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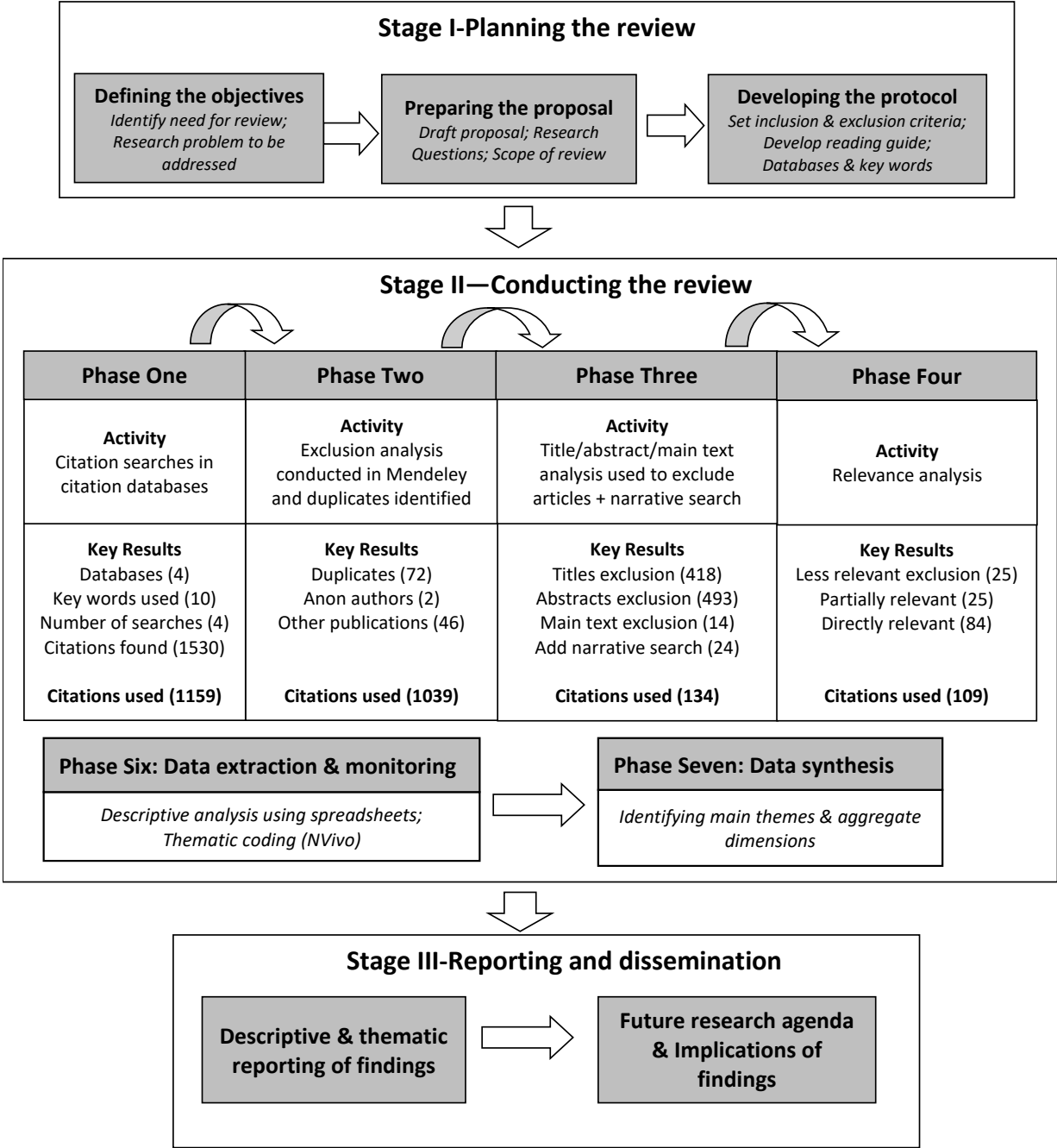
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Fig. 1 Summary of the systematic review process



Source: Adapted and modified from Thorpe et al. (2005) and Tranfield et al. (2003)

Table 1 Key words and search strings used in the review

Key words list	Search strings
SME	<i>Database: ABI-Inform/ProQuest</i>
Small and medium enterprise	TI (SME* OR small and medium enterprise* OR medium sized business* OR medium business* OR small and medium-sized enterprise* small business* OR micro-business* OR micro business* OR microbusiness*) AND AB (productiv*)
Small and medium-sized enterprise	
Medium sized business	<i>Database: Emerald</i>
Medium business	(SME* OR small and medium enterprise* OR medium sized business* OR medium business* OR small and medium-sized enterprise* small business* OR micro-business* OR micro business* OR microbusiness*) AND (productiv*)
Small business	
Micro business	
Micro-business	<i>Database: Scopus</i>
Microbusiness	TITLE-ABS (SME* OR small AND medium AND enterprise* OR small AND medium-sized AND enterprise* AND small AND business* OR medium sized business* OR medium-sized business* OR medium business* OR micro-business* OR micro AND business* OR microbusiness*) AND ALL (productiv*)
Productivity	<i>Database: Science Direct.</i> ABS (SME* OR small and medium enterprise* OR medium sized business* OR medium-sized business* OR medium business* OR small and medium-sized enterprise* small business* OR micro-business* OR micro business* OR microbusiness*) AND ALL (productiv*) AND LIMIT-TO (contenttype, "JL,BS","Journal")

Table 2 Inclusion and exclusion criteria of the review

Criteria	Reasons
1. Inclusion criteria	
Peer-reviewed journal articles (post-1990) that are electronically accessible	To ensure high quality of reviewed studies
Papers written in English	Majority of leading academic journals are published in English
Papers focused on UK, Europe (excluding transition economies), USA, Canada, Australia or New Zealand contexts	The review is focused on SMEs located in the western economies context as it allows consideration of the effects of macro-level factors on productivity
Qualitative and quantitative empirical studies	In order to capture empirical evidence analyzed through different methods
Papers focused explicitly on SMEs productivity	The review is focused on SMEs productivity
2. Exclusion criteria	
Book chapters, articles in edited books, editorials, commentaries, working papers, workshop/conference proceedings	These were excluded due to the variability in their review process
Conceptual, technical papers, literature reviews	The review is focused on the systematic review of empirical studies

Table 3 Reading guide adapted for the review

Reading Guide	
1.	Article title
2.	Author(s)
3.	Year of publication
4.	Journal
5.	Research question/focus
6.	Productivity focus/concepts
7.	Methodological approach
a.	Qualitative or quantitative?
b.	Type
c.	Measure
d.	Data sources
8.	Sample details
a.	Unit
b.	Sampling method
c.	Size
d.	Response rate
e.	Country
f.	Sector
g.	Comparison?
h.	Data analysis
9.	Limitations
10.	Main findings
11.	Study implications

Source: Adapted from Henry *et al.* (2016)

Table 4 Thematic classification of reviewed studies

First order codes	Second order themes	Aggregate dimensions
<p>Workplace practices (28) HRM & work practices [<i>Fabling & Grimes (2014); Fabi et al. (2010); Rasel (2016); Kohr et al. (2017); Onkelinx et al. (2016); Bartel et al. (2007); Black & Lynch (1996); Huselid (1995); Guthrie (2001); Lodefalk & Tang (2018); McGuinness et al. (2008); Datta et al. (2005); Koch & McGrath (1996)</i>] organizational innovations [<i>Laforet (2013); Torre & Solari (2011); Torrent-Sellens et al. (2016); Oeij et al. (2015)</i>] knowledge management/goal setting [<i>Mayer et al. (2017); Nunes et al. (2006)</i>] e-business alignment [<i>Raymond & Bergeron (2008)</i>]; quality management [<i>Towers & McLoughlin (2005)</i>] strategy/organizational changes [<i>Colombo et al. (2013); Raymond (2005); Esan et al. (2013)</i>] organizational culture [<i>Naranjo Valencia et al. (2010); McGuirk et al. (2015)</i>]; energy management [<i>Henriques & Catarino (2016)</i>]; business awards [<i>Jones et al. (2014)</i>] level of trust [<i>Chalker & Loosmore (2016)</i>]</p>	Organizational environment (34)	
<p>Ownership structure (4) family vs non family controlled [<i>Barbera & Moores (2013); Cassia et al. (2012); Classen et al. (2014)</i>] family owned vs foreign firms [<i>Harris et al. (2016)</i>]</p>		
<p>Industrial relations (2) union driven innovations [<i>Antonioli et al. (2010)</i>]; unionization effect on productivity [<i>Black & Lynch (1996)</i>]</p>		
<p>Training (11) training programs [<i>Antonioli et al. (2010); Black & Lynch (1996); McGuirk et al. (2015); Georgiadis & Pitelis (2016); Mancinelli & Mazzanti (2009); Savery & Alan Luks (2004); Henriques & Catarino (2016); Koch & McGrath (1996)</i>] employees age/education & skill level [<i>(Sandulli et al. (2013); Audretsch et al. (2020)</i>] employability [<i>Arocena et al. (2007)</i>]</p>		Internal factors influencing SME productivity
<p>Culture/ethnicity (4) owner's socio-demographics [<i>Middleton & Byus (2011); Middleton & Chambers (2010); Naranjo Valencia et al. (2010)</i>]; cultural diversity [<i>Niebuhr (2010)</i>]</p>	Organizational capabilities (18)	
<p>Leadership (2) leadership style [<i>Li et al. (2016)</i>]; CEO human capital [<i>Ribeiro Soriano & Castrogiovanni (2012)</i>]</p>		
<p>Wellbeing (1) psychological distress/absenteeism [<i>Cocker et al. (2013)</i>]</p>		
<p>Technology (29) AMT capabilities [<i>Fabi et al. (2010); Raymond (2005); Uwizeyemungu et al. (2015); Esan et al. (2013); Niaki & Nonino (2017)</i>]; e-business/digital technologies [<i>Li et al. (2016); Raymond & Bergeron (2008); Scuotto et al. (2017)</i>] ICT adoption/capabilities [<i>Colombo et al. (2013); Martinez-Caro & Cegarra-Navarro (2010); Mole et al. (2004); Rasel (2016); Raymond et al. (2013); Sandulli et al. (2012); Torrent-Sellens et al. (2016); Barajas et al. (2016); Gare & Melin (2011); Nunes et al. (2006); Strucker & Gille (2010); Li et al. (2009); Ballestar et al. (2020)</i>] information security [<i>Mayer et al. (2017)</i>]; digital divide [<i>Middleton & Byus (2011); Wielicki & Arendt (2010); Middleton & Chambers (2010)</i>]; ERP capabilities [<i>Ruivo et al. (2015)</i>]; firm technology level [<i>Sandulli et al. (2013)</i>]</p>	Investments (44)	

