



Population ageing and entrepreneurship under a regional perspective. A bibliometric and content analysis

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Abstract Due to the ageing population and the changing demographics, mature age or older entrepreneurship is becoming an important area of research within the regional literature. Using a hybrid literature review technique (bibliometrics and content analyses), we explore the literature (963 articles between 1990 and 2021) on the topic of population ageing and entrepreneurship under a regional perspective. After a general overview of the research on entrepreneurship and aging, we find two main streams of research and potential avenues for future study: (i) the role that regions have in entrepreneurship and start-up and (ii) the linkages between population ageing, entrepreneurship and the local and regional context. Finally, the paper recommends several research questions to extend the literature.

Keywords Senior entrepreneurship · Silver economy · Population ageing · Regional growth · Local determinants

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1 Introduction

Population ageing is today a significant phenomenon which results from both longer life expectancy and declining fertility rates. In many countries, the proportion of the population aged 65 and over is growing faster than any other age group, making older people a significant part of the economy and the society (Backman et al. 2021).

Due to the ageing population and the changing demographics, mature age or older entrepreneurship is becoming an important area of research within the regional literature. As “entrepreneurship is a regional event” (Sternberg and Rocha 2007), the role of the senior entrepreneurship in fostering economic development and growth can be hardly assessed outside the regional perspective (Fritsch 2008). However, despite a few early contributions on “grey entrepreneurship” or “seniorpreneurship” (Harms et al. 2014; Featherstone 2015), the issue of how ageing population and entrepreneurship coevolve at regional level has been somewhat neglected by the literature, thus making a review of the topic timely and useful for identifying avenues for future research.¹

In this paper, we contribute to this literature by providing a bibliometric citation analysis (Randhawa et al. 2016; Durisin et al. 2010; Sarin et al. 2017; Khan et al. 2020) and a content analysis (Danneels 2004; Verganti 2008; Corbett et al. 2013; Micheli et al. 2018; Griffin et al. 2018; Raff et al. 2020; Wijekoon et al. 2021) on the topic of population ageing and entrepreneurship under a regional perspective. Using established research methods, we provide a systematic analysis of most relevant topics, contributions, authors, and journals that have been dealing with the subject since the last thirty years (Broadus 1987; Diodato 1994; Pritchard 1969). After selecting a set of keywords that best represent our area of research, we first explored the issue of entrepreneurship and population ageing without considering the regional context. Then, we extended the analysis by filtering by regional topics. Finally, we developed a specific content analysis on the different research streams that emerged from the bibliometric study. Data and citations for the bibliometric analysis have been extracted from the Web of Science Core Collection dataset (Clarivate Analytics 2020), as available in August 2022. Details on the approach and methods are provided in Sect. 2.

The review investigates two critical questions: (i) the status of the research on the relationship between entrepreneurship and population ageing at regional level and (ii) the main streams of research that are currently developing in the field. We find two different streams of research and potential avenues for future study. The first stream includes the issue of entrepreneurship and start-ups in the regional context, also considering demographic factors and differences across territories. The second stream comprises the linkages between population ageing and entrepreneurship, with specific reference to the local and regional context.

¹ The literature on entrepreneurship and population ageing in a regional context has mainly focused on differences between regions, rural territories and micropolitan areas (Yang and Tsou 2020; Figueiredo and Paiva 2019; Kachlami et al. 2018; Leporati et al. 2021; Eliasson and Westlund 2013; Delfmann et al. 2014; Liu et al. 2021; Barkley and Dudensing 2011; Fisher and Nijkamp 2009).

The paper is organized as follows. Section 2 presents data and methodology. Section 3 shows the results of the bibliometric analysis of the literature on population ageing and entrepreneurship. In Sect. 4, we present the results of the bibliometric analysis on the restricted database, which specifically considers the regional perspective. Section 5 explores the most important contributions from the literature and discusses the main research lines. Section 6 presents the major results and Sect. 7 concludes.

2 Data and methodology

We adopted a hybrid review methodology for the literature analysis (Paul and Criado 2020). The method consists of two main techniques: (i) a bibliometric citation analysis² and (ii) a content analysis. The bibliometric analysis, first introduced by Price (1965) and developed in the following years in several contributions (Randhawa et al. 2016; Durisin et al. 2010; Sarin et al. 2017; Khan et al. 2020), is currently used for exploring the citation-based relationships between articles (Kim and Mcmillan 2008). The content analysis, which is a powerful and widely used methodology in the empirical research, helps in conducting systematic reviews of papers (Danneels 2004; Verganti 2008; Corbett et al. 2013; Micheli et al. 2018; Griffin et al. 2018; Raff et al. 2020; Tomas et al. 2003; Wijekoon et al. 2021; Gaur and Kumar 2018; Appio et al. 2021). Following Zabavnik and Verbič (2021), the bibliometric analysis has been run using the R-based software tool “Bibliometrix R-package” (Aria and Cuccurullo 2017), which has a web-interface called “Biblioshiny”. The selection of papers has been done on the Web of Science (WoS) Core Collection, which is considered highly competitive with respect to existing alternative database (e.g., Google Scholar, Scopus).³

The bibliometric analysis has been divided in two parts. In the first part, we only searched for our specific topic, i.e., entrepreneurship and population ageing, in a general context. In the second part, we delved into a more detailed analysis by focusing on the regional perspective. As for the first part, the selection of articles has been done using the following set of items: (“entrepreneur*” OR “enterprise*” OR “contractor” OR “manager”) AND (“senior*” OR “grey” OR “elderly” OR “silver” OR “demograph*” OR “age” OR “ages” OR “aging” OR “ageing”). This first search ended up with more than 28,000 articles, too many for a usable analysis of the topic. For this reason, we refined the research by selecting articles in specific macro-areas: “Economics”, “Business”, “Regional Urban Planning”, “Management”, “Environmental Studies”, “Geography”, “Environmental Sciences”, “Development Studies”, “Social Sciences Interdisciplinary”, “Area Studies”, “Green Sustainable Science Technology”, “Business Finance”, “Urban Studies”, “Demography”, “Sociology”, “History”, “Social Sciences Mathematical Methods”, “Ethnic

² Bibliometric analysis consists in “the use of statistical methods in the analysis of a body of literature to reveal the historical development of subject fields and patterns of authorship, publication, and use” (Young 1983).

