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# Mapping SME Productivity Research: A Systematic Review of Empirical Evidence and Future Research Agenda


## Abstract

SMEs are the lifeblood of economies around the world. They play an important role in productivity growth, which is crucial for developed economies as they adjust to major trends such as the industrial revolution, an aging population, and changes in the nature of work. This study maps the SME productivity research landscape by way of a systematic literature review focusing on the direct, indirect, as well as mediating/moderating factors that enable or constrain productivity in SMEs. We review 109 empirical studies and highlight the fragmented nature of the extant research in this field. Our thematic analysis identifies six key themes, namely *organizational environment, organizational capabilities, investments, types of innovation*, *external knowledgebase* and *commercialization*. By taking stock of existing knowledge, we highlight critical gaps and methodological issues that limit our understanding of SME productivity. We propose a future research agenda to address current shortcomings and advance knowledge on this topic. Implications for policy are also discussed.



**Keywords:** SMEs, Productivity, Systematic literature review, SME policy

**JEL Classifications: D24 L50 O40**

# 1 Introduction

Productivity, defined simply as the total output (e.g. goods, services) that can be produced with given inputs (e.g. labour, capital, resources), is a key driver of economic growth, social prosperity, and living standards. However, differing patterns and causes of productivity slowdown at the firm level have led to growing inequality in productivity since the 2008-2009 financial crisis (OECD 2019). For example, using firm level data for OECD countries, Criscuolo (2018) finds that the gap in productivity levels between firms in the top and bottom deciles of the productivity distribution increased by 14% between 2001 and 2012. This gap is partly attributed to an increase in divergence between technological frontier and the non-frontier firms (Andrews et al. 2016). Similar patterns are found in the productivity distribution of large and small firms with, for example, manufacturing SMEs achieving persistently lower productivity levels (only 62% in the case of small firms and 75% for medium firms) than large firms (OECD 2018). It is therefore essential to capture the heterogeneity in productivity growth amongst different firm size groups in order to better inform future research as well as policies targeted at reducing barriers to, and capitalizing on, opportunities for productivity growth (OECD 2017a).

In this systematic literature review, we focus on factors affecting productivity in small and medium sized enterprises (SMEs) as opposed to larger firms. The rationale for this is threefold. First, SMEs are the backbone of national economies worldwide, contributing significantly to economic growth and job creation, while at the same time having the potential to facilitate inclusive growth as economies adapt to major trends in the economy (Blancher et al. 2019; Motta 2020). For example, micro enterprises alone account for about 70 to 95% of all enterprises in OECD economies, and are a major source of employment and economic growth (OECD 2017a). Second, SMEs have been disproportionately affected by the 2008-2009 financial crisis, which also marks the widening gap in productivity growth between SMEs and large firms (OECD 2017b). In fact, studies indicate that despite the opportunities to participate in the global economy that digital technologies and global value chains provide, SMEs still lag behind in the digital transition, and are more adversely affected by structural barriers (Cusmano et al. 2018). Third, SMEs face unique constraints which make growth and productivity gains more challenging than in larger firms. In particular, small firms are constrained by the 'liability of smallness', a concept coined by Aldrich and Auster (1986) to explain the set of constraints stemming from: the lack of or uncertainty over financial resources; the impossibility to attract skilled workforce compared to large firms; the difficulty in meeting high interest rate payments and/or administrative costs generated by compliance with government regulations. Furthermore, small firms tend to be owner-manager centric, which restricts their ability to develop and execute strategies (Borch and Madsen 2007). For example, decision-making processes are constrained by the owner-manager's time, resources, information, and managerial skills (Gherhes et al. 2016; Osiyevskyy and Dewald 2015). Their tendency to focus on short-term survival also limits performance and detracts from demands of longer-term growth planning and strategizing (Beaver and Prince 2004). All these aspects have key implications for SME performance, and highlight the need to understand the specific challenges faced by SMEs in achieving productivity growth.

While interest in SME research boomed in the 1990s, research on SME productivity in particular gained increased attention from the mid-2000s when many western economies began experiencing a decline in labour productivity growth (Bughin et al. 2018; Gibb 2000). Nevertheless, while numerous studies have been carried out in entrepreneurship and management fields on different aspects of SME productivity, this knowledge remains highly fragmented. Previous systematic reviews on firm productivity have analysed the impact of Information Technology (Brynjolfsson and Yang 1996), work-family policy (Kossek and Ozeki 1999), manufacturing systems (Muthiah and Huang 2006), and structural change (Krüger 2008) on productivity. Those focused on SMEs have examined specific aspects related to productivity, such as the impact of performance management systems (Garengo et al. 2005), the relationship between innovation, exportation and growth (Love and Roper 2015), SME internationalization (Dabić et al. 2019; Paul et al. 2017), as well as the impact of cash holdings (La Rocca et al. 2019) and public investments (Dvouletý et al. 2020) on SME performance. While these reviews have advanced knowledge on the topic, they do not capture the broader landscape. As Cicea et al. (2019) note, the majority of empirical studies on SME performance - a key dimension of SME productivity - examine organisational factors in isolation, thereby overlooking the external environment in which SMEs operate and the interrelated factors which enable or constrain SME productivity. Moreover, factors influencing firm level productivity such as human capital, management practices, technology, fixed assets etc., are interdependent and cannot be understood in isolation (Prowle et al. 2017).

We therefore adopt a holistic approach to mapping SME productivity literature by carrying out an evidence-based systematic review of empirical studies that explicitly focus on SME productivity in western economies. The main aim of our study is to provide an integrated understanding of the main factors influencing SME productivity. In order to meaningfully explore the current landscape, we address the following research question: *What are the direct, indirect, as well as mediating/moderating factors that enable or constrain productivity in SMEs*? To the best of our knowledge, this is the first review that adopts such a holistic approach in attempting to map the fragmented SME productivity literature. Notably, the factors and mediators/moderators identified in this systematic review are neither specific to, nor restricted to SMEs, but rather provide a map of the current SME productivity research landscape that helps advance our understanding of the field by highlighting key gaps and areas for future research.

Through our systematic review of 109 empirical studies, we highlight the fragmented nature of SME productivity research landscape, and make the following contributions to the field. First, we thematically map empirical studies into six key themes organised around internal (*organizational environment, organizational capabilities, investments* and *types of innovation*) and external (*external knowledgebase*, *commercialization*) factors influencing SME productivity. Second, our descriptive and thematic analyses highlight critical gaps in existing knowledge, as well as methodological issues that currently restrict our understanding of how different factors such as technology, R&D, leadership skills, networks, and collaborations, interact to affect SME productivity. Third, we develop a research agenda and propose four main areas where future research could make useful contributions in advancing knowledge on SME productivity. These are the need for greater comparative analyses (i.e. within SMEs as well as between SMEs and large firms), the need to adopt a holistic approach to

understanding human capital in SMEs, the importance of context, and methodological developments that would better enable the analysis of underlying factors affecting SME productivity.

The remainder of the paper is organised as follows: section 2 explains the systematic review methodology and summarises the results of the database search; section 3 presents a descriptive analysis followed by a thematic analysis where we unpack and discuss the findings; section 4 discusses the results, sets a future research agenda, and considers the limitations of our study; section 5 discusses policy implications; and section 6 concludes.