First order codes	Second order themes	Aggregate dimensions
technology investments [<i>Torre & Solari (2011); Bartel et al. (2007); Ballestar et al. (2020)</i>]		
R&D (15) R&D intensity [<i>Hall et al. (2009); Raymond, & St-Pierre (2004); Falk & de Lemos (2019); Griffith et al. (2006); Nunes et al. (2013)</i>]; R&D subsidies [<i>Karhunen & Huovari (2015); Hottenrott & Lopes-Bento (2014)</i>] R&D spending [<i>Manez et al. (2013); Serban (2013); Baumann & Kritikos (2016); Niebuhr (2010); Ballestar et al. (2020); Parisi et al. (2006); Audretsch & Belitski (2020); Audretsch et al. (2020)</i>]		
Product & process innovation (10) firm size/R&D activities [<i>Hall et al. (2009); Baumann & Kritikos (2016); Griffith et al. (2006); Parisi et al. (2006)</i>] economic cycle [<i>Madrid-Guijarro et al. (2013)</i>]; IT integration [<i>Raymond et al. (2013)</i>]; cooperative ties [<i>Tomlinson & Fai (2013)</i>]; manufacturing technology/organization context [<i>Uwizemungu et al. (2015); Niaki & Nonino (2017)</i>]; export activity [<i>Henley & Song (2019)</i>]		
Process innovation (6) lean manufacturing [<i>Dora et al. (2013); Dora et al. (2014)</i>]; process improvement [<i>Gunasekaran et al. (2000)</i>]; quality improvement [<i>Maani et al. (1994)</i>]; R&D activities [<i>Manez et al. (2013)</i>]; technology integration [<i>Esan et al. (2013)</i>]	Types of innovation (21)	
Product innovation (5) product development innovation [<i>Bagchi-Sen (2001); Calderini & Cantamessa (1997)</i>] business strategy [<i>Su & Tang (2016)</i>]; IT investment/capability [<i>Bartel et al. (2007); Li et al. (2009)</i>] competitive environment [<i>Hernandez-Espallardo & Delgado-Ballester, (2009)</i>]		
Collaborations (15) alliances & networking [<i>Gunasekaran et al. (1996); Hemert et al. (2013); Mancinelli & Mazzanti (2009); Noke & Hughes (2010); Ruivo et al. (2015); Scuotto et al. (2017); Tomlinson & Fai (2013); Gare & Melin (2011); Hottenrott & Lopes-Bento (2014); Bakhtiari (2015); Henley & Song (2019)</i>] knowledge transfers/spillover [<i>Humphries (2005); Jones & Corral (2017); Audretsch & Belitski (2020)</i>] research joint ventures [<i>Barajas et al. (2016)</i>]		
Advisors (6) workplace interventions [<i>Oeij et al. (2015); Harris et al. (2016); McGovern et al. (2017); Mole et al. (2014)</i>] external advisors [<i>Ribeiro Soriano & Castrogiovanni (2012); Henley & Song (2019)</i>]	External knowledgebase (26)	External factors influencing SME productivity
Takeovers/mobility (2) takeovers [<i>Foreman-Peck & Nicholls (2013)</i>]; regional mobility [<i>Foreman-Peck & Nicholls (2015)</i>]		
Clusters (1) collective learning [<i>Capello (1999)</i>]		
Value chain (2) repositioning value chain [<i>Noke & Hughes (2010); Antonelli et al. (2015)</i>]		
Global competition/exports (16) exports/exporters [<i>Eliasson et al. (2012); Falk & Hagsten (2015a); Falk & Hagsten (2015b); Higón & Driffield (2011); Sandulli et al. (2012); Savery & Alan Luks (2004); Serban (2013); Falk & de Lemos (2019); Kohr et al. (2017); Lejarraga & Oberhofer (2015)</i>]	Commercialization (34)	

First order codes	Second order themes	Aggregate dimensions
internationalization/global competition [<i>Hall et al. (2009); Banno et al. (2014); Baumann & Kritikos (2016); North & Smallbone (1996); Onkelinx et al. (2016); Henley & Song (2019)</i>]		
Environment (18)		
regional differences [<i>Foreman-Peck & Nicholls (2013); Guzman-Cuevas et al. (2009); McGuirk et al. (2015); Niebuhr (2010); North & Smallbone (1996); Antonelli et al. (2015)</i>]		
national level [<i>McGovern et al. (2017); Wielicki & Arendt (2010); Lejarraga & Oberhofer (2015)</i>]		
spillover effects [<i>Romero-Jordan et al. (2019); van Stel et al. (2019)</i>]		
external firm environment [<i>Towers & McLoughlin (2005); Guedes de Carvalho et al. (2013); Hernandez-Espallardo & Delgado-Ballester (2009); St-Pierre & Raymond (2004)</i>]		
type of industry [<i>Datta et al. (2005); Nunes et al. (2013); Yazdanfar (2013)</i>]		

Note: The number of articles under each code/theme is indicated in brackets. Articles can be classified under more than one category.

Table 5 Detailed breakdown of descriptive analysis results

Issue	Percentage of studies
<i>Productivity measures used (most studies used one or more measures of productivity)</i>	
Labor productivity	41%
TFP measures	15%
Did not specify productivity measure employed	18%
Product & process innovation measures	12%
Product innovation measures	9%
Process innovation measures	5%
<i>SME categories included in sample</i>	
SMEs with 10 or more employees	43%
Micro enterprises	30%
<i>Sources of data</i>	
Survey data	39%
Databases	30%
Panel datasets	12%
Case studies	10%
Interviews or a combination of sources	9%
<i>Sampling methods</i>	
Random sampling	27%
Purposive sampling	17%
Stratified sampling	14%
Representative sampling	4%
A combination of random and purposive sampling	2%
Weighted sampling	2%
Convenience sampling	1%
Did not specify the sampling method used	35%
<i>Data analysis techniques</i>	
Regression analysis (including multilevel, multivariate)	61%
Qualitative analysis (case studies, interviews)	16%
Structural equation modelling	10%
Cobb-Douglas production function	6%
CDM model	5%
Non-parametric	2%