³ For a detailed analysis of different datasets, see Zabavnik and Verbič (2021).

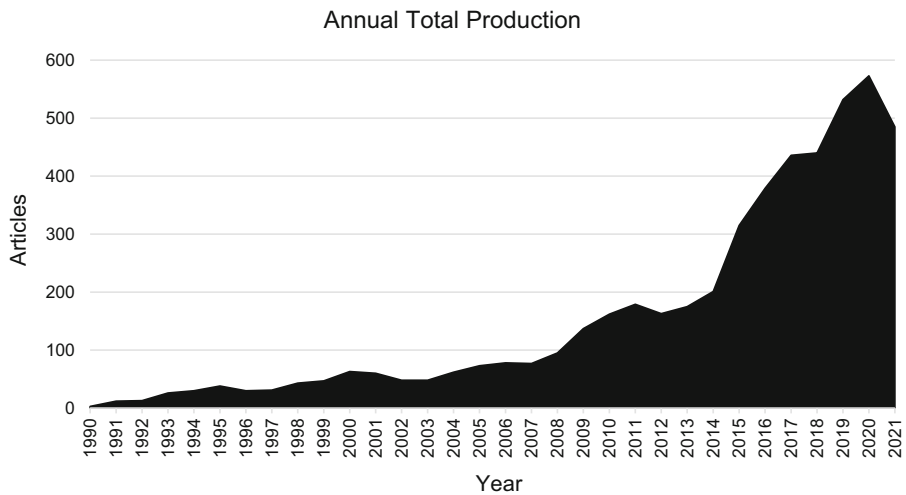


Fig. 1 Annual Scientific Production over the years 1990–2021—General Analysis. (Source: our own elaborations)

Studies”, “History of Social Sciences”, “Social Issues”, “Social Work” or “Statistics Probability”. Also, we only included documents in English. From this search, we ended up with a dataset of 5284 articles. Authors included in the dataset are 11,405; single-authored papers are 1161 and authors per paper are 2.16 in the sample average. Finally, publishing sources are 1379 and references are 215,943. As for the second part of the bibliometric analysis, we have added the regional identifier by including the following expressions: AND (“local level” OR “rural area*” OR “local area*” OR “region*”). This is a refinement of the previous research that requires papers to contain one (or more) of the terms indicated above (including the plural form). Using this approach, we found 963 articles, with 233 single-authored papers, 2397 authors, 527 sources and 48,348 references. The average number of authors per paper is 2.49. This is our working dataset.

3 General overview

The topic of population ageing and entrepreneurship has captured the interest of academic research since 1990. Looking at the annual scientific production between 1990 and 2021, the earliest papers date back to the beginning of the ‘90s (3 articles in 1990, 12 articles in 1991), and grew up to 573 articles in 2020 and 485 articles in October 2021.

The trend in Fig. 1 confirms the growing interest of researchers in recent years: the sizable growth rate of published papers between 1990 and 2021 (17.8% yearly average) is actually due to the huge production of research on the topic occurred in the last part of the period, i.e., from 2009 onwards.

Table 1 Country analysis for number of articles. This table shows the top 10 Countries by the number of published articles—General Analysis. (Source: our own elaborations)

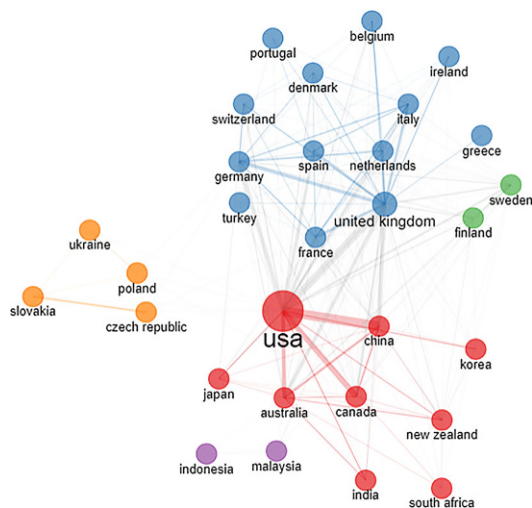
Country	SCP	MCP	Total Articles	Weight Countries (in %)	SCP ratio (in %)
USA	1041	236	1277	24.64	81.52
United Kingdom	415	174	589	11.36	70.46
China	333	161	494	9.53	67.41
Australia	153	74	227	4.38	67.40
Canada	109	73	182	3.51	59.89
Germany	108	71	179	3.45	60.34
India	131	15	146	2.82	89.73
Spain	93	52	145	2.80	64.14
Italy	91	49	140	2.70	65.00
Sweden	69	32	101	1.95	68.32

SCP Single Country Production, *MCP* Multiple Countries Production, *SCP ratio* dividing SCP by the total number of articles

3.1 Preliminary geographical analysis

Table 1 shows the top 10 Countries by number of published articles. The country with the largest number of papers are the USA, which account for about 25% of the whole scientific production. About 81.5% of these papers are Single Country Production (SCP), that is, papers in which there is not co-authors from a different country. The second country in the rank is the UK, with about 11% of the world production and 70.4% as SCP. Then, China follows as a third country (9.5% of world production, of which 67.4% is SCP) and India as the fourth one. India is the country with the highest SCP ratio (89.7%), i.e., almost the entire Indian scientific production on the topic is done within the country.