## 2 Method

In this section, we summarize the systematic review methodology employed in our study. Systematic reviews offer a more transparent, scientific, and reproducible procedure for carrying out literature searches and analyses than narrative reviews (Hu et al. 2015; Tranfield et al. 2003). An evidence-based systematic review is therefore appropriate for fulfilling the aim of our study, enabling us to review empirical studies that explicitly focus on SME productivity in western developed economies. Our review consequently includes studies focusing on Europe (excluding transition economies), the UK, USA, Canada, Australia, and New Zealand. As such, empirical studies focusing on transition or developing economies (Abor et al. 2014; De Loecker 2007; Kim and Ro 2017; Nyikos et al. 2020; Ur Rehman et al. 2019), or those primarily focused on other aspects like SMEs efficiency, performance or competitiveness (Hamilton and Asundi 2010; Hogan and Coote 2014; Ipinnaiye et al. 2017; Siqueira and Cosh 2008), are considered outside the scope of this review. While the focus on western economies restricts our understanding of SME productivity to this specific context, the exclusion of other geographical regions was deemed necessary to ensure greater homogeneity, and allow us to take into consideration the effects of macro-level factors on SME productivity (Ostapenko 2015; Rangamohan et al. 2007). The evidence-based approach also enabled us to provide an integrated understanding of factors influencing SME productivity that can better inform future research on the topic, as well as practitioners and policymakers' decisions with regard to improving productivity growth.

Similar to previous systematic reviews (Hu et al. 2015; Mallett et al. 2018; Thorpe et al. 2005), we follow Tranfield et al.'s (2003) rigorous systematic review methodology that includes three stages, namely planning, conducting and reporting. An overview of the systematic review process is presented in Figure 1 in Online Resource 1. In the planning stage, search strings were constructed in line with the aim of the review and based on a combination of key words related to SMEs and productivity (see Table 1 in Online Resource 1). In conducting the review, we identified and queried four databases, namely Scopus, ABI-Inform/ProQuest, Emerald and Science Direct. If a search generated less than 100 citations, the search string was amended to broaden the search scope. This initial search yielded a total of 1,530 citations. An initial analysis was then carried out to remove duplicates or articles that did not meet the inclusion criteria (see Table 2 in Online Resource 1). Further, in order to ensure scientific quality, only peer-reviewed articles published in academic journals were included (Jones et al. 2011; Liñán and Fayolle 2015). These analyses were carried out independently by two authors of this paper, resulting in a sample of 124 citations (81 articles were selected by both authors independently). Several discussions were

then held to decide which of the 43 articles that had been uniquely selected by either one of the authors should be included in the final review. To ensure that the review was comprehensive and did not exclude any potentially relevant articles, a review update was carried out in addition to the systematic search to identify articles published after our initial search or that the review might have missed. This comprehensive approach involved narrative searches on Google Scholar, as well as further searches at a later stage based on recommendations received from the anonymous reviewers during the review stage, and as a result of consultations with productivity experts. The narrative searches yielded an additional 24 articles. In the next step, the articles were classified into three categories based on their relevance i.e. articles that were directly relevant to the scope of the review (i.e. focused on factors that directly influence SME productivity), articles that were partially relevant (i.e. focused on factors that indirectly influence SME productivity), and articles that were less relevant (i.e. SME productivity is not the main focus, but is rather mentioned incidentally). Our final sample includes articles from the first two categories, resulting in a total of 109 relevant articles.

The last stage included carrying out a descriptive and thematic analysis of the review articles. In order to facilitate the descriptive analyses, we created a spreadsheet to capture information based on a reading guide adapted from Henry et al.'s (2016) systematic review (see Table 3 in Online Resource 1). An abductive coding process was used to carry out the thematic analyses, which involved the use of NVivo coding software. First order codes were inductively identified from the review articles. During the next stage, an iterative process, which involved moving back and forth between the data and theoretical literature, was followed in order to generate the second order analytical themes (Kennedy 2018; Miles et al. 2014). This iterative process involved consultations amongst the authors to further refine initial themes identified. The six main themes identified through this iterative process, were further categorized into aggregate dimensions of internal and external factors influencing SME productivity. An overview of the analytical themes and aggregate dimensions is presented in Table 4 in Online Resource 1.

## 2.1 Defining SMEs and productivity measures

While there is no single agreed upon definition of SMEs, these are generally considered to be non-subsidiary independent firms that employ fewer than a given number of employees, with the upper limit varying between 250 employees (e.g. in the European Union) and 500 employees (e.g. in the United States) respectively (OECD 2005). In this study, we use the OECD definition of SMEs, namely enterprises with fewer than 250 employees that comprise: micro (fewer than 10 employees), small (10–49 employees), and medium-sized (50–249 employees) enterprises (OECD 2017a).

Additionally, productivity is broadly understood in relation to the two most commonly used productivity measures, namely labour and total factor productivity. Labour productivity is a key determinant of living standards (i.e. per capita income) and was considered the main productivity measure until the 1950s when works by Solow (1957) resulted in the prevalent use of the Cobb-Douglas function and total (multi) factor productivity (TFP) (Godin 2009). TFP measures help to disentangle the direct growth contributions of labour, capital, intermediate

inputs, and technology; and is an important tool for reviewing growth patterns and assessing the potential for future economic growth. While the former measure is criticised for attributing all increases in efficiency to one factor (Linna et al. 2010), the latter presents a number of methodological issues that complicates the measurement of TFP (Van Beveren 2012). Despite these limitations, labour productivity and TFP are two of the most common productivity measures, and thus our systematic review includes empirical studies using either measure.

# 3 Results of the systematic review

This section presents the results of our systematic review in relation to the descriptive and thematic analyses carried out on the reviewed empirical studies. The descriptive analysis is presented first, followed by the thematic analysis.

## 3.1 Descriptive analysis

The 109 articles included in the review covered empirical studies published between 1994 to 2020 (inclusive), with the majority of studies (72%) being published within the last decade. The rising trend in number of articles highlights the traction gained by the concept of productivity, as well as the increased focus on SME productivity in both academic and policy discourses in recent years. Critically, we also find that the productivity measures, SME definitions, sample types and sizes, research methods, and data analysis techniques used in the reviewed studies, vary considerably. We summarize below the results of the descriptive analyses, with a more detailed description being provided in Table 5 in Online Resource 1.

The majority of reviewed studies (88%) focus on a single country, and only 4 of those focused on multiple countries specifically carry out cross-country comparisons in their analyses (see Figure 2 in Online Resource 1). Similarly, studies examine a variety of sectors ranging from manufacturing, construction, automotive, agriculture to information technology, textiles, food sector etc., with only 2 studies (Black and Lynch 1996; Yazdanfar 2013) carrying out sector-specific comparisons, and another 4 studies comparing both firm size and sectors (Antonelli et al. 2015; Falk and Hagsten 2015a; Lejarraga and Oberhofer 2015; Parisi et al. 2006). We also find that reviewed studies carrying out comparisons based on firm size and/or related factors such as age, absorptive capacity or region, are most common (22%), followed by those analysing the impact of different interventions (8%) and type/level of technology (6%).