Fig. 2 Geographic focus of reviewed studies

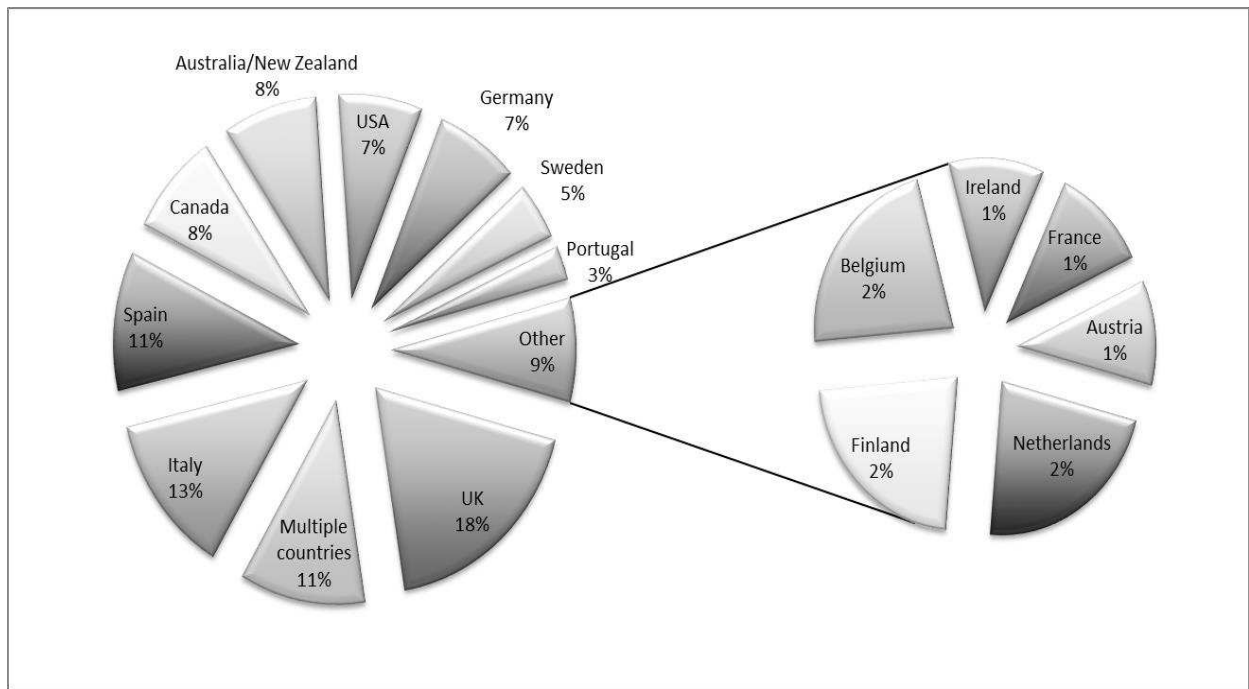


Fig. 3 Mapping of factors/variables directly influencing productivity

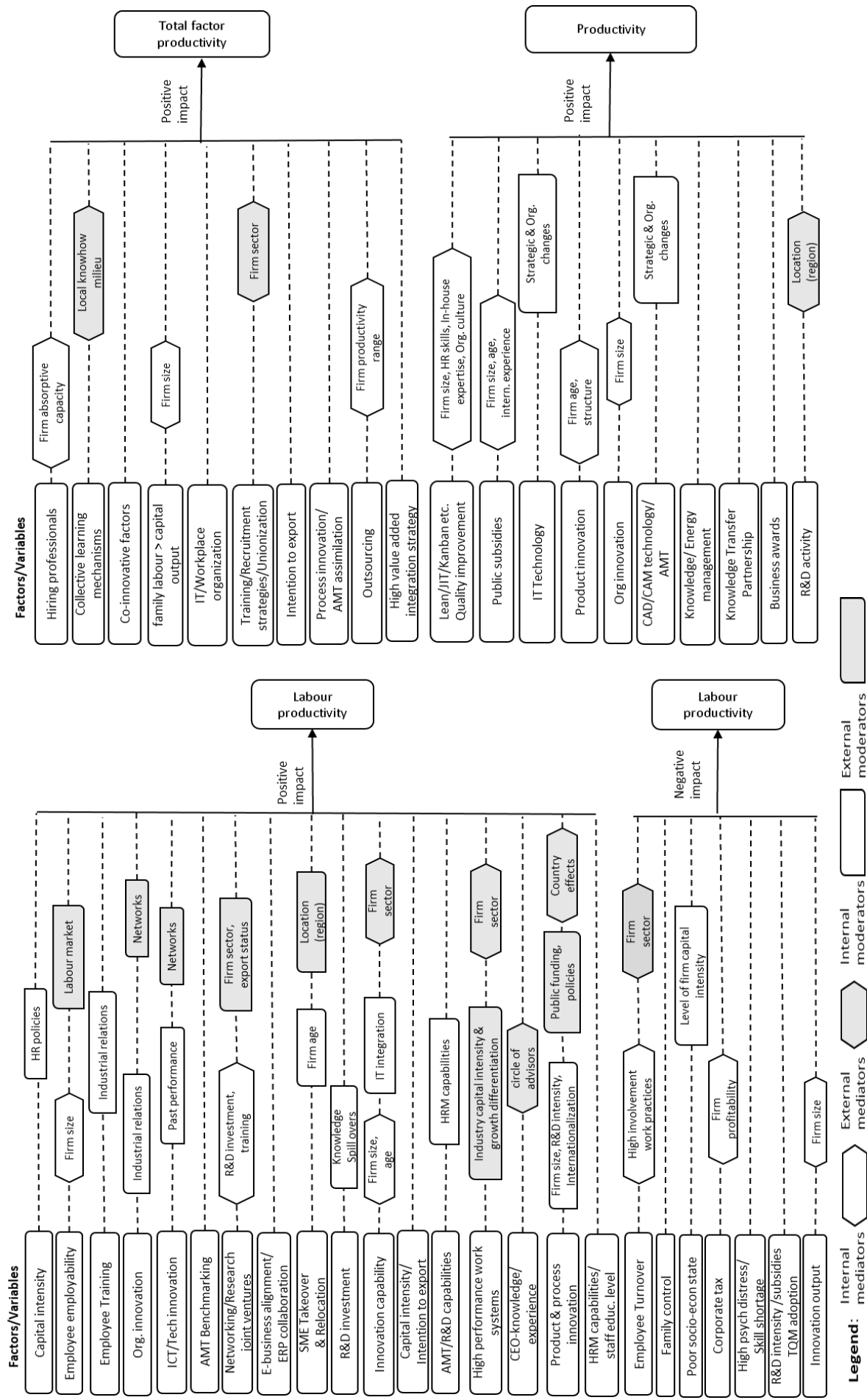


Table 6 Key findings from reviewed studies

a) Direct and indirect influence on productivity

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Antonelli, C., Crespi, F & Scellato, G. (2015)	<ul style="list-style-type: none"> Investigates the dynamics of productivity focusing on the determinants of firm-level persistence in time of high TFP growth rates relative to the corresponding sectoral distributions 		<ul style="list-style-type: none"> Firms with reduced vertical integration on average had a significantly higher likelihood of being among the best performers in terms of TFP growth rates. This confirms that specialization strategies in high value added enhances the possibility of obtaining long-lasting outperformance in productivity growth. Firms in High R&D regions seem to be more capable of sustaining persistently higher levels of productivity growth. Persistency patterns can be independent of size and not only large corporations are capable of sustaining higher productivity performances in time. 	V, VI
Antonioli, D., Mazzanti, M., & Pini, P. (2010)	<ul style="list-style-type: none"> Provide insight on nexus between innovation (training, technology, organizational, ICT) and labour productivity Role of industrial relations system and labour flexibility in the propensity to innovate by firm's management. 	<ul style="list-style-type: none"> Cooperative industrial relations are positively linked to training and organizational innovations Past performance influences ICT and technology 	<ul style="list-style-type: none"> Innovations can be ranked in terms of their significant positive influence on labour productivity as follows: training activities; technological innovation; organizational innovation; ICT 	I, II
Arocena, P., Nunez, I., & Villanueva, M. (2007)	<ul style="list-style-type: none"> Analysed the effect of promoting workers' employability on labour productivity. 	<ul style="list-style-type: none"> Provision of employability is more profitable for SMEs than for large firms 	<ul style="list-style-type: none"> Facilitating workers' employability increases labour productivity Higher job uncertainty, the higher the productivity gains 	II
Audretsch, D. & Belitski, M. (2020)	<ul style="list-style-type: none"> Investigates the relationship between investments in R&D, knowledge spillovers and three innovation strategies (make, buy, ally) as well as their effects on labour productivity in UK firms during 2002–2014. 	<ul style="list-style-type: none"> An increase in investment in R&D and knowledge spillover makes it more likely for a manager to choose “make” or “ally” versus “buy imitate” new products developed by others. Firms who aim to buy or imitate innovation will invest less in R&D in regions / industries where knowledge spillovers are high. 	<ul style="list-style-type: none"> Internal R&D investment and knowledge spillovers are complementary for labour productivity. R&D is important for both innovation and productivity, while knowledge spillovers are more important than R&D for firm productivity. Knowledge spillovers increases the intensity of investing in internal R&D because this strategy leads to higher labour productivity growth and relative labour productivity 	III, V
Audretsch, D., Kritikos, A. & Schiersch, A. (2020)	<ul style="list-style-type: none"> Analyses whether the link between the three aspects involving innovative activities—R&D, innovative output, and productivity—hold for knowledge-intensive services (KIS) micro-firms 	<ul style="list-style-type: none"> KIS firms of all age and size classes are able to turn innovative input (R&D activities) into innovation output (new product or service), with highly skilled employees being similarly important compared to R&D for creating innovation output in micro-firms. 	<ul style="list-style-type: none"> KIS firms benefit from innovation activities through increased labour productivity. This newly produced knowledge causally increases productivity Innovation activities enhance firm labour productivity and ultimately economic growth through knowledge-intensive services. 	II, III

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
		<ul style="list-style-type: none"> Start-ups and young firms are more likely to engage in innovation activities and, are more likely to successfully turn innovation input into a product or service innovation than mature firms. 		
Bakhtiari, S. (2015)	<ul style="list-style-type: none"> Studies the relationship between total factor productivity and outsourcing accounting for the possibility of inefficient firms self-selecting into exit instead of outsourcing to domestic suppliers. 		<ul style="list-style-type: none"> Immediate total factor productivity improvement after outsourcing but only for firms in the lower median of productivity range. In the short run, the most productive firms forfeit a portion of their productivity with outsourcing in return for longer-term improvements in competitiveness. 	V
Ballestar, M., Díaz-Chao, A., Sainz, J. & Torrent-Sellens, J. (2020)	<ul style="list-style-type: none"> Provide new insights into the link among knowledge, industrial robotics and labour productivity of Spanish manufacturing (SMEs) in 2008 and 2015 		<ul style="list-style-type: none"> Robotic-tool adoption by SMEs induced an increase in labour productivity Knowledge flows (captured through the activities of R&D, innovation and ICT) exerted a clearly positive total effect on SME labour productivity in 2015 	III
Banno, M., Piscitello, L., & Amorim varum, C. (2014)	<ul style="list-style-type: none"> Evaluates the impact of public financial support to the internationalization of small and medium enterprises. 		<ul style="list-style-type: none"> Incentives are effective in enhancing firms' performance in terms of domestic turnover and productivity growth, especially when targeted at smaller and younger firms and those with international experience Higher international experience leads to higher turnover growth but lower productivity growth in home country 	VI
Barajas, A., Huergo, E., & Moreno, L. (2016)	<ul style="list-style-type: none"> Analyses the impact of public support for international research joint ventures (RJVs) on SME performance considering two dimensions: technological and economic results. 	<ul style="list-style-type: none"> Previous experience in Framework Programme (FP) proposals, exporters & firms with higher ratio of intangible fixed assets to employee are more likely to apply Probability of being supported increases when the project belongs to the Bio-health area, is led by a foreign firm and includes core EU members 	<ul style="list-style-type: none"> Involvement in supported RJV has a positive impact on EBITDA per employee & labour productivity by increasing SMEs technological capabilities 	III, V
Barbera, F., & Moores, K. (2013)	<ul style="list-style-type: none"> Does family involvement have a positive or negative impact on firm productivity? 		<ul style="list-style-type: none"> Family firm labour contributes significantly more to total output than benchmark non-family firm labour Family capital output contributes significantly less to total output than benchmark non-family firm labour 	I

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Bartel, A., Ichniowski, C., & Shaw, K. (2007)	<ul style="list-style-type: none"> Better understand the relationship between investments in IT and productivity growth 	<ul style="list-style-type: none"> Investment in new IT-enhanced equipment improves all stages of the production process which allows a shift to producing more customized products. Adoption of new computer-based IT also coincides with increases in the skill requirements and adoption of new human resource practices 		I, III, IV
Baumann, J., & Kritikos, A. S. (2016)	<ul style="list-style-type: none"> Analyses whether micro firms make R&D investments to become more innovative Whether the link between R&D, innovation and productivity is the same for micro firms as for larger SMEs 	<ul style="list-style-type: none"> For firms that engage in innovative activities, R&D intensity is larger the smaller firms are. Regardless of firm-size, R&D intensity has a positive effect on the probability of reporting an innovation, with a larger effect for product than for process innovation. Firm age has positive effect on product innovation only for large SMEs 	<ul style="list-style-type: none"> Only product innovation has a sizeable effect on firm's labour productivity regardless of size 	III, IV, VI
Black, S. E., & Lynch, L. M. (1996)	<ul style="list-style-type: none"> The impact of human-capital investments, such as education and employer provided training, on productivity 		<ul style="list-style-type: none"> Average education level (no of years) has significant positive effect on productivity in both non & manufacturing sectors For manufacturing, the greater the proportion of time spent in formal off-the-job training, the higher the productivity For nonmanufacturing, the content of the training programs; recruitment strategies and unionization have a positive impact on productivity High labour turnover has a negative impact on productivity especially for nonmanufacturing 	I, II
Calderini, M., & Cantamessa, M. (1997)	<ul style="list-style-type: none"> A micro-level analysis of the impact of innovation in product development processes on SMEs 	<ul style="list-style-type: none"> Innovation process in SME manufacturers pivots on the companies' ability to integrate flexibly with customers & partners in the product design and development phase Decision to innovate product development influenced by internationalisation of company ownership, pressure from customers and the competitive base Organizational innovation driven by significant path-dependent phenomena limiting the role of managers 		IV