Fig. 2 Network analysis for the first 30 Countries. This analysis connects the countries basing on the connections among authors—General Analysis. (Source: our own elaborations)



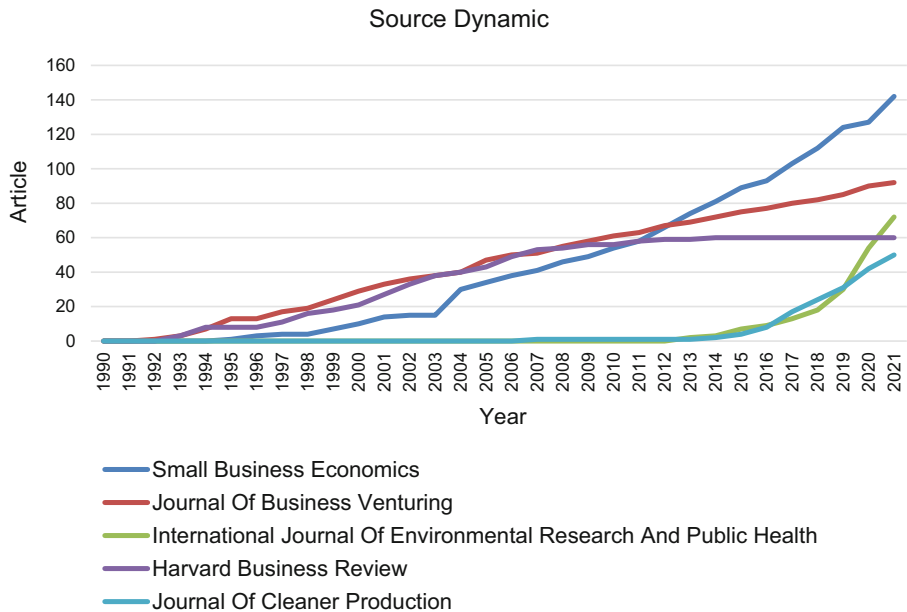


Fig. 3 Cumulative dynamics of the top 5 most influential journals based on total published articles (1990–2021)—General Analysis. (Source: our own elaborations)

Figure 2 shows the network analysis at country level. The USA are the largest hub in the network and the most connected with the other countries. The strongest connections are with two groups of four countries each. The first group includes Australia, Canada, China and Japan, whereas the second group includes the United Kingdom, France, Germany and Italy. Countries belonging to this second group are included in the blue cluster named “European Cluster”.⁴ The yellow cluster is the most detached one, with four countries (Ukraine, Poland, Slovakia and Czech Republic) that are connected only between each other. Likewise, the purple cluster only includes two countries (Indonesia and Malaysia) that are very closely connected to each other. By contrast, the green cluster is very connected with the red and blue clusters, even if it only includes two countries (Sweden and Finland).

3.2 Most relevant journals

The five most influential journals based on the cumulative number of publications are summarized in Fig. 3. The most active journal is *Small Business Economics*, that accounts for the largest number of publications by October 2022 (142) and the most significant growth since the early 2000s. The second journal in the rank is the *Journal of Business Venturing* (92 publications), followed by the *International Journal of Environmental Research and Public Health* (72 publications). The *Harvard Business Review* (HBR) and the *Journal of Cleaner Production*, both active since 1993 and

⁴ Apart from Switzerland, Turkey, and UK (since 2020), all countries are in the EU.

Table 2 Bradford's Law distribution—General Analysis. (Source: our own elaborations)

Zone	No. Journal	No. Articles	Weight Journal (in %)	Name
1	61	1750	4.42	Core
2	256	1793	18.56	Middle
3	1062	1741	77.01	Minor
Total	1379	5284	100	–

This analysis estimates the journals' distribution by dividing journals into three zones. The first zone is called "Core zone", the second "Middle zone" and the third "Minor zone"

Table 3 Top 10 most influential journals based on the number of articles—General Analysis. (Source: our own elaborations)

Journal	H-index Total	H-index Local	Total Citations	No. Articles
Small Business Economics	131	46	7372	153
Journal of Business Venturing	182	60	14,543	92
International Journal of Environmental Research and Public Health	113	12	427	72
Harvard Business Review	170	21	3762	60
Journal of Cleaner Production	200	20	1138	50
Journal of Business Research	195	19	1666	47
Entrepreneurship And Sustainability Issues	25	7	166	43
Journal of Business Ethics	187	20	1860	42
Entrepreneurship Theory and Practice	155	23	2743	41
International Journal of Human Resource Management	114	18	1067	41

The H-Index Total of journals is provided by Scimago Journal Rank (SJR)

2007, respectively, have not published any articles on the topic since 2014, after which they published 60 (HBR) and 50 (Journal of Cleaner Production) papers, respectively. Besides the overall growth of publications, the yearly data provide evidence on how journals are positioned according to their interest in the subject matter. The first journal by number of publications on the topic is the International Journal of Environmental Research and Public Health, with 12, 24 and 18 papers published in 2019, 2020 and 2021, followed by Small Business Economics with 15 articles in 2004 and 2021.

After analysing the yearly performance of the top five journals, we identify the sources most focused on the subject using the Bradford's Law approach (Bradford 1934), which splits the journals distribution in three zones: the "Core zone", the "Middle zone" and the "Minor zone". The distribution of articles following Bradford's Law is reported in Table 2.