Furthermore, the majority of reviewed studies are quantitative (86%), with sample sizes ranging from one case study (Esan et al. 2013) to 1,897,288 observations from a panel dataset (Foreman-Peck and Nicholls 2013, 2015). Data sources are diverse and include independent surveys (via mail, web, or telephone), data from the national statistical offices, balance sheet data, unstructured/semi-structured interviews, and case studies. The data analysis methods utilized are equally varied and include regression analysis, CDM models, structural equation modelling, case study analysis and observations. In addition, only 31% of reviewed studies address the issue of endogeneity. These studies use a variety of methods, such as the use of longitudinal data, lagged or predicted variables, the

Hausmann-Wu test, CDM framework, or the Generalised Method of Moments system estimator to control for it. Moreover, only 11% of the studies are longitudinal, and analyse the impact of factors such as process innovation, HRM practices, technology adoption, export participation or public subsidies on SME productivity.

Importantly, this variation in data sources and methods of analysis hinders the direct comparability of findings from reviewed studies. Nevertheless, while we acknowledge this as one of the limitations of the systematic review, our aim is to provide an integrated understanding of the main factors influencing SME productivity. We discuss these methodological challenges in section 4 where we also highlight areas for further consideration in future research.

## 3.2 Thematic analysis

Our thematic analyses identified six key themes which were further aggregated into two main groups, namely internal (*organizational environment; organizational capabilities; investments; type of innovation*) and external (*external knowledgebase; commercialization*) factors influencing SME productivity (see Table 4 in Online Resource 1). The categories and themes identified are not mutually exclusive, as majority of the reviewed studies (56%) are classified under more than one category/theme. Our analysis in this section therefore focuses on providing an integrated understanding of the different factors directly or indirectly influencing SME productivity. A mapping of the factors and related mediators/moderators directly influencing SME productivity, as well as a summary of key study findings, are presented in Figure 3 and Table 6 respectively in Online Resource 1.

*Theme I - Organizational environment:* this theme includes research focused on understanding how internal aspects such as workplace practices, ownership structure, industrial relations etc., affect a firm's operations. Reviewed studies analyse how the work environment and human resource (HR) policies impact a firm's labour productivity, with many studies indicating a positive effect of proactive HR planning and recruitment (Black and Lynch 1996; Koch and McGrath 1996; Lodefalk and Tang 2018; McGuinness et al. 2008). For example, Koch and McGrath (1996) find that proactively planning and recruiting the right people from the onset not only results in greater labour productivity, but also benefits the firm through the interaction effect between HR policies and capital intensity (i.e. ratio of assets to total employees). This effect exerts a more dominant influence upon productivity than capital intensity on its own (Koch and McGrath 1996). Hiring lead professionals from frontline firms, also results in knowledge transfers that contribute to the hiring firm's TFP, but only for firms with high absorptive capacity (Lodefalk and Tang 2018).

The productivity of the firm's workforce is also contingent on factors such as work systems, business awards, industrial relations, and technological innovations (Antonioli et al. 2010; Fabling and Grimes 2014; Henriques and Catarino 2016; Jones et al. 2014; Mayer et al. 2017; Towers and McLoughlin 2005). High-performance and decentralized incentive-based work systems are generally positively related to labour productivity. (Datta et al. 2005; Guthrie 2001; Huselid 1995; Rasel 2016), yet it is still unclear whether high performance systems lead to increased productivity or vice versa (Datta et al. 2005). Moreover, the negative effect that small firm size can have on the combination of decentralized work systems and technological innovations points to the need to better

understand how workplace systems interact with other internal factors to impact the labour productivity of different sized firms (Rasel 2016). Unlike large firms, which have more comprehensive work management, HR practices, and technology systems, SMEs tend to focus on organizational practices that increase revenues and optimise resources in order to improve their level of productivity (Bartel et al. 2007; Torrent-Sellens et al. 2016).

Given the increased adoption of technology by SMEs, examining how workplace practices might interact with technological innovations to influence firm productivity is another central focus of reviewed studies (Cohen, 2006; Colombo et al., 2013; Fabi et al., 2010; Raymond, 2005; Torre and Solari, 2011). These point to a complementary relationship, with extensive strategic and organizational changes required to accompany the adoption of technological innovations - and vice versa - in order to have a positive impact on productivity (Colombo et al. 2013; Torre and Solari 2011). Studies analysing the link between productivity, innovation strategies, and industrial relations, find that cooperative industrial relations positively impact training activities and organizational innovation, which in turn drive superior labour productivity (Antonioli et al. 2010). Additionally, Black and Lynch (1996) find that both industrial relations and recruitment processes focused on grades have a positive impact on the labour productivity of firms in the non-manufacturing sector.

Further, studies analysing firm ownership structure focused on understanding how the unique characteristics of family firms, such as family members involvement in the daily running of the firm or the desire to transfer ownership through succession, might influence a firm's productivity level (Barbera and Moores 2013; Cassia et al. 2012; Classen et al. 2014). While no major differences are found between family controlled firms and non-family firms in terms of investment in innovation or financial performance, the former tend to be disadvantaged in terms of workforce motivation and labour productivity (Cassia et al. 2012; Classen et al. 2014). However, these findings seem to be influenced by the productivity measure used. While the two previous studies focus on measuring the labour productivity of firms in Italy and Germany respectively, a study by Barbera and Moores (2013) focuses on measuring the TFP of firms in Australia. This latter study finds that family-controlled firms' labour output (capital output) contributions are significantly higher (lower) than that for non-family firms. Subsequently, they conclude that when heterogeneity of output contributions are considered, no differences exist between family controlled and non-family firms' productivity levels (Barbera and Moores 2013).

Although numerous studies have been carried out on understanding the impact of a firm's internal organizational environment on productivity, there is still scope for future research to analyse the interrelationship between ownership structure and factors like technological innovations, R&D, and HR systems. Studies examining a wider range of workplace practices, and those considering the intensity of technology usage, as opposed to mere adoption, could also provide a more in-depth understanding of the conditions under which these relationships are magnified (Colombo et al. 2013). Moreover, the absence of longitudinal studies in this area limits our knowledge of the cumulative impact that HR practices or training schemes might have on SME productivity.

*Theme II – Organizational capabilities:* the studies under this theme focused on understanding how a firm's ability to manage its human resource impacts its level of productivity. Studies analysed a variety of factors including staff employability, training, wellbeing, leadership, and owner-managers' demographics (Arocena et al. 2007;

Cocker et al. 2013; Henriques and Catarino 2016; Li et al. 2016; McGuirk et al. 2015; Middleton and Byus 2011; Ribeiro Soriano and Castrogiovanni 2012; Savery and Alan Luks 2004). In general, training seems to have a positive effect on labour productivity (Georgiadis and Pitelis 2012; Mancinelli and Mazzanti 2009). However, a more in-depth analysis reveals that the impact of training activities is dependent on other factors. Training programmes focused on employees have a larger positive impact on firm productivity than those focused on managerial staff or HRM (Georgiadis and Pitelis 2012). Further, Black and Lynch (1996) find that the average education level of firm employees has a significant positive effect on labour productivity for both the manufacturing and non-manufacturing sectors. Moreover, they also find that while a greater proportion of formal off-the-job training resulted in higher labour productivity (after adjusting for costs of introducing new skills) for firms in the manufacturing sector, the content of training programs was more important for those in the non-manufacturing sector (Black and Lynch 1996; Koch and McGrath 1996). The need to match employees' skill levels to the firm's level of technological change is also highlighted by Sandulli et al. (2013) who find that, contrary to common belief, having a younger workforce could result in reduced efficiency for firms with high-levels of technology change. Highly skilled employees are also found to be as equally important as R&D for the innovation output of knowledge-intensive service micro-firms (Audretsch et al. 2020).