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Capello, R. (1999)	<ul style="list-style-type: none"> Is capital productivity in firms located in the milieu dependent on know-how accumulated over time in the milieu? Is labour productivity in firms located in the milieu influenced by labour market stability and dynamic synergy effects in the labour market of the milieu? 		<ul style="list-style-type: none"> Collective learning provides local firms with positive external effects on factor productivity. Collective learning mechanisms, increase labour productivity. Knowledge accumulated outside the milieu does not lead to a higher productivity than local knowledge. 	V
Cassia, L., Massis, A. D., & Kotlar, J. (2012)	<ul style="list-style-type: none"> Effect of family control on the characteristics of SMEs i.e. demographic characteristics, cost and productivity of labour, financial ratios, and performance 	<ul style="list-style-type: none"> Family controlled firms are significantly smaller in terms of revenues and are significantly older than their nonfamily counterparts. 	<ul style="list-style-type: none"> Family controlled firms outperformed their nonfamily counterparts in terms of return on sales, ROE and ROA, but show significantly lower revenues per capita and workforce productivity 	I
Chalker, M., & Loosemore, M. (2016)	<ul style="list-style-type: none"> Explores the association between trust and productivity from a subcontractor perspective 	<ul style="list-style-type: none"> High levels of trust have positive influence on productivity by enabling greater collaboration, better communication and greater flexibility, agility and informality in project relationships 		I
Classen, N., Carree, M., Gils, A., & Peters, B. (2014)	<ul style="list-style-type: none"> Analysis of differences between family and non-family firms in innovation investment, product and process innovation outcomes, and labour productivity. 	<ul style="list-style-type: none"> Family SMEs have a higher propensity to invest in innovation, but do so less intensively than non-family counterparts. Family SMEs tend to outperform non-family SMEs in terms of process innovation outcomes when controlling for innovation investment. 	<ul style="list-style-type: none"> Family SMEs underperform regarding labour productivity in comparison to non-family SMEs. 	I
Cocker, F., Martin, A., Scott, J., Venn, A., & Sanderson, K. (2013)	<ul style="list-style-type: none"> Investigate prevalence of high/very high psychological distress, past-month sickness absenteeism and presenteeism days in SME owner/managers; and associated, self-reported lost productivity 	<ul style="list-style-type: none"> SME owner/managers, don't rely on colleagues or employees to compensate for lost productivity due to their sickness absence. Work related wellbeing factors, higher educational attainment, treatment and neuroticism were correlated with higher absenteeism days. 	<ul style="list-style-type: none"> However, those owner/managers who continued to work whilst experiencing high/very high psychological distress reported substantially reduced productivity. 	II
Colombo, M. G., Croce, A., & Grilli, L. (2013)	<ul style="list-style-type: none"> Analyse the impact of the adoption of broadband Internet technology on the productivity performance on SMEs 		<ul style="list-style-type: none"> SMEs experience positive effect on productivity when adopting advanced broadband applications depending on: (i) their industry of operations; (ii) the relevance of the specific broadband software applications (iii) the undertaking of complementary strategic and organisational changes. 	I, III
Dora, M., Kumar, M., Goubergen, D. V., Molnar, A., & Gellynck, X. (2013)	<ul style="list-style-type: none"> Analyses the application of lean manufacturing, its impact on operational performance and critical success factors in the food processing SMEs. 	<ul style="list-style-type: none"> Majority of food SMEs focus on quality assurance in comparison to quality improvement methods such as lean manufacturing. Skill of workforce, in-house expertise and organizational culture are critical factors for successful implementation of lean 	<ul style="list-style-type: none"> Respondents indicated improvement in operational performance, especially with overall productivity from the application of lean manufacturing. 	IV

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Datta, D. K., Guthrie, J. P., & Wright, P. M. (2005)	<ul style="list-style-type: none"> Examining how industry characteristics moderated the effectiveness of high-performance work systems and the relationship with labour productivity. 		<ul style="list-style-type: none"> There are general positive effects of high-performance work system practices on labour productivity. The relationship is stronger as industry capital intensity diminishes; in circumstances of high industry growth; and under conditions of high industry differentiation. 	I, VI
Dora, M., Dirk, V. G., Kumar, M., Molnar, A., & Gellynck, X. (2014)	<ul style="list-style-type: none"> Analyses the status of the lean manufacturing practices and their benefits and barriers among European food processing SMEs. 	<ul style="list-style-type: none"> Lean manufacturing practice deployment is generally low in SMEs and still evolving. Key barriers encountered by food SMEs are characteristics of the food sector as well as lack of knowledge and resources. Hungarian compared to German and Belgium companies were more successful in reducing cost of production through lean manufacturing practices. 	<ul style="list-style-type: none"> The most important benefits of lean manufacturing practices are: reduced costs of production, increased profitability, increased productivity and reduced customer complaints. Small-sized companies profit more than the micro-sized companies with respect to cost reduction and increased productivity. 	IV
Esan, A. O., Khan, M. K., Hong, S. Q., & Naylor, C. (2013)	<ul style="list-style-type: none"> Describe an integrated manufacturing strategy for the deployment of a CAD/CAM system in a small, medium manufacturing enterprise (SMME). 	<ul style="list-style-type: none"> The CAD/CAM system permits the firm to speed their responses to market needs and frees users to focus on creativity, innovation and production at minimum possible cost. 	<ul style="list-style-type: none"> CAD/CAM integration as part of lean manufacturing increased knowledge of CAD/CAM technology, productivity, and flexibility whilst reducing throughput times. CAD/CAM integration required a change of management framework and company culture 	I, III, IV
Eliasson, K., Hansson, P., & Lindvert, M. (2012)	<ul style="list-style-type: none"> Distinguishing between learning by exporting and learning to export among new export-entrants 		<ul style="list-style-type: none"> Observe a labour productivity increase among export entrants relative to non-entrants before export entry. Productivity gap between export entrants and non-entrants does not continue to grow after export entry suggesting learning to export occurs but learning by export does not. 	VI
Fabi, B., Lacoursire, R., Raymond, L., & St-Pierre, J. (2010)	<ul style="list-style-type: none"> To what extent do managerial choices made in (HRM, R&D, AMT) affect the performance of SMEs? To what extent do the interactions of HRM capabilities with R&D and AMT capabilities also affect the performance of these enterprises? 	<ul style="list-style-type: none"> Manufacturing SMEs' R&D capabilities are enhanced when the employees involved are well informed of both operational activities and key strategic and economic aspects 	<ul style="list-style-type: none"> HRM capabilities have the most influence on the labour productivity of SMEs. Associating certain HRM practices to R&D processes and AMT use renders these processes more dynamic and increases their impact on productivity 	I, III
Fabling, R., & Grimes, A. (2014)	<ul style="list-style-type: none"> Examine how the adoption of HRM practices affects firm performance. 		<ul style="list-style-type: none"> Adopting a general suite of high-performance work practices leads to higher growth in (multi-factor and labour) productivity for each sector apart from the low-professional services group. 	I

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Fazio, G., & Piacentino, D. (2010)	<ul style="list-style-type: none"> Perform a multilevel analysis of productivity to estimate how much of the observed firm-level heterogeneity is due to firm-specific factors as opposed to spatial economic and socio-institutional differences 	<ul style="list-style-type: none"> Northern provinces have on average greater productivity than Southern ones due to greater slopes of capital intensity. 	<ul style="list-style-type: none"> Worse territorial socio-economic conditions do lower firm-level productivity. This effect is larger on firms with smaller than higher capital intensity. 	n/a ¹
Foreman-Peck, J., & Nicholls, T. (2013)	<ul style="list-style-type: none"> Investigate the contribution that SME takeovers may make to spatial variations in productivity. 		<ul style="list-style-type: none"> Takeovers raise labour productivity after acquisition in all regions but by less for the most productive SMEs. Age effects generally indicate higher chances of older SMEs being taken over. 	V, VI
Foreman-Peck, J., & Nicholls, T. (2015)	<ul style="list-style-type: none"> Examine the relocation of SMEs to assess whether the process reinforces core– periphery disparities, as in many new economic geography models, or ameliorates them in neoclassical style. 		<ul style="list-style-type: none"> Fast-growing SMEs become even more productive and employ even more workers after moving than regionally immobile SMEs. 	V
Georgiadis, A., & Pitelis, C. N. (2016)	<ul style="list-style-type: none"> Investigates relationship between employees' and managers' training and firm performance using a policy intervention that randomly assigned training support to SMEs 		<ul style="list-style-type: none"> Employees' training had a stronger positive impact on firms' labour productivity and profitability than managers' training 	II
Gunasekaran, A., Okko, P., Martikainen, T., & Yli-Olli, P. (1996)	<ul style="list-style-type: none"> Explain importance of the new production concepts and technologies for SMEs, how they can be used for improving productivity and quality, as well as facilitating suitable alliances and networking of firms. 	<ul style="list-style-type: none"> Alliances and networking influence the type of strategies that the SMEs select for improving their productivity and quality Limited assistance is received from larger companies 		V
Gunasekaran, A., Forker, L., & Kobu, B. (2000)	<ul style="list-style-type: none"> Improve productivity in two cells of the company, namely the Honda/Rover cell and the headlamp cleaning cell. Identify potential areas for cost savings resulting from productivity gains. 		<ul style="list-style-type: none"> Manufacturing concepts and technologies associated with large firms (e.g. JIT/Kanban/Hoshin etc) can be applied to small firms for productivity and quality improvements. Changes must become a company-wide cultural change for gains to last. 	IV
Gare, K., & Melin, U. (2011)	<ul style="list-style-type: none"> To investigate conditions in the context of sense-making for ICT adoption and use among SMEs. 	<ul style="list-style-type: none"> ICT infrastructure can be viewed as constituted by needs identified among SMEs, in sense-making, sense-giving, and service infrastructures. There is a need, especially among micro firms for support in technical matters as well as applications and integration in work processes. Micro firms have to rely on external partners and suppliers, corresponding to a need for cooperation. 		III, V

¹ As the only study focused on the impact of socio-economic context on SME productivity, it is not included in the themes, but discussed under future research agenda.