According to this distribution, 61 sources (4.4% of the total of 1379) are in the Core zone, which account for 33.1% of the total scientific production. Moreover, the Core zone includes all the five journals mentioned before, thus confirming the relevance of these journals for the analysis. 256 journals are in the Middle zone (1793 publications), which accounts for 18.5% of the journals. Finally, the remain-

Table 4 Top 10 authors for relevance based on the Number of Publications and Local Citations—General Analysis. (Source: our own elaborations)

Authors	H-in-dex Total	H-in-dex Local	Total Citations	No. Pub- lications	Ranking NP	Local Citations	Ranking LC
Kautonen Teemu	23	8	672	8	14	38	7
Minniti Maria Vittoria	22	7	1864	7	24	53	4
Belas Jaroslav	18	9	263	12	2	24	27
Wright Mike	69	8	904	8	17	26	17
Burton M. Diane	10	5	658	6	30	28	13
Kozubikova Ludmila	9	6	174	7	20	24	28
Williams Colin C	46	8	225	15	1	18	53
Zahra Shaker A	69	5	1031	5	59	25	20
Sapienza Harry J	32	4	1708	4	106	89	1
Kljucnikov Alek- sandr	13	7	231	12	3	14	66

H-Index Total is provided by Web of Science Core Collection (WoS)

ing 1062 sources are positioned in the Minor zone (1741 articles), that includes 77.1% of the total sample journals. Among the most relevant Journals, we find Small Business Economics, Journal of Business Venturing, International Journal of Environmental Research and Public Health, Harvard Business Review and Journal of Cleaner Production (Table 3).

3.3 Most relevant authors

Authors in Table 4 are sorted by the average value between the two rankings of authors' local citations and number of publications. The most relevant author is Teemu Kautonen with 8 publications in the database (14th place) and 38 local

Table 5 Lotka's law: the frequency of publication by authors—General Analysis. (Source: our own elaborations)

No. Contribu- tions	No. Authors	Authors Weight (in %)	No. Contribu- tions	No. Authors	Authors Weight (in %)
1	10,042	88.05	9	7	0.06
2	957	8.39	10	3	0.03
3	237	2.08	11	1	0.01
4	78	0.68	12	5	0.04
5	29	0.25	13	2	0.02
6	23	0.20	14	1	0.01
7	14	0.12	15	1	0.01
8	3	0.03	16	2	0.02

This analysis describes the frequency of publication by authors in each field of research. According to this analysis, 99% of authors are "occasional" and wrote only on paper. Only five authors have produces at least three contributions and fall into the "core authors"

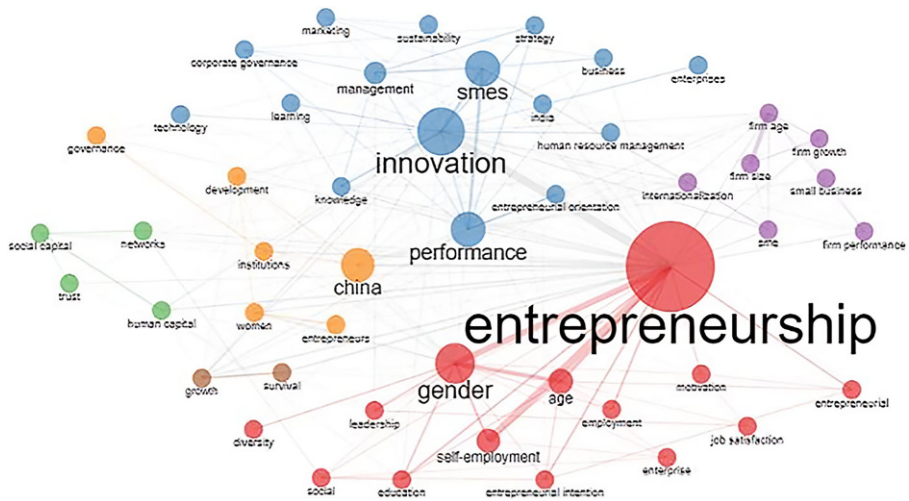


Fig. 4 Co-occurrence analysis for the first 50 author's keywords. This analysis connects the keywords basing on the frequency with the words are used together. The size of the nodes is proportional to the word's occurrence—General Analysis. (Source: our own elaborations)

citations (7th place). He is followed by Maria Vittoria Minniti with 7 publications in the database (24th place) and 52 local citations (4th place); she also has the highest number of Total Citations in this subsample (1864), followed by Harry J. Sapienza (1708), who is the most local cited author (89 local citations). Colin C. Williams is the author with the largest number of publications (15), whereas Jaroslav Belas is the author with the highest H-index Local (9), followed by Teemu Kautonen, Mike Wright and Colin C. Williams.

To describe the frequency of publication by authors in each field of research, we use the Lotka's law, which states that: "as the number of articles published increases, authors producing that many publications become less frequent" (Lotka 1926). The result of this analysis is shown in Table 5.

The left-side tail contains "occasional" authors, i.e., authors who wrote only one or few articles on the topic, while the right-hand side of the distribution defines the core zone, which contains authors who have published many documents, at least five or more. From Table 5, this field of research appears to be populated mostly by occasional authors, whereas core authors represent only 1% of the total number of authors.

3.4 Contributions' analysis

Figure 4 presents the co-occurrence analysis of most frequently used keywords by authors (Callon et al. 1983). This is a "technique that uses the words in the document to establish relationships and build a conceptual structure" (Zupic and Cater 2015). From Fig. 4, we can identify six clusters. The first cluster is the red one: it includes the biggest word (entrepreneurship), which has a very large number of occurrences (397) and strong connections with gender (134 occurrences), age (73) and