Additionally, the slow adoption of information and communication technologies (ICTs) by SMEs has been shown to constrain productivity growth (Martínez-Caro and Cegarra-Navarro 2010). A number of studies analyse the relationship between SME owner-managers' socio-demographic characteristics (e.g. gender, ethnicity, race, education, experience) and their adoption of ICTs (Middleton and Byus, 2011; Middleton and Chambers, 2010). Whereas no significant effect is found for the owner-managers' gender, education, or experience, on their intention to adopt or use Wi-Fi technology, this is not the case when ethnicity is considered (Middleton and Chambers, 2010). Examining SMEs located in renewal communities - areas specifically targeted for growth and development by the federal government in the USA - Middleton and Byus (2011) find a continuing digital divide between Hispanic and non-Hispanic SME-owners, which undermines the very policies designed to enhance business operations in these relatively disadvantaged urban areas. In general, non-Hispanic SME-owners are more likely to adopt ICTs for both administrative and analytical purposes (Middleton and Byus, 2011). Interestingly, another study analysing the impact of a workforce's cultural diversity on patent applications in various German regions, finds that cultural diversity has an innovation-enhancing effect due to its positive influence on the knowledge creation process (Niebuhr 2010).

Further, only a handful of studies focus on leadership and employee wellbeing, even though these factors play a key role in influencing productivity. For example, Ribeiro Soriano and Castrogiovanni (2012) find that the CEO's entrepreneurial human capital, in the form of industry specific knowledge prior to start up, and general business knowledge post-start-up, are both positively related to the firm's labour productivity. Furthermore, Li et al. (2016), who focus on the impact of e-leadership, find that SME leaders play an important role in improving firm productivity by ensuring optimal utilization of existing/new technologies. SME owner-managers' wellbeing also has an important impact on labour productivity, with experiences of high levels of psychological distress resulting in substantial productivity loss (Cocker et al. 2013). However, as these two topics remain relatively

underexplored, future studies examining the interrelationship between employee wellbeing, leadership styles, and SME productivity can make significant contributions to current knowledge. Moreover, there is need for a better understanding of the type of training that is most appropriate for increasing labour productivity; especially when factors such as the level of education/experience of the workforce, or the sector/region within which the firm operates, are taken into consideration.

*Theme III – Investments:* the studies classified under this theme analysed the impact of investments in R&D and technology on firm productivity. While the relationship between technology and productivity has been a source of debate historically (Brynjolfsson and Yang 1996), recent studies point to the positive impact intensive use of information technology has on productivity. This is attributed to the increased collaboration capabilities (Ruivo et al. 2015), as well as the decreased market research and coordination costs that exporting firms incur (Sandulli et al., 2012). Despite the fact that investment in technology is shown to be relevant for SMEs, both in terms of productivity and firm survival in competitive markets (Niaki and Nonino 2017; Ruivo et al. 2015; Scuotto et al. 2017), SMEs are still slow in adopting ICTs (Martínez-Caro and Cegarra-Navarro, 2010; Mole et al., 2004). Two of the studies in our sample analyse how owner-managers' perceptions might influence SMEs' adoption of new technologies (Nunes et al. 2006; Wielicki and Arendt 2010). Nunes et al (2006), for example, find that while owner-managers are cognizant of the positive impact of knowledge management on productivity, they are still reluctant to invest in long-term goals for which they cannot establish added value. Thus, knowledge management activities within SMEs happen in an informal manner, and are rarely supported by ICT systems (Nunes et al., 2006).

Moreover, an SME's ability to assimilate technological innovations, rather than simple adoption, is a crucial factor in determining whether it experiences a positive or negative impact on its productivity levels (Raymond and St-Pierre 2005). R&D is crucial to facilitating a firm's absorption capacity of new technology, and through innovation, boosts productivity growth (Ballestar et al. 2020; Parisi et al. 2006). Internal R&D and knowledge spillovers are also complementary for labour productivity; with knowledge spillovers being more important for productivity, and R&D being important for both innovation and productivity (Audretsch and Belitski 2020). Knowledge spillovers also have an impact on the intensity of R&D investment, which subsequently results in increased labour productivity growth (Audretsch and Belitski 2020). Analysing robotic tool adoption in Spanish manufacturing SMEs, Ballestar et al. (2020) also find that while knowledge spillover effects relate to capitalization and exports in the case of robotized SMEs, they relate to human capital for non-robotized SMEs.

Studies also focus on understanding how public support might influence the likelihood of a firm's engagement in R&D and the subsequent impact on productivity, but with inconclusive results. On the one hand, some studies find that public subsidies have a positive impact on a firm's investments in R&D (Griffith et al. 2006; Hottenrott and Lopes-Bento 2014). In this case, increased R&D efforts per employee leads to a higher probability of the firm having at least one process or product innovation; with both types of innovation being associated with higher firm productivity (Griffith et al. 2006). Publicly induced R&D investments also positively impact sales from market novelties, especially for international collaborators, suggesting that knowledge spillovers from partner firms contribute substantially to a firm's success when introducing radical innovations (Hottenrott and Lopes-Bento

2014). On the other hand, other studies find that R&D subsidies have no positive significant effect on labour productivity over the five-year period after a subsidy is granted (Karhunen and Huovari 2015). In effect, due to its negative impact on productivity, small firms tend to invest in R&D only when public support is available (Serban 2013).

While reviewed studies highlight the varied impact that investment in technology and R&D have on productivity based on factors such as firm size, age, and sector (Baumann and Kritikos 2016; Nunes et al. 2013; Struker and Gille 2010), there is still a limited understanding of the lagged effect of R&D spending, or the impact of the economic cycle, on SME productivity growth (Madrid-Guijarro et al., 2013; Mañez et al., 2013; Sandulli et al., 2013). Further longitudinal studies that are better able to capture the dynamic aspects of such factors would make valuable contributions to this knowledge gap. Future research should also consider the interrelationship between technology, R&D investments, organization culture, and management style (Falk and de Lemos, 2019; Nunes et al., 2006).

*Theme IV – Types of innovation:* the studies under this theme focused on understanding how a firm's participation in either process or product innovation, or a combination of the two, might influence productivity. Although the studies highlight that both types of innovation have a positive impact on firm productivity (Bagchi-Sen 2001; Dora et al. 2014; Hall et al. 2009; Higón and Driffield 2011; Maani et al. 1994; Raymond et al. 2013; Su and Tang 2016), a firm's decision to undertake either type of innovation is influenced by the firm characteristics (Calderini and Cantamessa 1997; Dora et al. 2013; Su and Tang 2016) and level of R&D spending (Baumann and Kritikos 2016; Griffith et al. 2006; Hall et al. 2009; Parisi et al. 2006).

