and contributes to the performance management literature by inducting of an array of initialising practices for PM capability. This array can facilitate other researchers to empirically examine how these practices are developed, complementing the work on antecedents and critical success factors. The intervention gradient is a useful concept to articulate the 'independent internalisation' (Done et al., 2011) required in the arena of practice development.

The PPDI diagnostic, which is synthesised from two previous models, the performance pyramid and the MFP calculation, is a contribution to the field of productivity measurement and performance management. This model and associated diagnostic could be tested in other manufacturing contexts and on a wider scale, but it also has scope for adjustment to be sector agnostic. The PPDI is also a contribution to practice; for example, management consultants and SME's can use this to diagnose areas for productivity improvement focus. The other tools, the PIP configuration and the Data Extraction protocol are useful for practitioners who engage in productivity improvement and could help SME's initiate and self-assess their productivity improvement efforts.

The potential societal benefit is a contribution to the demystification of the impact of performance management on productivity by the revealing of distinct, recognisable, and realisable practices that businesses can engage in.

The study highlights the importance of depth of engagement in practice development, which if followed by more SME's could aid organisational development and personal development of many employees across the SME sector.

7.3 Implications for Policy makers and managers

SME businesses of this type require medium to long term *sustained* programme of interventions, to develop productivity improvement capability. These interventions need to be designed to mobilise and support organisational development deep within and across the SME.

Business ecosystem intermediaries, such as accountancy firms and commercial banks can have a role in identifying, recruiting, and supporting SME businesses in productivity development programmes. More work needs to be done on establishing the most appropriate size of the 'pool' to achieve a desired cohort, and on suitable selection criteria to decrease potential attrition.

The findings confirm the utility within a knowledge transfer intervention of a mixture of interactions of workshops and 1-2-1 business focused interactions (Done *et al.,* 2011; Farrukh *et al.* 2019; McGovern *et al.,* 2017) and the use of a diagnostic process to assist in the focusing of effort. The findings re-enforce the importance of template fidelity (McGovern et al, 2017), where experts are required to help the SME transpose 'best practice' or relevant concepts onto their business. In this project the support dialogue around the diagnostic was valuable, but most acute was the need for a more prescribed pathway for the data analysis practice. The data analysis practice required more iterations of coaching and feedback to successfully enact the practice. This is supported by Gray et al (2011, p. 874) who found that for coaching in SMEs, the most important gains were around "improving organisational performance, thinking through issues logically and develop and implement operational plans". The authors posit from this study that explicitly utilising a team coaching approach (Hackman and Wageman, 2005; Rousseau *et al.,* 2013) in knowledge transfer intervention designs could assist both the depth of engagement and the intervention gradient and drive quantity and quality of client work, and subsequently practice development.

The managerial implications are that SME's can develop PM practices, and this can be acquired via knowledge transfer. However, this needs to be sustained and iterative, and developing capability requires involving multiple employees across and within the organisation. It is likely to require development of direct labour as well as indirect labour given the relatively low proportion of indirect labour in the SME context.

7.4 Further work

Further work could be done on larger scale trials of the intervention model, but with the following adjustments:

- The intervention programme should be elongated with set of interventions with iterations to allow at least one feedback loop per input. This could potentially include elongating the intervention to include a successful completion of a pilot productivity project based on the PIP.
- A more prescribed analytical pathway for process data analysis
- Ground the work in a team coaching mode, so the SME would have to nominate and engage a group of employees from across their business
- Contain more substantive client relationship management (CRM) arrangements for the SMEs on the intervention programme, utilising the clients' current business intermediaries

Use of the business intermediaries in the search and selection process for intervention programmes could be improved. Absorptive capacity (Cohen and Levinthal, 1990) which consists of four elements; acquire, assimilate, transform and exploit knowledge for the development of [PM] capability, could provide more definitive criteria for the screening and selection process using the professional partners' knowledge of the client firms.

Further research could also be carried out relating to individual elements of the intervention model, such as the PPDI, or the DEP and data analysis, or the PIP and scorecard as potential examples. Finally, businesses can themselves decide to start developing PM capability prior to implementation of a complete PMS system, and may utilise the three tools used within this programme, PPDI, Data extraction protocol and the PIP configuration to achieve this

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