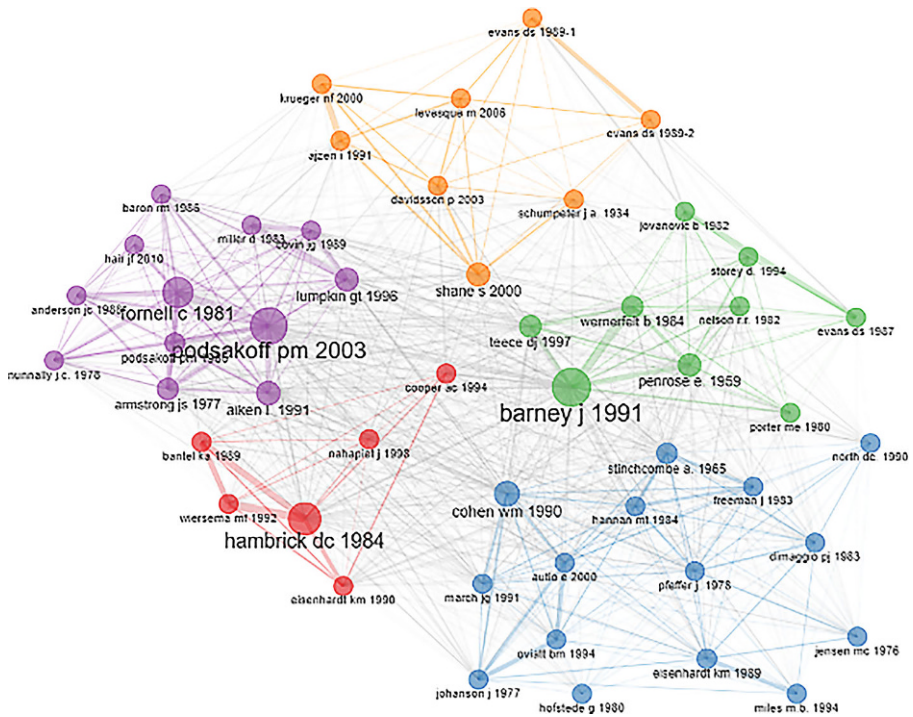


Fig. 5 Co-citation network for authors. This analysis connects the articles basing on the frequency with they are co-cited another paper. The size of the nodes is proportional to the total citations of the article—General Analysis. (Source: our own elaborations)

self-employment (80). Entrepreneurship is also closely linked to the most frequent word (innovation, 159 connections) of the second cluster, i.e., the blue cluster, and it is strongly connected to other two relevant words: SMEs (127 connections) and performance (122 connections).

The remaining four clusters are smaller in size. The brown cluster has only 2 words: growth (50), also connected with innovation, and survival (28), connected with entrepreneurship. The most frequent word in the yellow cluster is China (129), followed by entrepreneurs (55), but without strong connections. The green cluster has only four words, the biggest one being human capital (49), which is strongly connected to social capital (33). Lastly, the purple cluster has few words with similar occurrences (between 30 and 46), with a trifold strong connection between firm age (42), firm size (31) and firm growth (33).

Figure 5 presents the co-citation network of authors. This analysis shows five different clusters that emphasize the relationships between authors based on cited documents. Clusters have different size and focus. Starting from the smallest cluster, i.e., the red cluster, it only has six documents, but contains the pivotal contribution by Hambrick and Mason (1984), which reaches a total of 194 citations in the dataset. By contrast, the biggest cluster is the blue one, which contains 15 contributions and includes the most cited paper by Cohen and Levinthal (1990), with 123 citations. In

Table 6 Top 10 most relevant documents for Local Citations—General Analysis. (Source: our own elaborations)

Authors (year)	Title	Journal	Local Citations	Total Citations	LC/GC Ratio (%)
Autio E., Sapienza H.J., Almeida J. (2006)	Effects of Age at Entry, Knowledge Intensity, and Im- itability on International Growth	Academy of Manage- ment	76	1426	5.33
Berger A.N., Udell G.F. (1998)	The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle	Journal of Banking & Finance	42	1253	3.35
Curran J., Blackburn R.A. (2001)	Older People and the Enterprise Society: Age and Self- Employment Propensities	Work, Employment and Society	34	88	38.64
Langowitz N., Minniti M. (2007)	The Entrepreneurial Propensity of Women	Entrepreneurship Theory and Practice	30	452	6.64
Zissimopoulos J.M., Karoly L.A. (2007)	Transitions to self-employment at older ages: The role of wealth, health, health insurance and other factors	Labour Economics	27	111	24.32
Michel J.G., Hambrick D.C. (1992)	Diversification Posture and Top Management Team Char- acteristics	Academy of Manage- ment	26	486	5.35
Blanchflower D.G., Oswald A., Stutzer A. (2001)	Latent entrepreneurship across nations	European Economic Review	25	260	9.62
Carr J.C., Haggard K.S., Hmieleski K.M., Zahra S.A. (2010)	A study of the moderating effects of firm age at interna- tionalization on firm survival and short-term growth	Strategic En- trepreneurship Jour- nal	25	80	31.25
Carpenter M.A., Fredrick- son J.W. (2001)	Top Management Teams, Global Strategic Posture, and the Moderating Role of Uncertainty	Academy of Manage- ment	24	466	5.15
Richard O.C., Barnett T., Dwyer S., Chadwick K. (2004)	Cultural Diversity in Management, Firm Performance, and the Moderating Role of Entrepreneurial Orientation Dimensions	Academy of Manage- ment	24	350	6.86