Examining the link between R&D, innovation, and labour productivity for micro- and large SMEs in Germany, Baumann and Kritikos (2016) find that only product innovation has a sizable positive effect on labour productivity for both micro-firms and SMEs. Labour productivity also increases with firm age, and particularly in the case of micro-firms (Baumann and Kritikos 2016). Similarly, Su and Tang (2016) who analyse the factors influencing a firm's decision to pursue different business strategies in a post-crisis context, find that Canadian SMEs pursuing product innovation are more productive than those pursuing cost-cutting strategies. On the contrary, while investigating how and when innovation takes place, Hall et al. (2009) find that both product and process innovations (and especially process innovation) have a positive impact on the productivity of SMEs, and that larger and older firms seem to be, to a certain extent, less productive, ceteris paribus. Similarly, Audretsch et al. (2020) find that start-ups and young knowledge-intensive service micro-firms are more likely to engage in innovation activities than mature firms, and that such innovation activities lead to increased labour productivity.

The lagged effect that process innovations might have on TFP is also analysed in a study by Manez et al. (2013), who find that implementing a process innovation for the first time does not guarantee immediate productivity rewards. Instead, it allows the firm to gain experience which results in extra productivity growth in the subsequent period, and that this growth lasts for only one period (Mañez et al. 2013). A more holistic approach that incorporates organization-wide cultural changes is required in order for a firm to benefit from productivity gains over the long-term (Gunasekaran et al. 2000; Uwizeyemungu et al. 2015). Therefore, a more comprehensive

understanding of the lagged effect of product and process innovations on SME productivity, as well as the dynamic relationship between innovation processes and IT systems integration (Raymond et al., 2013) is needed. Greater attention should also be paid to the type of firm innovation (i.e. incremental versus radical) and its impact on productivity (Hernandez-Espallardo and Delgado-Ballester 2009).

*Theme V – External knowledgebase:* this theme includes studies analysing the impact of alliances/collaborations, business advisors, takeovers or firm mobility, clusters and value chains on SME productivity. Most studies in this theme point to the positive impact that alliances/collaborations, value chains, and knowledge clusters have on SMEs' innovation capabilities and productivity (Antonelli et al. 2015; Bakhtiari 2015; Capello 1999; Hemert et al. 2013; Jones and Corral 2017; Noke and Hughes 2010; Tomlinson and Fai 2013). Specifically, the formation of alliances/collaborations is associated with increasing firms' new product capability (Noke and Hughes 2010), facilitating the ICT adoption process for micro firms (Gare and Melin 2011), and increasing technological capabilities (Barajas et al. 2016); all factors that are associated with improved labour productivity. Audretsch and Belitski (2020) also find that increased investment in R&D and knowledge spillovers impact the likelihood of an owner-manager implementing "make or ally" innovation strategies rather than "buy or imitate" new products developed by others.

Furthermore, participation in publicly supported international research joint ventures or knowledge transfer partnerships at local/international levels also allows SMEs to draw upon higher institutions' knowledge and human resources to strengthen their innovation capabilities and increase productivity (Barajas et al. 2016; Humphries 2005). Nevertheless, the positive impact of such collaborations is contingent upon firm specific factors. For example, Mancinelli and Mazzanti (2009) find that without accompanying investments in R&D and training, networking (and by implication the mere existence of local spillovers) plays a negligible role in stimulating labour productivity. In the same way, the impact of productivity centres on SMEs' process improvement capabilities are dependent on: firms' willingness to change, senior management support, establishment of key performance indicators, and availability of personnel (McGovern et al., 2017). SMEs therefore need to make internal organizational adjustments in order to reap the benefits of increased productivity resulting from participation in external collaborations and networks.

Other aspects examined by studies in this theme are the role of advisors, and the relationship between takeovers/firm mobility and productivity. Henley and Song (2019), for exmaple, find that using external advice, business networking, and having a formal business plan, are all associated with a significant increase in the likelihood that micro-firms will innovate. Studies focused on analysing interventions aimed at increasing SMEs' innovation capabilities also find that, while such interventions have a positive impact on goal setting, firm performance, and labour productivity, they have a detrimental effect on innovation activities (Oeij et al. 2015). For example, Harris et al. (2016) find that SMEs that are located in peripheral regions and that adopt business improvement methods end up undertaking innovation-related activities but remain non-innovators.

A number of studies also find a reciprocal relationship between SMEs takeover or mobility and the level of productivity, that is further influenced by geographic location (Foreman-Peck and Nicholls 2013, 2015). Unlike

large firms, more productive small firms are at a greater risk of takeovers if they are centrally located (Foreman-Peck and Nicholls 2013). Such takeovers raise the productivity levels for SMEs located in both central and peripheral regions. Moreover, firm mobility is more prevalent amongst SMEs that are younger, more productive, relatively larger, and centrally located, than regionally immobile firms (Foreman-Peck and Nicholls, 2015). After moving, these fast-growing SMEs become even more productive and employ more workers; and through this market process the regional core supports peripheral regions (Foreman-Peck and Nicholls 2015).

Although the studies highlight the important role that the external knowledgebase plays in influencing SME productivity, a number of issues remain unresolved. For example, it is not clear whether cooperation leads to innovation or vice versa (Tomlinson and Fai 2013). The role of firm specific factors such as ownership structure, firm size or age, in influencing the formation of external collaborations, as well as the subsequent impact on innovation and productivity is equally unclear (Harris et al. 2016; Noke and Hughes 2010). Therefore, further in-depth analyses of these relationships would make valuable contributions in this area.

*Theme VI – Commercialization:* studies under this theme focus on analysing how global competition, export activities, and the external environment influence SME productivity (Guzman-Cuevas et al. 2009; St-Pierre and Raymond 2004). The strong positive relationship found between SMEs' productivity levels and export participation (Eliasson et al. 2012; Falk and de Lemos 2019; Falk and Hagsten 2015a, 2015b) has resulted in research focused on understanding the factors influencing an SME's intention to export. A number of studies show that factors such as innovation activity, firm size, workforce, and public incentives all influence a firm's propensity to export (Banno et al. 2014; Eliasson et al. 2012; Falk and de Lemos 2019; Higón and Driffield 2011; Onkelinx et al. 2016). Henley and Song (2019), however, find that there is no direct productivity benefit from innovation for micro-firms, but that the impact is as a result of exporting as an internationalisation strategy. Importantly, the intention to export also has a positive impact on a firm's productivity levels (Eliasson et al. 2012).

Further, investigating the export productivity premium of SMEs, Falk and Hagsten (2015b) find that the level of labour productivity of exporting SMEs is 13 percentage points higher than that of non-exporting firms in any given industry and country. Relative productivity levels are also higher for SMEs present in both EU and non-EU markets than those operating in only one of the two markets. A second study by Falk and de Lemos (2019) finds that SMEs' export participation and export share depend on their labour productivity level and R&D-sales ratio, with the impact being more pronounced for micro-, young, and born global firms. Firm labour productivity (Onkelinx et al. 2016) and industry sector (Lejarraga and Oberhofer 2015) also have an impact on SME internationalization and intention to export respectively, with productive ICT and professional service firms more likely to export to foreign markets (Lejarraga and Oberhofer 2015). Additionally, Lejarraga and Oberhofer (2015) show that TFP and firm size of SMEs in the manufacturing and services sector affect their probability to export, but not their relative engagement in foreign markets. Public financial support is also found to be effective in enhancing productivity growth, especially when targeted towards smaller, younger firms, and those with international experience (Banno et al. 2014).