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Griffith, R., Huergo, E., Mairesse, J., & Peters, B. (2006)	<ul style="list-style-type: none"> The role innovation plays in productivity across four European countries, France, Germany, Spain, and UK 	<ul style="list-style-type: none"> Government funding increases the probability firm engages in R&D continuously, but has little impact on intensity of R&D. Larger firms, those operating in international markets and those in industries where greater use is made of formal or strategic methods to protect innovations are more likely to engage/invest in R&D. Suppliers are an important source of information for process innovation, while customers are significant in stimulating product innovation 	<ul style="list-style-type: none"> Process innovation is associated with higher productivity only in France while product innovation is associated with higher productivity in France, Spain, and the UK 	III, IV
Guthrie, J. P. (2001)	<ul style="list-style-type: none"> Examined the relationship between firms' use of high-involvement work practices and employee retention and productivity. 		<ul style="list-style-type: none"> Employee turnover is associated with decreased (increased) labour productivity when investments in high-involvement work practices are relatively high (low). 	I
Hall, B. H., Lotti, F., & Mairesse, J. (2009)	<ul style="list-style-type: none"> Investigates how and when innovation takes place in SMEs and whether—and how—innovation outcomes impact SME firms' productivity. 	<ul style="list-style-type: none"> Firm size, R&D intensity, and investment in equipment, enhances likelihood of having both process and product innovation. Firm size is negatively associated with intensity of R&D, but positively with the likelihood of having product or process innovation International competition fosters R&D intensity, especially in high-tech firms. 	<ul style="list-style-type: none"> Both product and process innovations have a positive impact on firm's productivity, especially process innovation. 	III, IV, VI
Harris, R., McAdam, R., & Reid, R. (2016)	<ul style="list-style-type: none"> Tests whether commonly used business improvement methods (BIM) foster or inhibit innovation SMEs in peripheral regions. 	<ul style="list-style-type: none"> Adopting BIM results in firms undertaking innovation-related activities while remaining non-innovators. Those using product design as their competitive edge, selling in export markets and being foreign owned increased probability of being successful innovators. 		I, V
Hemert, P., Nijkamp, P., & Masurel, E (2013)	<ul style="list-style-type: none"> Explores the innovation strategy of innovative Dutch SMEs by means of their sources of innovation (SI), innovation capabilities (IC), innovation performance (IP) and commercialization sources (CS) 	<ul style="list-style-type: none"> Knowledge-intensive business services play bridging function in facilitating the utilization of sources of innovation for technological innovation capabilities enhancement. A combination of local university knowledge and international contacts significantly strengthens SMEs' innovation capabilities. Active connections with competitors are positively linked to innovation performance. 		V

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Henley, A. & Song, M. (2019)	<ul style="list-style-type: none"> Analyses how the production of innovation in turn contributes to improved performance, in terms of exporting activity and productivity for microbusinesses. 	<ul style="list-style-type: none"> Microbusinesses with innovation have around 11% higher likelihood of exporting than those without any innovation. There are no direct benefits of innovation on productivity, but the effect comes from exporting as an internationalisation strategy. Using external advice or information, business networking and having a formal business plan are all associated with a significant increase in the likelihood that microbusinesses will innovate. In non-service sectors, it is only product innovation that leads to export, whereas across the full sample of businesses, service and process innovation also contributes to exporting decisions and intensity. In both non-service and service sectors, it is more radical (i.e. new to the market) innovation that contributes in particular to microbusiness exporting. 	<ul style="list-style-type: none"> Labour productivity is 11% higher in exporting businesses relative to matched comparators, although, because this estimate is only significant at just below the 5% level, the confidence interval is relatively wide. 	IV, V, VI
Higón, D.A. & Driffield, N. (2011)	<ul style="list-style-type: none"> Investigate the link between the innovation activities (distinguishing product from process innovation) and export performance amongst UK SMEs. 	<ul style="list-style-type: none"> Both product and process innovation independently have a positive impact on the decision to export. Considering their interdependence there is no evidence that process innovation increases the probability to export beyond product innovation. 		VI
Humphries, D. (2005)	<ul style="list-style-type: none"> Inform businesses about the best practice in getting the most out of the government-funded Knowledge Transfer Partnerships 	<ul style="list-style-type: none"> KTPs are an excellent aid to business, both in short term completion of projects, and also in long term profitability. 	<ul style="list-style-type: none"> Knowledge Transfer Partnerships significantly improve productivity and profitability in most businesses 	V
Henriques, J., & Catarino, J. (2016)	<ul style="list-style-type: none"> Identify the main barriers which impede deployment of energy efficiency in the industrial sector. 	<ul style="list-style-type: none"> The responsible actor for energy management in most of the firms are administrative and management staff and as a result, energy management focuses on invoices' analysis and contracts rather than aspects that could contribute to energy efficiency improvements. For small firms the main barriers are lack of information, limited access to capital, and low priority on energy issues. 	<ul style="list-style-type: none"> Together with cost savings, energy efficiency delivers other benefits that help firms grow and develop e.g. by improving productivity, profitability and competitiveness and product quality. 	I, II
Hernandez-Espallardo, M., & Delgado-Ballester, E. (2009)	<ul style="list-style-type: none"> Study whether the effectiveness of innovation in improving a firm's performance varies in different competitive situations 	<ul style="list-style-type: none"> Product innovation is found to be effective in influencing performance in small firms with higher pressure from the five competitive forces. SMEs leverage their innovation on market orientation in both contexts 		IV, VI

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Hottenrott, H., & Lopes-Bento, C. (2014)	<ul style="list-style-type: none"> Analyses the impact and effectiveness of targeted public support for R&D investment at the firm level. 	<ul style="list-style-type: none"> Targeted public subsidies trigger R&D spending, especially in internationally collaborating SMEs. Publicly induced R&D is productive as it translates into marketable product innovations. 		III, V
Huselid, M. A. (1995)	<ul style="list-style-type: none"> Evaluated the links between systems of High Performance Work Practices and firm performance 		<ul style="list-style-type: none"> Investment in high performance work practices are associated with lower employee turnover and greater productivity and corporate financial performance. 	I
Jones, J., & Corral, d. Z. (2017)	<ul style="list-style-type: none"> Examining the contribution of knowledge flows from HEIs and related research institutes to the innovation output and firm performance on sustainability-oriented innovation (SOI) in SMEs. 	<ul style="list-style-type: none"> Developing human resource transfer via employing new graduates, providing further education and vocational training generates performance benefits in the form of innovation outcomes, which in turn indirectly leads to productivity and sales growth 		V
Jones, P., Scherle, J., Pickernell, D., Packham, G., Skinner, H., & Peisl, T. (2014)	<ul style="list-style-type: none"> Explores the value and impact that SMEs derive from winning business awards. 	<ul style="list-style-type: none"> In the short term, enterprises benefited in terms of enhanced brand identity in their network and community which resulted in enhanced turnover and enterprise profile. 	<ul style="list-style-type: none"> Internally, winning an award acted as a motivator for enterprise employees, enhancing their productivity. 	I
Karhunen, H., & Huovari, J. (2015)	<ul style="list-style-type: none"> Investigates how R&D subsidies affect firms' employment, value added and employee education levels 	<ul style="list-style-type: none"> Firms with high share of workers with tertiary education and foreign trade have a higher likelihood of obtaining an R&D subsidy. Foreign ownership decreases this probability. Subsidy effect on survival rates is positive and significant three to five years later. 	<ul style="list-style-type: none"> A negative effect on SMEs' annual productivity growth one to two years after the subsidy year. 	III
Koch, M. J., & McGrath, R. G. (1996)	<ul style="list-style-type: none"> Examine connections between HRM practices and firm-level performance outcomes. 		<ul style="list-style-type: none"> Investments in human resource planning and investments in hiring practices are associated positively with labour productivity Interaction effect between human resource policies and capital intensity that exerts a dominant influence upon productivity, rather than capital intensity on its own Firms that systematically train and develop their workers are more likely to enjoy the rewards of a more productive workforce 	I, II
Laforet, S. (2013)	<ul style="list-style-type: none"> Examine the impact of positive and negative outcomes of Organizational Innovation (OI) in SMEs in relation to company size, age, and business sector. 	<ul style="list-style-type: none"> OI has a greater positive impact on small firms in terms of profit margin, competitiveness, market leadership, and improvement of product design and process. 	<ul style="list-style-type: none"> OI results in an increase in productivity, profit margin, market share, market leadership, improved working environment, and operating outside core competency. OI leads to an increase in productivity in medium size firms implying that small firms are more innovative. 	I

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Lejarraga, I., & Oberhofer, H. (2015)	<ul style="list-style-type: none"> Investigate the trade behaviour of SMEs, exploring any differences between manufacturing and services sectors. 	<ul style="list-style-type: none"> The probability of engaging in any export activities is an increasing function of firm size, with the smallest firms being least likely to export. Firm size exhibits a positive impact on firms operating in financial industries, ICT and professional services but not for travel services providers. 		VI
Li, J., Merenda, M., & Venkatachalam, A. R. (2009)	<ul style="list-style-type: none"> Examines the relationship between the extensiveness of business process digitalization (BPD) and new product development (NPD) 	<ul style="list-style-type: none"> NPD is positively related to the extensive use of business process digitalization Moderating effect of firm age on the relationship between BPD and NPD is positive and significant, suggesting an indirect impact of firm age on SME innovation. 		III, IV
Li, W., Liu, K., Belitski, M., Ghobadian, A., & O'Regan, N. (2016)	<ul style="list-style-type: none"> Develop and empirically test an e-leadership conceptual model focusing on how leadership in SMEs leverages business and digital technology 	<ul style="list-style-type: none"> Agile leadership (agile culture, strategy and pro-activeness) is particularly important for SMEs to quickly execute business strategy linked with digital technologies 	<ul style="list-style-type: none"> SME leaders need to drive IT professionals to be business savvy in order to maximize the potential of existing and new technologies to improve company competitiveness, customer service, efficiency, productivity and innovation 	II, III
Lodefalk, M., & Tang, A. (2018)	<ul style="list-style-type: none"> Examine the heterogeneous productivity impacts of hiring top workers on SMEs 	<ul style="list-style-type: none"> A firm's absorptive capacity, measured in terms of educational level, and its interaction with the technology gap is more important for laggard firms' productivity. 	<ul style="list-style-type: none"> Hiring professionals is associated with within-firm TFP growth but mainly in SMEs with higher absorptive capacity. 	I
Madrid-Guijarro, A., García-Pérez-de-Lema, D., & Van Auken, H. (2013)	<ul style="list-style-type: none"> Examines product, process and management innovation among Spanish SMEs during the current economic downturn (2009) and previous upswing (2005) 	<ul style="list-style-type: none"> In economic expansion process innovation is more important than product or management innovation During recession, there was no significant difference between process and product innovation, but process innovation declined more. 		IV
Maani, K. E., Putterill, M. S., & Sluti, D. G. (1994)	<ul style="list-style-type: none"> Focuses on direct and indirect relationships between quality, productivity and manufacturing performance. 	<ul style="list-style-type: none"> Strong support for an overall link between quality improvements and enhanced manufacturing performance. 	<ul style="list-style-type: none"> Quality improvement positively enhances operational performance and productivity. 	IV
Mancinelli, S., & Mazzanti, M. (2009)	<ul style="list-style-type: none"> Focus on the complementarity links between firms' internal R&D activities and networking activities. 	<ul style="list-style-type: none"> The intensity of training activities matters more than mere training introduction Process innovation is where effective substitutability is more frequent, compared to product innovation that witnesses some strong complementarity evidence. 	<ul style="list-style-type: none"> Expenditures per employee in R&D and formal training emerge as main significant factors impacting labour productivity. Networking alone cannot play a role in stimulating innovation and, even harder, labour productivity. It has to be linked to investments in R&D and training. 	II, V