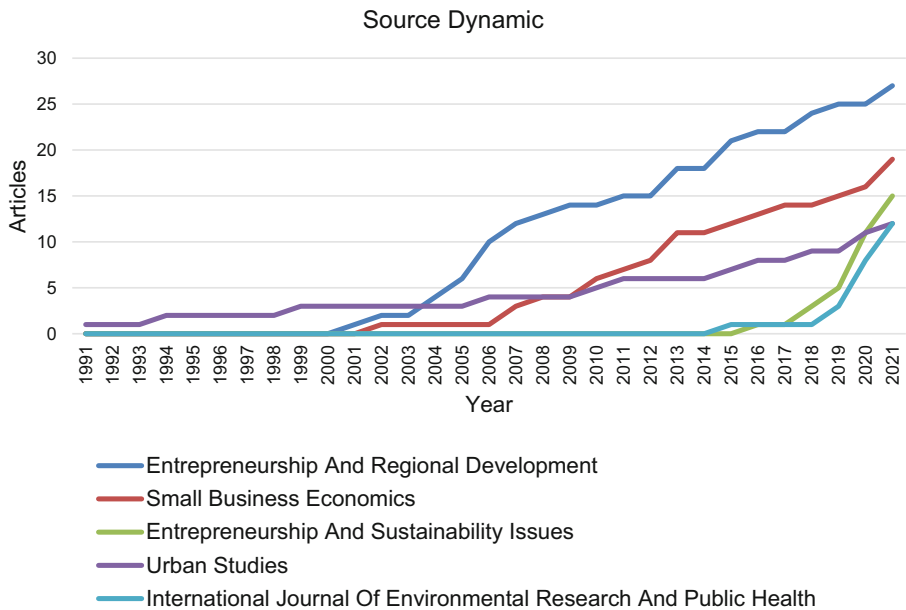


Fig. 6 Cumulative dynamics of the top 5 most influential journals based on total published articles (1990–2021)—Regional Analysis. (Source: our own elaborations)

the third cluster (green), the most relevant contribution is Barney (1991), with 211 total citations in the dataset. Lastly, the remaining two clusters (purple and yellow) have 12 and 8 documents, respectively. Among them, the most relevant contributions are Podsakoff et al. (2003) and Shane and Venkataraman (2000), with 209 and 135 citations. Finally, from a network analysis perspective, network centrality is very large for Barney (1991), Podsakoff et al. (2003) and Hambrick and Mason (1984).

We finally rank the most relevant documents by the number of local citations. From Table 6, the top three contributions by citations are: “Effects of Age at Entry, Knowledge Intensity, and Imitability on International Growth”, by Erkkö A., Sapienza H.J. and Almeida J. (76 local citations); “The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle”, by Berger A.N. and Udell G.F. (42); and “Older People and the Enterprise Society: Age and Self-Employment Propensities” written by Curran J. and Blackburn R.A. (34).

4 The regional perspective

We restricted the research scope by including keywords related to the regional framework. We added the following keywords: “rural area”, “local”, “region” and any variation of these basic words (plural or part of longer words). Among the group of the most frequent words in the sample, we found: “regional” (72 occurrences), “entrepreneurship” (72) and “age” (46).

Table 7 Top 10 Most relevant journal for number of publications—Regional Analysis. (Source: our own elaborations)

Journal	H-index Total	H-index Local	Total Cita- tions	No. Publica- tions
Entrepreneurship and Regional Development	131	17	1017	27
Small Business Economics	90	14	1266	21
Entrepreneurship And Sustainability Issues	84	5	44	15
Urban Studies	182	7	147	13
International Journal of Environmental Research and Public Health	113	4	61	12
Journal Of Rural Studies	104	9	575	11
Regional Studies	62	6	135	10
Journal Of Enterprising Communities	26	4	47	9
International Business Review	238	7	197	8
Journal Of Cleaner Production	102	5	167	8

The H-Index Total of journals is provided by SJR

4.1 Most relevant journals

Focusing the analysis at the regional level, the first evidence concerns the journals active in the area and their dynamic over time. Figure 6 shows the trend, based on the cumulative publications, of the top five journals.

Since 1991, there has been a significant growth of publications at regional level by all the five most influential journals. The most active source, Entrepreneurship and Regional Development, has a total of 27 publications by October 2022. It is followed by Small Business Economics, with a total of 19 publications, Entrepreneurship and

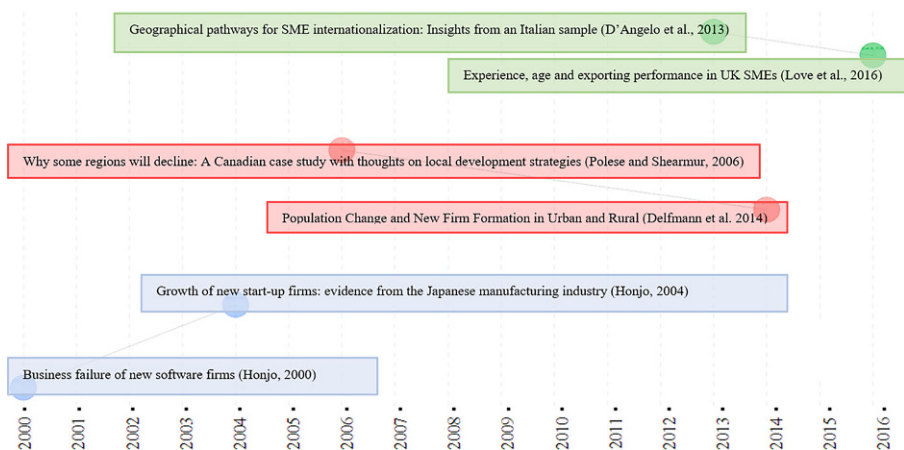


Fig. 7 Historical Direct Citation Network. This analysis exhibits some of the major streams of literature and highlights the historical development of most relevant direct citations resulting from the dataset—Regional Analysis. (Source: our own elaborations)

Sustainability Issues (15 publications), Urban Studies (12) and International Journal of Environmental Research and Public Health (12). The earliest paper on the subject was published in Urban Studies in 1991; by contrast, two other sources (International Journal of Environmental Research and Public Health and Entrepreneurship and Sustainability Issues) first published a paper on the subject only in 2015 and 2016, respectively. The journal with the highest number of papers by the number of publications is Entrepreneurship and Regional Development (27 papers), followed by Small Business Economics, Entrepreneurship and Sustainability Issues and Urban Studies, with 21, 15 and 13 publications respectively (Table 7).