Other studies examining the potential contribution of SMEs to rural economic development find that rural regions have a higher proportion of fast growing SMEs, which are more active in adapting to local market conditions (North and Smallbone, 1996). However, these SMEs lag behind their urban counterparts, both in terms of labour productivity, and orientation to national and international markets (North and Smallbone 1996). A more recent study analysing productivity transmissions between SMEs and large firms, confirms a positive spillover effect of SME labour productivity on large firm productivity in the long run (van Stel et al. 2019). Similar positive spillover effects on TFP are experienced between frontier and laggard firms (Romero-Jordan et al. 2019). Finally, labour productivity is an important determinant for growth and profitability of SMEs in various industry sectors, with smaller, younger firms benefitting more than larger, older firms (Guedes de Carvalho et al. 2013; Yazdanfar 2013).

Given the significant role that global competition and participation in exports play in enhancing SME productivity, future studies examining how related factors such as location of global markets, or human capital (e.g. level of education or international work experience) might influence a firm's export intentions (Kohr et al. 2017; Onkelinx et al. 2016) can provide further insights in this area.

# 4 Discussion and Future Research Agenda

SME productivity growth is important for developed economies as they adapt to major trends such as digitalisation, an ageing population, and changes in the nature of work. For example, the BEIS report on small businesses and productivity indicates that SMEs play an important role in contributing to productivity growth through their impact on wealth and employment creation (BEIS 2018b). Fostering productivity in SMEs as a way of ensuring their survival and growth has therefore been a major focus for both practitioners and policymakers (Mañez et al. 2013). The continuing decline in labour productivity growth that characterized many western economies since mid-2000, and especially after the financial crisis of 2008-2009, has similarly led to a sharp increase in SME productivity research. However, as underlined by our systematic review, which aimed to provide an integrated understanding of the main factors affecting SME productivity, this research field is highly fragmented. While the empirical studies provide useful insights into the direct, indirect, and mediating/moderating factors influencing SME productivity, there are important gaps in knowledge that need to be addressed by future research. Our discussion highlights four main areas, namely 1) the need for comparative analyses within SMEs, as well as between SME and large firms, 2) the need to adopt a holistic approach to understanding human capital in SMEs, 3) the importance of context, and 4) the methodological challenges and developments to be considered. In highlighting these gaps, we develop a research agenda to guide future research and help advance knowledge on SME productivity. We also consider the limitations of our study at the end of this section.

## 4.1 The need for comparative analyses

Our analysis emphasizes the effect of firm characteristics (e.g. size, age, sector) on productivity levels (Barbera and Moores, 2013; Eliasson et al., 2012; Falk and Hagsten, 2015a; Hall et al., 2009; Laforet, 2013; Mole et al.,

2004; Raymond et al., 2013; Sandulli et al., 2012). Indeed, firm size can have a constraining effect on firm capacity both in terms of its human and financial resources, and influences the type of strategies SMEs adopt to improve productivity levels (Torrent-Sellens et al. 2016). Besides, a combination of firm size, age, and sector, influences a firm's innovation capability and determines the effect that technological and R&D investments have on its productivity (Baumann and Kritikos, 2016; Hall et al., 2009; Nunes et al., 2013). Apart from having an impact on the internal firm factors influencing productivity, these firm specific characteristics can also act as enablers or inhibitors to external factors such as the types of alliances/networks formed, or level of participation in global markets (Harris et al. 2016; Noke and Hughes 2010). For example, network relationships with suppliers, customers, trade associations, and other intermediaries, are important factors affecting innovation and SME productivity (Pittaway et al. 2004).

A firm's sector will also influence the type of opportunities and restrictions impacting its growth and productivity level. For example, Hogan and Coote (2014) highlight that a culture of innovation in professional services firms in particular, supports innovative behaviours that can sustain organizations and foster organizational renewal. Even the type of training most appropriate for increasing SME labour productivity is influenced by the sector in which the SME operates (Black and Lynch 1996). Future studies therefore need to pay greater attention to changing trends in different sectors. The growing economic importance of the services sector is likely to result in R&D activities becoming more prevalent in order to support service innovations (Miles, 2007), with potential benefits for productivity enhancements.

Therefore, in line with Mallett et al. (2018), we find the homogenisation of different-sized businesses under the SME umbrella problematic, as it obscures differences that may be important for understanding firm operations, goals, and challenges. For example, in the case of micro-firms "the owner-manager is the company" (Lean, 1998:233), which not only imposes constraints on their growth capacity but also makes growth dependent on the owner-managers' skills, capabilities, and ambitions (Gherhes et al. 2016). In such firms, owner-managers have a more dominant role than might be the case for larger counterparts, which can have key implications for productivity. Future studies on SME productivity therefore need to consider firm size and the heterogeneity of firms are classified under this category, especially given that definitions of SMEs tend to vary across geographic regions (Koch and McGrath 1996; Raymond et al. 2013; Raymond and Bergeron 2008). This would allow for more in-depth analyses into the types of factors that are more relevant for specific firm categories, while providing greater insights for targeted interventions aimed at improving SME productivity.

Furthermore, there is a need for more comparisons between SMEs and large firms in order to better understand the type of factors that have a greater impact on the productivity of different sized firms. For example, exporting, like many other factors highlighted in this review is not restricted to SMEs, but affects firms of all sizes. While studies find an export premium, with export entrants becoming more productive once they start exporting (De Loecker 2007, 2013), key questions that remain unresolved include whether export premium varies with firm size. Future research could focus on both within-SMEs variation, as well as compare SMEs to large firms, in order to understand the benefits of exporting on productivity gains.

## 4.2 Human capital in SMEs

The studies in our review indicate that human capital is significant in determining an SME's level of productivity. However, this area remains relatively underexplored, with only a handful of studies looking at aspects such as leadership style, organizational culture, and employee wellbeing (Cocker et al. 2013; Li et al. 2016; Ribeiro Soriano and Castrogiovanni 2012). Importantly, reports indicate that poor management practices can have a limiting effect on SME productivity and innovation (OECD 2017b). CEOs' managerial skills and human capital, especially in the case of SMEs, are important in promoting innovations within the organization (Custodio et al. 2017). The current gap in knowledge therefore presents opportunities for future studies in this area. Given that management practices account for 30% of TFP differences both within countries, and between countries across firms (Bloom et al. 2016), we encourage future studies to examine how the CEO's management and/or leadership style directly or indirectly influences SME productivity (Büschgens et al. 2013; Hogan and Coote 2014).

Moreover, a more holistic approach to analysing human resources in SMEs that focuses not only on skills and experience, but also on factors such as workforce diversity, wellbeing, and work-life balance, is necessary. Given the positive impact that ethnic and gender diversity has on firm innovation (Díaz-García et al. 2013; Nathan 2014), future studies analysing these and other types of diversity (e.g. neurodiversity, ability status, race) would provide insights on the relationship between diversity and productivity. Understanding how modern societal challenges, such as an ageing population and changes in the nature of work (e.g. more flexible and/or short-term contracts) might impact productivity also provides a fruitful avenue for future research.