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Manez, J.A., Rochina-Barrachina, M.E., Sanchis, A. & Sanchis, J. A. (2013)	<ul style="list-style-type: none"> Explore in depth, the effect of process innovations on total factor productivity growth for SMEs, taking into account the potential endogeneity problem that may be caused by self-selection into these activities. 	<ul style="list-style-type: none"> R&D activities play a role in enhancing SMEs “absorptive capacity” in terms of favouring the adoption of new technologies through the introduction of process innovations. 	<ul style="list-style-type: none"> Introduction of process innovations yields an extra productivity growth that lasts for only one period. As productivity improvement fades, the path of TFP growth both for process innovators and non-innovators converges. 	III, IV
Martinez-Caro, E. & Cegarra-Navarro, J. G. (2010)	<ul style="list-style-type: none"> To provide evidence of the influence of different e-business technologies on capital productivity (CP). 		<ul style="list-style-type: none"> For e-business systems to impact CP, managers need to provide and support a context with two dimensions: groupware applications and collective systems 	III
McGovern, T., Small, A., & Hicks, C. (2017)	<ul style="list-style-type: none"> Evaluate the European Regions for Innovative Productivity project that established Innovative Productivity Centres (IPCs) to assist SMEs in the North Sea Region of Europe to develop a process improvement capability. 	<ul style="list-style-type: none"> Successful process improvement interventions were dependent on: a recognized need for change; senior management support; establishment of KPIs; tailoring intervention to meet firm requirements; availability of personnel; time to engage with the process improvement practice; and suitable composition of the team. Developing a process improvement capability depended upon the availability of company resources, establishing KPIs and change agent support. 		V, VI
McGuinness, S., Bennett, J., & McCausland, G. (2008)	<ul style="list-style-type: none"> Assess the nature and extent of labour market shortages arising from a lack of basic skills among the 16–25-year-old workforce. 	<ul style="list-style-type: none"> Hard-to-fill vacancies were found to be more prevalent in firms employing lower proportions of females, those who were less aware of existing qualification bodies and those in the hotel and restaurant sector. 	<ul style="list-style-type: none"> In instances where skill shortages were due to a lack of basic literacy/numeracy skills they exerted a negative impact on productivity performance. 	I
McGuirk, H., Lenihan, H., & Hart, M. (2015)	<ul style="list-style-type: none"> Does Innovative Human Capital (IHC) contribute to firm-level innovation, and does IHC have differing outcomes in small and larger-sized firms? 	<ul style="list-style-type: none"> Managers in small firms who avail of training provided have a significantly positive impact on the probability of engaging in all three types of innovation. The willingness of the manager to accept change is found to be positively significant for service innovation and stronger for product innovation. The location of the firm, has a more significant effect for larger-sized firms than small firms. 		I, II, VI
Middleton, K. L., & Chambers, V. (2010)	<ul style="list-style-type: none"> Examine whether the intention to adopt and use wifi technology by SMEs reduces the digital divide among users who exhibit differences in gender, race, age, education, and experience. 	<ul style="list-style-type: none"> Access to the internet via high-speed Wi-Fi has the potential to reduce and/or eliminate the digital divide among and between diverse populations of SMEs While both Hispanics and Whites indicated a positive intent to adopt the new Wi-Fi technology, 		II, III

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Middleton, K. L., & Byus, K. (2011)	<ul style="list-style-type: none"> Examine the influence of Hispanic ethnicity on the adoption and use of ICT tools by SMEs in a south-western renewal community 	<p>only White SME owners indicated a significant and positive use of the technology.</p> <ul style="list-style-type: none"> Results point to a continuing digital divide among Hispanic and non-Hispanic SME owners Non-Hispanic SME owners found to be much more likely to adopt a wider range of ICTs and to use them for both administrative and long term strategic analytical purposes. 		II, III
Mole, K. F., Ghobadian, A., O'Regan, N., & Liu, J. (2004)	<ul style="list-style-type: none"> Assesses the adoption of different soft process technologies in British engineering and electronics SMEs 	<ul style="list-style-type: none"> Firm specific factors make a larger difference to the adoption of process technologies than competitive factors. Benchmarking, suggestions schemes, problem solving techniques and ISO 9000 adoption was unrelated to firm size, which holds out the prospect of soft process technologies as an alternative. 		III
Mole, K. F., Hart, M., & Roper, S. (2014)	<ul style="list-style-type: none"> Evaluate whether changes to delivery mechanisms affect the type of advice received. 	<ul style="list-style-type: none"> SMEs sought word-of mouth referrals before taking internal, capability-enhancing advice. Only when firms took advice that used extant capabilities (e.g. marketing or sales) did they rely on the Internet. When Internet is privileged over face-to-face advice the changes made by each recipient of advice are likely to diminish causing less impact from advice within the economy. 		V
Naranjo Valencia, J. C., Sanz Valle, R., & Jiménez Jiménez, D. (2010)	<ul style="list-style-type: none"> Study empirically the relationships among organizational culture and product innovation. 	<ul style="list-style-type: none"> Ad hococratic cultures have a positive and significant effect on product innovation. Organizational cultures that empathise internal and control orientations will inhibit the generation of product and services innovations. 		I, II
Niaki, M. K., & Nonino, F. (2017)	<ul style="list-style-type: none"> Identify the impacts of additive manufacturing (AM) in manufacturing, business strategies and business performance 	<ul style="list-style-type: none"> An increasing competitiveness of the early adopter SMEs using Rapid Manufacturing. AM brought not only a process innovation but also product innovation 		III, IV
Niebuhr, A. (2010)	<ul style="list-style-type: none"> Analyse the effect of cultural diversity of the labour force on patent applications for a cross-section of German regions. 	<ul style="list-style-type: none"> Significant impact of R&D expenditure, relative size of industrial sector, as well as type of sector (manufacturing) on innovation output Innovation-enhancing effect of cultural diversity of the workforce irrespective of applied diversity measure. 	<ul style="list-style-type: none"> Areas that are less densely populated with small firms, especially rural areas, tend to be marked ceteris paribus by lower productivity of R&D activity. 	II, III, VI

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
North, D., & Smallbone, D. (1996)	<ul style="list-style-type: none"> Contribute to the debate about the potential contribution of SMEs to rural economic development. 	<ul style="list-style-type: none"> In terms of the degree of adaptation to local market conditions and employment performance, it was the rural SMEs that tended to be more active. Rural firms still lag behind their counterparts in terms of their orientation to national and international markets. 	<ul style="list-style-type: none"> Remote rural firms not only had much lower labour productivity levels than their urban counterparts, but the rate of productivity change during the 1980s was also inferior. 	VI
Nunes, M. B., Annansingh, F., Eaglestone, B., & Wakefield, R. (2006)	<ul style="list-style-type: none"> Study of knowledge management understanding and usage in small and medium knowledge-intensive enterprises. 	<ul style="list-style-type: none"> Knowledge management activities within SMEs tend to happen in an informal way, rarely supported by purposely designed ICT systems. Reveals lack of understanding of the value of knowledge in competition, innovation and even survival by both managers and employees. 	<ul style="list-style-type: none"> All SMEs, including knowledge intensive ones, acknowledge that adequately capturing, storing, sharing and disseminating knowledge can lead to greater innovation and productivity 	I, III
Nunes, P. M., Goncalves, M., & Serrasqueiro, Z. (2013)	<ul style="list-style-type: none"> Investigate whether age is a fundamental characteristic of the relationships between determinants and growth. 	<ul style="list-style-type: none"> R&D intensity in situations of financial deficit is of greater relative importance for diminished growth in young SMEs, but only in context of high-tech SMEs 		III, VI
Noke, H., & Hughes, M. (2010)	<ul style="list-style-type: none"> Examine strategies used by firms to reposition through creating a new product development (NPD) capabilities 	<ul style="list-style-type: none"> Four strategic approaches (strategic alliances, licensing key technologies/ideas, outsourcing and deploying internal development process) to enable the creation of a NPD capability are found. The strategies are not mutually exclusive. The strategies enabled value chain repositioning not just in terms of higher value to the current product range, but also created wholly new value chains as firms created starkly different new product outcomes 		V
Onkelinx, J., Manolova, T. S., & Edelman, L. F. (2016)	<ul style="list-style-type: none"> Explore the effect of investments in employee human capital on labour productivity, and the role of labour productivity in SME internationalization. 	<ul style="list-style-type: none"> Human capital of the entire organization matters for SME internationalization, not just the human capital of the owner/founder. 	<ul style="list-style-type: none"> Investments in employee human capital lead to greater labour productivity in the following year, which in turn, leads to a higher degree of internationalization. 	I, VI
Oeij, P., de Vroome, E., Bolland, A., Gründemann, R., & van Teeffelen, L. (2014)	<ul style="list-style-type: none"> Does the innovation project 'My Enterprise 2.0' strengthen the innovation capability of SMEs 	<ul style="list-style-type: none"> The increase in "workplace innovativeness" found in firms implementing a "workplace innovation intervention" is significantly different from the decrease in firms that did not Only three types of interventions applied: the areas of strategy, design of primary process, and deployment of personnel led to a significant improvement in the "workplace innovativeness" as a whole." 	<ul style="list-style-type: none"> Firms also reported positive effects of workplace innovation intervention on company performance, achieving company goals and improving labour productivity. 	I, V