4.2 Historiographical analysis

Proposed by Garfield et al. (1964), historiographical analysis (Fig. 8) allows to identify different streams of literature and analyse the historical development of direct citations resulting from the dataset.

Figure 7 shows the existence of three research streams, each identified with a different colour. The older one is represented by two contributions provided by Honjo in 2000 and 2004. By analysing the post-entry performance of new firms and the business failure of new firms over time, Honjo found that growth is more likely for younger and small-size firms than old and large ones, and that entrepreneur's age and education are important drivers for growth in the Japanese economy. The second stream is based on Delfmann et al. (2014) and Polese and Monetta (2006). They found a negative relationship between new firm formation in urban context and population changes and defined the demographic transition from periphery towards centre as a possible explanation of the regional economic decline. The third and most recent research stream is based on Love et al. (2016) and D'Angelo et al. (2013). Using a sample of Italian manufacturing firms, D'Angelo et al. (2013) find that

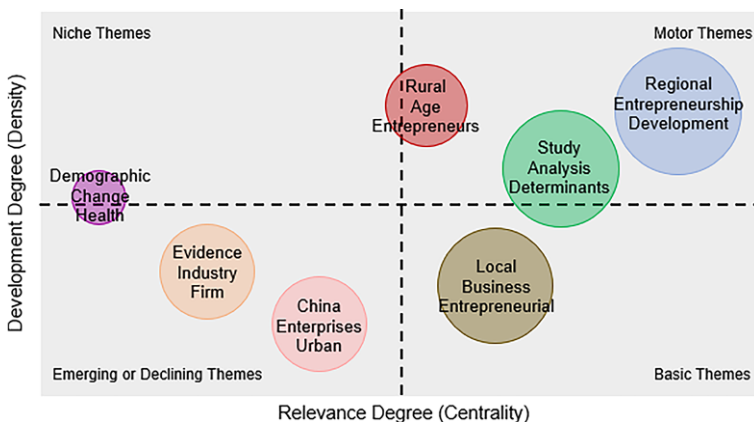


Fig. 8 Thematic map. This analysis splits the topics basing on their centrality (defined as the intensity of links of the focal cluster with other clusters) and density (defined as strength of the links that ties the words within the cluster). Based on these 2 metrics, topics are classified into “motor themes” (Q1), “basic and transversal themes” (Q2), “emerging or declining themes” (Q3), “high developed and isolated themes” (Q4)—Regional Analysis. (Source: our own elaborations)

SMEs export performance varies with the geographic scope of internationalization. Similarly, Love et al. (2016) estimate a positive relationship between export and firm international activity in a sample of UK SMEs.

4.3 Thematic analysis

Before discussing the different streams of research, we investigate how the identified clusters have evolved and matured over time. Following Callon et al. (1991), we exhibit the graph of the thematic map in order to provide a dynamic analysis of major topics. To do this, Callon et al. (1991) proposed two cluster-based metrics: centrality, defined as the intensity of links of the focal cluster with other clusters, and density, defined as the strength of the links that tie the words within the cluster. By ordering clusters by centrality and density, we describe a graph split in four quadrants, i.e., “motor themes” (Q1), “basic and transversal themes” (Q2), “emerging or declining themes” (Q3), “high developed and isolated themes” (Q4) (Fig. 8).

Evidence in Fig. 8 shows the results. The blue cluster, which includes the words regional, entrepreneurship and development, represents the central theme (it is positioned in the upper corner of Q1). As expected, also the cluster including the keywords “rural, age and entrepreneurship” (red cluster) constitutes a relevant area of research; however, it seems isolated from other clusters. By contrast, the cluster that includes the terms “local, business and entrepreneurial” (brown cluster) rep-

Table 8 Most relevant articles in the regional analysis. (Source: our own elaborations)

Authors (year)	Title	Journal
Eliasson K., Westlund H. (2013)	Attributes influencing self-employment propensity in urban and rural Sweden	Annals of Regional Science
Conroy T., Weiler S. (2019)	Local and social: entrepreneurs, information network effects, and economic growth	Annals of Regional Science
Kitsos A., Bishop P. (2018)	Economic resilience in Great Britain: the crisis impact and its determining factors for local authority districts	Annals of Regional Science
Wagner J., Sternberg R. (2004)	Start-up activities, individual characteristics, and the regional milieu: Lessons for entrepreneurship support policies from German micro data	Annals of Regional Science
Bosma N., Schutjens V. (2011)	Understanding regional variation in entrepreneurial activity and entrepreneurial attitude in Europe	Annals of Regional Science
Honjo Y. (2004)	Growth of new start-up firms: evidence from the Japanese manufacturing industry	Applied Economics
Zheng L., Zhao Z. (2017)	What drives spatial clusters of entrepreneurship in China? Evidence from economic census data	China Economic Review
Liu S.Q., Qian H.F., Haynes K.E. (2021)	Entrepreneurship in Small Cities: Evidence from US Metropolitan Areas	Economic Development Quarterly
Barkley D.L., Dudensing R.M. (2011)	Industrial Legacy Matters: Implications for the Development and Use of Indices of Regional Competitiveness	Economic Development Quarterly
Bönte W., Falck O., Heblich S. (2009)	The Impact of Regional Age Structure on Entrepreneurship	Economic Geography

resents a possible future path of research, as it includes issues and topics that are becoming central to the analysis, but not yet fully explored.

5 Content analysis

In this subsection, we provide the content analysis of the most influential contributions on the research fields which include entrepreneurship and population ageing under a regional perspective. To this aim, we have first selected the most relevant articles that, according to our best knowledge, correspond to central papers in this research field (see Table 8 for the first 10 selected relevant articles). After an initial overview of the literature (Sect. 5.1), we then delve into two main streams. The first stream investigates the issue of entrepreneurship and start-up into the regional context, focusing on demographic factors and differences across territories, rural and developed areas. The second stream explores the relationship between population ageing and entrepreneurship into local and rural contexts.