Our knowledge on the impact of wellbeing and work-life balance on productivity, or vice versa, also remains limited. Work-life programmes, for example, have a positive impact on productivity in large firms (Konrad and Mangel 2000). However, given the different operational dynamics that SMEs are likely to face, future studies could examine how work-life balance is achieved within SMEs, and how this subsequently impacts productivity. Wellbeing has also been strongly associated with active engagement in entrepreneurial tasks (Shir et al. 2018). This research should be extended to determine whether similar positive relationships exist between wellbeing and SME productivity. We also argue that the different aspects of human capital should not be analysed in isolation. Instead, studies should focus on understanding how they interact with other internal firm-level factors, such as investment in R&D, technological innovations, workplace systems, as well as external firm factors like the external knowledgebase to influence productivity.

## 4.3 The importance of context

In management research, and for the purposes of this systematic review, context refers to the circumstances, conditions, situations, or environments that are external to the respective phenomenon and that enable or constrain it (Welter 2011). Critically, only one study in our sample focused on analysing the impact of socio-economic contexts on SME productivity, which was insufficient to warrant a separate theme. The study examined how spatial economic and socio-institutional factors might influence the productivity of SMEs located in the Northern and Southern provinces of Italy (Fazio and Piacentino 2010), with the socio-economic context being measured in

terms of: level of employment, unemployment rates, crime levels, and net brain drain. They find that even though SMEs located in regions of greater social decay experience lower productivity, this relationship is dependent upon the firm's level of capital intensity. Hence, firms with higher capital intensity are less affected by external factors such as location or geography (Fazio and Piacentino 2010).

We therefore want to highlight the important role of the socio-economic context for SME productivity levels, especially in the context of broader calls for contextualizing entrepreneurship research (Autio et al. 2014; Smallbone 2016; Welter 2011). Scholars have shown that a firm's geographic location matters (Foreman-Peck and Nicholls, 2013; Foreman-Peck and Nicholls, 2015; Harris et al., 2016; North and Smallbone, 1996), with SME productivity being influenced by external factors at the national, regional and local levels. At the regional and local level, external factors such as the availability and cost of labour, market size, level of infrastructure, technology, as well as access to finance and knowledge centres, can impact SME productivity. At the national level, formal (legislations, regulation, property rights) and informal (social norms, cultures, customs, traditions) institutions, also referred to as the rules of the game (North, 1991) provide the incentive structure for economic activity. Institutions can therefore act as either enablers or inhibitors of entrepreneurial behaviour (Welter and Smallbone 2011), firm productivity (Ostapenko 2015), and innovation (Autio et al. 2014). However, studies focused on cross-country or regional level comparisons are scarce, thus limiting our understanding of the dynamics and uniqueness of different country and regional contexts (Autio et al. 2014; Smallbone 2016; Welter 2011), as well as the generalisability of current knowledge across different contexts. The lack of multi-country comparisons also provides opportunities for future research aimed at gaining a deeper understanding of the national/regional factors influencing SME productivity. We therefore call for future context-sensitive research to provide a better understanding of how different contextual factors enable or constrain SME productivity.

Further contributions can also be made by studies analysing the direct and indirect impact of informal institutions (i.e. culture, social norms, societal expectations) on SME productivity. For example, the intersection of gender and innovation leads to gendered innovation processes, and the gendering of innovation practices (Alsos et al. 2013). Socio-economic factors also tend to have a constraining influence, positioning female-led firms in gendered spaces (Carter et al. 2015), and impacting the recognition of opportunities for social innovations (Spiegler and Halberstadt 2018). Analyses of female SME owner-manager's innovation activities and the resulting impact on productivity, should therefore be embedded in understanding normative frames and structural factors at play (Alsos et al. 2013). Future research examining the relationship between factors such as culture, ethnicity, gender, race, and productivity can provide useful insights on the broader structural challenges that SME owner-managers belonging to under-represented groups encounter, and the strategies they employ to overcome them.

### 4.4 Methodological challenges and developments

As productivity measurement is strongly data-driven, access to and quality of firm-level data is particularly important. A key challenge that we identified in this systematic review is the variety and inconsistency of methodological approaches adopted, with a wide range of data sources, sampling methods, and data analysis

techniques being employed to research SME productivity. As such, there is a need to consider the advantages and disadvantages of specific data. For example, self-conducted surveys of production values are likely to suffer from measurement errors and high rates of non-response. Balance sheet data is also generally not appropriate for analysing SME productivity, due to reporting thresholds that result in micro- and small firms not providing profit and loss accounts in many countries. Another important challenge is firm-level data representativeness; given that larger SMEs are often over-represented while micro firms are under-represented.

Main issues that require greater consideration by future research therefore includes the low response rates of individual surveys, unclear representativeness, gaining access to national statistics data, and linking data from different surveys. For instance, while data from national statistical offices is of high quality, access and linking possibilities are country specific. Therefore, there is a need for multi-country studies using harmonised and internationally comparable data at firm level (Hagsten and Kotnik 2017). Moreover, the type of data available typically includes either administrative accounting data with little opportunity to link to contextual information, or surveys focused on contextual factors with no opportunity to link to value-added firm-level data. In the latter case, the answers to productivity questions could also depend on how respondents frame their understanding of productivity. Nevertheless, data linkage remains a key issue, which also presents the problem of connecting firm-level data to information on the characteristics and attributes of individuals, such as owner-manager teams rather than single individuals.

Furthermore, while studies use both labour productivity and TFP measures indiscriminately, we argue that greater attention needs to be paid to the type of measurement used, as this might influence study results (Barbera and Moores 2013; Cassia et al. 2012; Classen et al. 2014). For example, Linna et al. (2010) highlight the limitations of using single factor productivity measures, such as labour productivity, that attribute all increases of efficiency to one factor. Moreover, while TFP measures might be more appropriate in determining SME productivity given the changing trends in the work environment, future studies need to bear in mind the various challenges in estimating TFP (Van Beveren 2012).

The issue of endogeneity is another key concern for future econometric studies on SME productivity. Our systematic review indicates that only 31% of quantitative studies deal with this issue, and these employ various methods such as lagged or predicted variables, Hausmann-Wu test, CDM framework, or the Generalised Method of Moments system estimator. As most explanatory variables are correlated with the error term, and given the restrictiveness of OLS Gauss-Markov assumptions, coefficients may be biased and/or inconsistent if the issue of endogeneity is not adequately addressed. At the same time, given that 85% of the reviewed studies are quantitative, there is not only scope, but also need for more mixed-method research to untangle the complex nature of SME productivity.

Finally, the analysis of issues mentioned in the previous sections also calls for research using a wide array of methodological approaches and data sets. For example, a more fine-grained analysis of the contextual factors influencing SME productivity might provide opportunities for studies using qualitative or mixed method approaches. Additionally, the lagged effect of R&D investments, the long-term cumulative effects of interventions

such as training programmes, the adoption of technological innovations, and the changing work environment, all call for longitudinal studies that are better able to capture the changing dynamics of SME productivity growth. Experiments and randomised controlled trials—not widely used in the SME literature—would also allow studies to move beyond cross-sectional analyses to determine causal relationships between factors such as organizational culture, innovation, HRM capabilities and SME productivity growth (Baumann and Kritikos 2016; Fabi et al. 2010; Naranjo Valencia et al. 2010).