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Parisi, M., Schiantarelli, F. & Sembenelli, A. (2006)	<ul style="list-style-type: none"> Presents evidence on the effect of process and product innovations on productivity, as well as on the role played by R&D and fixed capital investment in enhancing the likelihood of introducing innovations at the firm level 	<ul style="list-style-type: none"> R&D spending is strongly positively associated with the probability of introducing a new product, whereas fixed capital spending increases the likelihood of introducing a process innovation The effect of fixed investment is magnified by R&D spending internal to the firm implying that R&D can affect productivity growth by facilitating the absorption of new technologies. The introduction of innovations is significantly related to cash flow and this is persistent only for product innovation. 	<ul style="list-style-type: none"> Process innovation has a larger impact on total factor productivity than product innovation. 	III, IV
Rasel, F. (2016)	<ul style="list-style-type: none"> Examines whether information technology (IT) and decentralized and incentive-based workplace organization are complementary only for large firms or also for smaller firms. 	<ul style="list-style-type: none"> SMEs with decentralized and incentive-based work practices tend to use IT more intensively. 	<ul style="list-style-type: none"> IT and workplace organization are individually associated with higher productivity, but the combination of IT and decentralization does not yield a productivity premium. Combining IT and decentralized workplace organization seems a successful strategy for only larger firms. 	I, III
Raymond, L. (2005)	<ul style="list-style-type: none"> Focuses on the performance outcomes of alignment between the assimilation of AMT and the CSFs (critical success factors) associated with operations and production management in manufacturing SMEs. 	<ul style="list-style-type: none"> Increased uncertainty in the SMEs' environment leads to increased CSF levels but not to increased assimilation of AMT The more "soft" aspects of AMT, linked to the effective implementation and use of manufacturing resources management applications are more problematic for SMEs. 	<ul style="list-style-type: none"> While increased CSF and AMT assimilation levels directly impact operational performance in terms of increased productivity, cost reductions, flexibility, quality, and integration, a mismatch between the two significantly reduces performance 	I, III
Raymond, L., & St-Pierre, J. (2004)	<ul style="list-style-type: none"> Explore the actual relationship between customer dependency, R&D, and the business performance of small manufacturers. 	<ul style="list-style-type: none"> The more commercially dependent the SME, the greater proportion of its financial and human resources allocated to product R&D. R&D activities could allow manufacturing SMEs to counter the influence of major customers, by reversing commercial dependency 	<ul style="list-style-type: none"> Implied relationship between R&D and performance i.e. more intense R&D activities associated with lower productivity but with higher profitability 	III
Raymond, L., & Bergeron, F. (2008)	<ul style="list-style-type: none"> Understanding the performance outcomes of the alignment between the e-business capabilities of manufacturing SMEs and their business strategy 	<ul style="list-style-type: none"> Results indicate that the ideal e-business profiles vary in relation to the firms' strategic orientation 	<ul style="list-style-type: none"> E-business alignment has positive performance outcomes in terms of growth, productivity and financial performance For defender type firms, greater alignment of their e-business activities is associated to stronger growth and greater profitability but not to greater productivity. Whereas for the prospector type, alignment is associated only to productivity. 	I, III

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Raymond, L., Bergeron, F., & Croteau, A. (2013)	<ul style="list-style-type: none"> Identify the enabling effect of IT integration on the innovation capability of manufacturing SMEs—in terms of growth and productivity outcomes—and to verify if this effect is subject to industry influences. 	<ul style="list-style-type: none"> The positive effect of innovation capabilities on growth is significantly greater in the high-IT integration SMEs than low-IT integration ones. However, this does not remain true when controlling for sector, size and age of the firm. Integrative IT such as ERP systems can indeed be counterproductive, and “seamless integration” can induce rigidities running counter to process innovation aims. 	<ul style="list-style-type: none"> Firm’s innovation capability was found to be positively related to the growth and productivity of manufacturing SMEs. While IT integration was not seen to enable the innovation capability of manufacturing SMEs in terms of growth, it was seen to have a disabling effect on this same capability with regard to productivity. 	III, IV
Ribeiro Soriano, D., & Castrogiovanni, G. J. (2012)	<ul style="list-style-type: none"> Investigate the effects of entrepreneurial human capital on SME performance within the European Union. 	<ul style="list-style-type: none"> There is a link between performance and inclusion of other CEO-owners in the founder’s inner circle of advisors. Relationship is positive when the advisor’s venture has experienced failure and negative when the advisor’s venture has been successful. 	<ul style="list-style-type: none"> Both profitability and productivity are positively related to industry-specific knowledge possessed by the CEO-owner prior to starting up and the general business knowledge acquired post start-up. Experience as a result of having previously worked in a firm in the same industry pre-start-up was related to productivity only 	II, V
Ruivo, P., Oliveira, T., & Neto, M. (2015)	<ul style="list-style-type: none"> What are the antecedents of commercial-packaged ERP (Enterprise resource planning) value in European SMEs? What are the differences and similarities of commercial-packaged ERP value? 	<ul style="list-style-type: none"> SMEs are not only using ERPs as transaction processing systems, but also as systems to facilitate firms’ collaboration and analytics capabilities. 	<ul style="list-style-type: none"> While collaborating with colleagues, system, suppliers, partners, and customers increases productivity, analytics provides greater business insight for better decision making processes. 	III, V
Romero-Jordan, D., Sanz-Labrador, I., & Sanz-Sanz, J. F. (2019)	<ul style="list-style-type: none"> Analyses whether corporation tax penalises the productivity growth of smaller enterprises (SEs) 	<ul style="list-style-type: none"> For SEs, corporation tax has a negative effect only upon the decision to invest in productive fixed assets MLEs corporation tax negatively affects both the decision to invest and project size. 	<ul style="list-style-type: none"> Corporation tax has a negative effect upon productivity growth in companies with the greatest profitability, whether large or small. 	VI
Sandulli, F., Fernández-Menéndez, J., Rodríguez-Duarte, A., & López-Sánchez, J.I. (2012)	<ul style="list-style-type: none"> Examines the effects of information technology (IT) adoption on the productivity of multimarket SMEs 	<ul style="list-style-type: none"> Positive relationship between IT adoption and exporting firms' performance. IT adoption contributes to the efficiency of SMEs facing higher complexity. Multimarket SMEs should favour the deployment of operations-oriented IT in micro firms, or supporting financial processes with IT in larger firms. 	<ul style="list-style-type: none"> Intensive use of IT in operations processes is found to be associated with substantial increases in productivity of firms following both related and unrelated diversification 	III, VI
Sandulli, F. D., Baker, P. M. A., & López-Sánchez, J.I. (2013)	<ul style="list-style-type: none"> Explore the interactions between cognitive and technical skills and IT-led technological change in SMEs. 	<ul style="list-style-type: none"> Firms with lower levels of technological change are less likely to adopt organizational innovations and will not fully benefit from highly educated workers. Experience and accumulation of human capital have a significant impact on a firm's efficiency when technological change is deep. 		II, III

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Savery, L. K., & Alan Luks, J. (2004)	<ul style="list-style-type: none"> Consider the role of education and training in the success of organizations. 	<ul style="list-style-type: none"> Employing managers with tertiary qualifications in business management, commerce or administration will lead to an intention to significantly increase production. 		II, VI
Scuotto, V., Del Giudice, M., & Obi Omeihe, K. (2017)	<ul style="list-style-type: none"> Explore mass collaborative knowledge management (MCKM) and its implications for SMEs. 	<ul style="list-style-type: none"> Using (social media networks) SMNs results in a daily, digital communication strategy aimed at employees and customers, and the co-customer-centred approach in the innovation process and entrepreneurial challenges SMEs can use the internet to integrate their organizational innovation processes within functional departments and supply chain members via e-collaboration tools. 		III, V
Serban, S. (2013)	<ul style="list-style-type: none"> Understand why and to which extent firms decide to invest in innovation, what drives the innovation output and what are the impacts of the innovation output on productivity of firms. 	<ul style="list-style-type: none"> Firms decide to invest in R&D mainly because of public support or exports If firms decide to invest both in physical and knowledge capital they will invest more in innovation if they have more public support. Exports also positively impact innovation input intensity. R&D continuity positively affects all types of firms regarding their innovation output. 	<ul style="list-style-type: none"> For small firms unlike medium or large firms, innovation output has a negative impact on their productivity 	III, VI
St-Pierre, J., & Raymond, L. (2004)	<ul style="list-style-type: none"> Tests a model of the relationship between benchmarking, the adoption of advanced manufacturing systems, and the performance of SMEs. 	<ul style="list-style-type: none"> Benchmarking leads manufacturing SMEs to adopt new business practices such as flexible manufacturing systems (FMS), computer-based inventory management, bar-coding and maintenance management and ERP systems. 	<ul style="list-style-type: none"> In the short term, benchmarking is directly associated with the adoption of new production practices in the form of Advanced manufacturing systems, with a higher level of capital and labour productivity, and with a lower level of production effectiveness. 	VI
Struker, J., & Gille, D. (2010)	<ul style="list-style-type: none"> Determining firm-size specific characteristics of Radio frequency identification (RFID) 	<ul style="list-style-type: none"> Smaller enterprise size makes RFID adoption and exploitation of the productivity potential easier. SMEs using RFID have significantly less-extensive IT-equipment than large RFID users. SMEs more frequently seek to optimize the coordination of processes and applications than LEs. 		III
Su, Z., & Tang, J. (2016)	<ul style="list-style-type: none"> Study the factors that may be important for firms' decision in pursuing these two different business strategies. 	<ul style="list-style-type: none"> Age of firms, the single-establishment structure of the business and being multinationals are useful predictors for firms to undertake product innovation. 	<ul style="list-style-type: none"> Firms focusing on product innovation are more productive than firms focusing on cost-cutting strategies. 	IV