### 4.5 Limitations

We acknowledge a number of limitations to our systematic review. First, while the systematic review methodology is designed to be as objective as possible, by its nature, it relies on defined parameters, which means that certain papers will be out of scope, but not irrelevant. Thus, the use of keywords, search strings, and specific databases may have limited the number of papers identified as relevant by the review, while the databases used may also exclude publications from specific journals, making it difficult to capture all relevant literature. Second, restricting database searches to titles and abstracts may also have restricted the number of articles found. However, such an approach is deemed appropriate when the body of knowledge is vast (Thorpe et al. 2005), which is the case of the SME productivity literature. Third, the high variation in data sources, research methods, and data analysis techniques in our sample of articles hinders the direct comparability of study findings. Nevertheless, our systematic review provides a useful map of the SME productivity literature, highlighting key methodological shortcomings and providing key directions for future research in this area.

Therefore, we acknowledge that certain key issues that are relevant to the SME productivity debate may not have been captured by our systematic review due to the nature of the review protocol. For example, the issue of knowledge spillover effects that have been shown to have an impact on innovation and productivity growth (Acs et al. 2009; Glaeser et al. 1992) is relatively underexplored by the reviewed studies. Specifically, only 14% of the reviewed studies address the issue of spillover effects, and examine, for example, the spillover effects of SME productivity to large firms (van Stel et al. 2019), spillover effects of TFP growth from frontier to laggard firms(Romero-Jordan et al. 2019), the relationship between internal R&D, knowledge spillovers and innovation strategies (Audretsch and Belitski 2020), and the link between knowledge flows, industrial robotics, and labour productivity (Ballestar et al. 2020). The remaining studies focus on analysing the impact of alliances, collaborations, recruitment practices, or workforce diversity on firm productivity (Hottenrott and Lopes-Bento 2014; Lodefalk and Tang 2018; Niebuhr 2010), and indicate possible knowledge spillover effects as part of their findings.

Similarly, access to capital has been shown to have major implications for SME productivity. A meta-analysis carried out by Kersten et al. (2017) on SMEs in low and middle income countries, finds a positive significant effect of SME finance on investments, firm performance, and employment. Although, the reviewed studies do acknowledge the particular challenges faced by SMEs in accessing finance, the issue of funding is primarily analysed in relation to the impact that public funding and subsidies for R&D investment, internationalization, or

research joint ventures, have on SME productivity (Banno et al. 2014; Barajas et al. 2016; Griffith et al. 2006; Hottenrott and Lopes-Bento 2014; Karhunen and Huovari 2015). While our systematic review may not have captured a wide range of papers focused on these topics, there is scope for future reviews to provide additional insights in these and other areas, and thus to bring further clarity to this highly fragmented field.

## 5 Policy Implications

Our systematic review yields important implications for policy. Improving productivity as a means of ensuring long-term economic growth is a key concern for many governments, with SMEs being central to achieving this growth (van Stel et al. 2019). For example, the productivity lag in the UK has been attributed to the long tail of unproductive small business (BEIS 2018b). Gaining a better understanding of the main factors affecting productivity in SMEs is therefore crucial for researchers and policymakers alike (Mañez et al. 2013). As emphasised by the OECD, "upgrading productivity in a large population of small businesses, including in traditional segments and the informal economy, can help governments achieve both economic growth and social inclusion objectives, including escaping from low productivity traps and improving the quality of jobs for low-skilled workers" (OECD 2017b, p.8). Implications for policymakers include the need to provide sustainable support to SMEs, which focuses on building skills and competencies that can assist them in implementing organizational/strategic changes needed to profit from sustained productivity gains as a result of R&D and technological investments (Gunasekaran et al. 2000). Targeted interventions such as training and/or advisory programmes should also consider the mode and type of training being offered, as well as firm specific factors such as size, age, sector, and location. Providing a platform that facilitates greater collaboration and networking opportunities between SMEs and local/international knowledge centres (e.g. universities, research institutes) should also have a positive effect in strengthening SMEs' innovation capabilities. Lastly, interventions that are focused on providing public subsidies as a way of countering the negative effects of R&D investment should also be sensitive to unintended consequences, such as the survival of less efficient firms (Karhunen and Huovari 2015), that could subsequently have a negative impact on overall productivity growth.

In this sense, the issues highlighted in our systematic review relate to the broader productivity puzzle debate. This refers to the unusually weak or declining productivity growth that has characterized many western economies since the financial crisis of 2007-2008 (OECD 2017c). While competing explanations have been proposed for this declining growth, such as the difficulty of measuring productivity, or the shortage of demand and investment opportunities that constrain productivity growth, economists have hitherto failed to reach a consensus. However, it is widely acknowledged that productivity remains the single most important economic factor (Prowle et al. 2017). As Paul Krugman's widely cited remark emphasizes: "Productivity isn't everything, but, in the long run, it is almost everything." A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker. Importantly, SMEs make a critical contribution to economic growth and job creation in western economies, yet differences in productivity between large and small firms persist, with SMEs often characterised by lower productivity than their larger counterparts (OECD 2018). In highlighting methodological shortcomings and key gaps in our knowledge on SME productivity, our systematic review

provides a useful map for future research to address these issues, and provide critical insights into SME productivity dimensions that can contribute towards solving the productivity puzzle.

## 6 Conclusion

Our systematic review of 109 empirical studies aims to provide an integrated understanding of the main factors affecting SME productivity in western economies. By thematically analysing studies, we provide a map of the current SME productivity research landscape, identifying direct, indirect, and mediating/moderating factors influencing SME productivity. Our systematic review highlights the fragmented nature of research in this field, and makes three key contributions. First, we thematically map existing empirical studies into six key themes organised around internal (*organizational environment, organizational capabilities, investments and types of innovation*) and external (*external knowledgebase, commercialization*) factors influencing SME productivity. Second, our descriptive and thematic analyses enable us to highlight critical gaps in existing knowledge, as well as methodological issues that restrict our understanding of how different factors such as technology, R&D, leadership skills, networks and collaborations etc., interact to affect SME productivity. Third, we develop a research agenda and propose four main areas where future research could make useful contributions in advancing knowledge on SME productivity. These include the need for greater comparative analyses (i.e. within SMEs as well as between SMEs and large firms), the need to adopt a holistic approach to understanding human capital in SMEs, the importance of context, and methodological developments that would facilitate the analysis of underlying factors affecting productivity.

Future studies can build on our systematic review by focusing on SME productivity in emerging or developing economies, in order to provide a better understanding of the different macro-level factors driving firm productivity in these contexts (Rangamohan et al. 2007). Future reviews could also focus on countries with robust firm-level data such as Japan, South Korea, and China, that have been excluded from the current study due to the parameters of the systematic review. Moreover, there is scope and need for meta-analyses that draw on results from extant studies to provide better clarity on the influence of specific factors on SME productivity, especially in cases where results are inconclusive. These can also address the some of the methodological challenges highlighted in our discussion. Finally, given the importance of the topic for practitioners and policymakers, future reviews can contribute to SME productivity debates by focusing on grey literature as a way of building on academic focused reviews. These were beyond the scope of this review, but do provide important insights on SME productivity.

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