Articles	Article focus	Indirect influence on productivity	Direct influence on productivity	Themes
Tomlinson, P. R., & Fai, F. M. (2013)	<ul style="list-style-type: none"> Explore the SME innovation–cooperation relationship by designing and utilising measures that capture both the multi-scalar (strength) and multi-dimensional (variety) nature of co-operation and innovation. 	<ul style="list-style-type: none"> The strength of cooperative ties across a range of productive activities within the value chain are important facilitators for SME innovative capability; true for both product and process innovation. 		IV, V
Torre, E. D., & Solari, L. (2011)	<ul style="list-style-type: none"> Is there a relationship between the adoption of organisational innovations and a firm’s economic results in SMEs? 	<ul style="list-style-type: none"> With lower technological levels, a high degree of organisational innovation may have counter-productive effects by worsening the business results. 	<ul style="list-style-type: none"> SMEs which achieved the largest labour productivity increases are those which combined investments in the new organisation of work with advanced technologies and embeddedness in stable relational networks with other firms. 	I, III
Torrent-Sellens, J., Ficapal-Cusi, P., Boada-Grau, J., & Vigil-Colet, A. (2016)	<ul style="list-style-type: none"> Provide empirical evidence and a practical tool to measure new co-innovative sources of perceived productivity in tourism SMEs. 	<ul style="list-style-type: none"> The co-innovative factors in SMEs reside in specific practices mainly orientated towards increasing income and/or optimizing of costs or production factors. 	<ul style="list-style-type: none"> In radical innovation-oriented tourism SMEs, co-innovative factors including promoting Internet uses and organizational practices that increase income and optimize resources could be a clear strategic choice to improve productivity. 	I, III
Towers, N., & McLoughlin, J. (2005)	<ul style="list-style-type: none"> Examine how widespread TQM has been implemented within the UK textile manufacturing sector that is characterised by a high proportion of SMEs managing unpredictable and volatile demand. 	<ul style="list-style-type: none"> External environment in which SMEs operate predominantly requires the adoption of TQM as a driver towards customer orientation by the business. 	<ul style="list-style-type: none"> The adoption of TQM had produced a limited effect on employee-related issues as only minor improvements had been reported in labour turnover and productivity. In fact the last attribute had been the widest range of responses with no major improvement or even deterioration being reported. 	I, VI
Uwizeyemungu, S., Poba-Nzaou, P., & St-Pierre, J. (2015)	<ul style="list-style-type: none"> Analyses the relationship between AMT proficiency levels in manufacturing SMEs and product innovation performance. 	<ul style="list-style-type: none"> The organizational and environmental context of SMEs are more determinant for product innovation performance than AMT assimilation patterns. 		III, IV
Wielicki, T., & Arendt, L. (2010)	<ul style="list-style-type: none"> Examined the perceptions of ICT implementation barriers by SMEs’ owners and managers across different cultures and countries. 	<ul style="list-style-type: none"> USA is more ready to take advantage of new technologies and knowledge-based economy than Spain, Portugal and Poland The more knowledge-driven a given economy is, the more likely it is that managers/owners of SMEs will shift their attention from short-term ICT barriers, like lack of funds, to more long-term barriers, like lack of knowledge and an information system plan. 		III, VI

b) Impact of productivity

Articles	Article focus	Impact of productivity	Themes
Antonelli, C., Crespi, F & Scellato, G. (2015)	<ul style="list-style-type: none"> Investigates the dynamics of productivity in a large sample of Italian manufacturing firms, focusing on the determinants of firm-level persistence in time of high TFP growth rates relative to the corresponding sectoral distributions 	<ul style="list-style-type: none"> Being in the top 15 % of the distribution of TFP growth rates in year $t - 1$ has a positive and largely significant impact on the likelihood of the firm still being in the top 15 % in year t. These dynamics are not influenced by the past but are path dependent Firms which have been able to improve the general efficiency of their production process at time t are more likely to sustain above-average performance in the subsequent periods of time. 	V, VI
Bagchi-Sen, S. (2001)	<ul style="list-style-type: none"> Examines similarities and differences between SMEs with different levels of reported product innovation. 	<ul style="list-style-type: none"> Pursuing product innovation results in better performance in terms of total and export sales SMEs with higher levels of product innovation value expansion of R&D efforts, incremental innovation, new product development, and new export market development SMEs with lower levels of product innovation emphasize the importance of cost-based pricing and market development within the local market. 	IV
Bakhtiari, S. (2015)	<ul style="list-style-type: none"> Studies the relationship between total factor productivity and outsourcing accounting for the possibility of inefficient firms self-selecting into exit instead of outsourcing to domestic suppliers. 	<ul style="list-style-type: none"> Productivity is the principal determinant of outsourcing. Low productivity significantly raises the likelihood of the outsourcing decision as well as the decision to exit. 	V
Eliasson, K., Hansson, P., & Lindvert, M. (2012)	<ul style="list-style-type: none"> Distinguishing between learning by exporting and learning to export among new export-entrants 	<ul style="list-style-type: none"> Future exporters have higher productivity than do non-entrants only before entry into international markets indicating self-selection into exports and learning to export. Positive effect of pre-export labour productivity valid for micro or small firms but not medium or large ones. 	VI
Falk, M., & de Lemos, F. F. (2019)	<ul style="list-style-type: none"> Investigates the link between export behaviour, labour productivity and R&D activities in SMEs. 	<ul style="list-style-type: none"> A combination of high labour productivity and high R&D intensity are particularly favourable for export activities. The importance of labour productivity is more pronounced for micro enterprises, young firms and born global firms than for old firms. R&D activities are only relevant if the gap in labour productivity between SMEs and large firms in a given industry is not too wide. Below a certain threshold of the relative labour productivity level, higher R&D expenditures do not pay off in extended export activities. 	III, VI
Falk, M., & Hagsten, E. (2015a)	<ul style="list-style-type: none"> Investigates the exporter productivity premium of SMEs relative to large firms 	<ul style="list-style-type: none"> The level of labour productivity of exporting SMEs is higher than that of non-exporting ones in a given industry and country. Relative productivity level is highest for SMEs present in both markets than for those only present in one of the two Exporter productivity premium is highest in manufacturing, and professional and technical services. 	VI
Falk, M., & Hagsten, E. (2015b)	<ul style="list-style-type: none"> Analyses the determinants of the export participation of Swedish SMEs in the computer and other business service industries with particular emphasis on micro firms (0–9 employees). 	<ul style="list-style-type: none"> A high productivity level in the previous year is most important in determining decisions to export. The impact of labour productivity on exporting in computer services does not differ between micro firms and other SMEs. In business services, the relationship between export probability, labour productivity and skill intensity is significant only for micro enterprises. 	VI
Foreman-Peck, J., & Nicholls, T. (2013)	<ul style="list-style-type: none"> Investigate the contribution that SME takeovers may make to spatial variations in productivity. 	<ul style="list-style-type: none"> Contrary to big firms, more productive small businesses are more subject to takeover—although effect is weaker if they are located in peripheral regions. 	V, VI

Articles	Article focus	Impact of productivity	Themes
Foreman-Peck, J., & Nicholls, T. (2015)	<ul style="list-style-type: none"> Examine the relocation of SMEs to assess whether the process reinforces core– periphery disparities, as in many new economic geography models, or ameliorates them in neoclassical style. 	<ul style="list-style-type: none"> SMEs that relocate are more productive, relatively larger and younger, as well as more probably initially located core locations (e.g. London). 	V
Guedes de Carvalho, P., Nunes, P., & Serrasqueiro, Z. (2013)	<ul style="list-style-type: none"> The growth determinants of fitness SMEs in Portugal using the two-step estimation method. 	<ul style="list-style-type: none"> Internal finance, external finance and labour productivity are important determinants to increase growth of fitness SMEs 	VI
Guzman-Cuevas, J., Caceres-Carrasco, R., & Soriano, D. R. (2009)	<ul style="list-style-type: none"> Analyses both the firm characteristics that make up a particular productive structure and its relation to the level of economic development 	<ul style="list-style-type: none"> While economic growth depends on a number of variables of different nature such as productivity, technology, human capital, investment, economic policy etc. within a structural economic framework, entrepreneurial tissue represents a key factor that has a great influence on the economic behaviour of a specific territory. 	VI
Karhunen, H., & Huovari, J. (2015)	<ul style="list-style-type: none"> Investigates how R&D subsidies affect firms' employment, value added and employee education levels 	<ul style="list-style-type: none"> Productivity growth before the subsidy year is also higher in subsidised firms 	III
Kohr, C. K., Malorgio, G., & Aragrande, M. (2017)	<ul style="list-style-type: none"> Explore the determinants of internationalisation among late starters in the wine sector. 	<ul style="list-style-type: none"> Productivity measures and unit revenue indicators are correlated with the export intensity of a business. 	I, VI
Lejarraga, I., & Oberhofer, H. (2015)	<ul style="list-style-type: none"> Investigate the trade behaviour of SMEs, exploring any differences between manufacturing and services sectors. 	<ul style="list-style-type: none"> Firm size and (total factor) productivity only affect a firm's export probability but (conditional on being an exporting firm) not its relative engagement in foreign market activities. More productive ICT and professional services firms are more likely to export to foreign markets, while productivity matters less for financial or travel services providers. 	VI
Mayer, P., Gerber, N., McDermott, R., Volkamer, M., & Vogt, J. (2017)	<ul style="list-style-type: none"> Understanding of goal setting in organizations, especially regarding the mitigation of conflicting productivity and security goals. 	<ul style="list-style-type: none"> The presence of rewards for productivity goal achievement is strongly associated with a decrease in security compliance. 	I, III
Nunes, P. M., Goncalves, M., & Serrasqueiro, Z. (2013)	<ul style="list-style-type: none"> Investigate whether age is a fundamental characteristic of the relationships between determinants and growth. 	<ul style="list-style-type: none"> R&D intensity and labour productivity are of greater relative importance for increased growth in old SMEs than for young SMEs. 	III, VI
Onkelinx, J., Manolova, T. S., & Edelman, L. F. (2016)	<ul style="list-style-type: none"> Explore the effect of investments in employee human capital on labour productivity, and the role of labour productivity in SME internationalization. 	<ul style="list-style-type: none"> The effect of labour productivity on degree of internationalization is contingent on SMEs' internationalization strategy i.e. only for accelerated internationalizers 	I, VI
Romero-Jordan, D., Sanz-Labrador, I., & Sanz-Sanz, J. F. (2019)	<ul style="list-style-type: none"> Analyses whether corporation tax penalises the productivity growth of smaller enterprises (SEs) 	<ul style="list-style-type: none"> In the Spanish case productivity a 1% increase in TFP growth for frontier firms leads to an average increase in the TFP growth of 0.85% in laggard firms although the effect is much weaker in the SEs. 	VI
Savery, L. K., & Alan Luks, J. (2004)	<ul style="list-style-type: none"> Consider the role of education and training in the success of organizations. 	<ul style="list-style-type: none"> Firms that wish to improve their productivity and/or profitability are more likely to train their staff. 	II, VI

Articles	Article focus	Impact of productivity	Themes
van Stel, A., Lokshin, B., & de Vries, N. (2019)	<ul style="list-style-type: none"> Focuses on productivity transmissions between SMEs and large firms. 	<ul style="list-style-type: none"> A one percent increase in productivity of SMEs increases productivity of large firms in the long run. Impact of SME labour productivity increases on labour productivity increases of large firms primarily reflects an effect of medium-sized and small firm productivity increases The long-run elasticity with respect to changes in productivity of SMEs is larger in countries with bigger size of the SME sector 	VI
Yazdanfar, D. (2013)	<ul style="list-style-type: none"> Examining the profitability determinants of Swedish micro firms at the firm level. 	<ul style="list-style-type: none"> Productivity is the most significant determinant of profitability. These results are fairly robust across the various industry sectors Larger and younger firms with high productivity and growth are more likely to be profitable. There are profitability heterogeneities at the industry level. 	VI