5.1 General overview

Starting from the general framework provided by Fritsch (2013), entrepreneurial activities are considered important determinants of the economic growth of countries and regions. However, the issue of the influence of entrepreneurship on regional growth is far from being settled. On the one hand, senior entrepreneurship is an option for high-income, innovation-driven countries wishing to increase their overall entrepreneurial levels (Harms et al. 2014; Featherstone 2015). Consistently, Lévesque and Minniti (2011) highlight that local development constitutes a reservoir for elderly entrepreneurs in developed countries, while Kautonen et al. (2014) show that entrepreneurial activity increases with age for individuals who aspire to growth, i.e., the vast majority of entrepreneurs in high income regions. On the other hand, Klyver et al. (2012), Kautonen et al. (2008) and Harhoff (2008) point out that there is no systematic and reliable empirical evidence about the innovativeness of senior entrepreneurship in innovation-driven countries. In addition, Pilková and Reháč (2017) consider senior entrepreneurship generally less innovative, as well as less growth-oriented, despite its role in creating job opportunities for unemployed persons.

Age plays a role in allowing population to start an entrepreneurial venture. Maritz et al. (2015) show that seniors are on average less disposed to engage in entrepreneurial activity because of health issues and—more relevant—different time allocation preferences (Singh and DeNoble 2003; Kenny and Rossiter 2018). Additionally, seniors often sustain higher opportunity costs that could hamper prospective business activity (Lévesque and Minniti 2011). By contrast, Kautonen and Minniti (2014), Zissimopoulos and Karoly (2007) and Figueredo and Paiva (2019) show that senior entrepreneurship presents advantages due to the availability of flexible time.

Lévesque and Minniti (2006) provide a conceptual model where individuals may choose between waged labour and self-employment, with the age of the individ-

ual playing a key role in the choice.⁵ The result of this decision-making process is an inverted U-shaped relationship between age and the likelihood of being an entrepreneur: the relationship is positive up to a critical level and becomes negative thereafter. Many empirical studies support this result (Blanchflower 2004, Grilo and Irigoyen 2006, Karoly and Zissimopoulos 2004; Tornikoski et al. 2009), including Bönte et al. (2009) who found an inverted U-shaped relationship between the regional age structure and the regional start-up activity.

In line with this stream of research, Kohlbacher and Herstatt (2008) introduce the term “silver economy” when they study the Japanese economy, where demographic change has led to the rise of new markets targeted to old age consumers (Kohlbacher and Herstatt 2008, Barska and Šnihur 2017). In this context, the regional sphere is relevant, as opportunities and challenges that entrepreneurship may have in growing or shrinking regions are much more nuanced than when the local context is not considered (Mayer and Leick 2019; Fuller-Love et al. 2006; Cuervo 2005; Anderson 2000; Feldman 2001; Stam 2007), thus making entrepreneurship a regional-based area of research.

5.2 Entrepreneurship in the regional perspective

In this line of research, we can identify two different sub-streams: the first sub-stream focuses on incumbent entrepreneurship and its relationship with demographic and social changes; the second sub-stream links self-employment propensity to start-up creation at regional level.

5.2.1 Regional entrepreneurship and incumbent firms

By investigating the role of industrial legacy on metropolitan economic development, Barkley and Dudensing (2011) demonstrate that regions with relatively large shares of young establishments and high rates of establishment churning have strong employment growth. Consistently, Conroy and Weiler (2019) show that population growth has an impact on employment growth, whereas Bosma and Schutjens (2011) find that regional entrepreneurial attitude change across territories, with developing regions showing high rates of early-stage entrepreneurship. For the Italian case, Piacentino et al. (2017) show that the impact of entrepreneurship depends on geographical location and sectors. They find relevant differences between the South and the North of the country—with the first one exhibiting the highest firm entry and exit rates. Similar results are obtained by Delfmann et al. (2014) who show that population change in Dutch municipalities is positively related to the firm creation rate, but with differences with respect to the regional context, as urban regions are particularly responsive to population growth, while rural areas are responsive to population decline.

⁵ Within the same framework, Lévesque and Minniti (2006) and Kibler et al. (2011) explore the issue of how financial factors impact the propensity of older entrepreneurs to start an activity. Sternberg and Rocha (2007) generalize this intuition and report that the decision to become an entrepreneur is influenced by the surrounding environment, including the financial structure of the economy.

Rodriguez-Gulias et al. (2020) discuss how regional and firm level factors simultaneously impact on innovation in Spanish economy: while firm age and size have a negative and positive effect, respectively, on the probability of patenting, regional variables do not show any significant effect on innovation. By contrast, Dziekan-ski (2021) find that the level of entrepreneurship in Poland depends on the level of endogenous socio-economic variables, such as the standard of living and public safety, and that regions with the highest level of competitiveness are in the proximity of urban and industrial centres. Bika and Rosa (2020) contribute to explain how the regional socio-economic European context relates to family business. Results show that the co-existence of family SMEs with large firms is negatively related to regional economic performance.

In the US context, Willis et al. (2020) investigate the differences in the relationship between entrepreneurial income and individual, industry, and regional characteristics, whereas Packalen (2015) explores how industry evolution and regional context affect the change in founding research over time.

As for Asian regions, Honjo (2004) and Zheng and Zhao (2017) focus on entrepreneurial activities at macro-region level. Honjo (2004) shows that firms located in the central business district in Tokyo are more likely to grow; Zheng and Zhao (2017) show that the level of manufacturing entrepreneurship is higher in places where there are many small firms. In addition, the level of entrepreneurship in services tends to be higher in cities with more elderly people, more migrants and more foreign direct investment inflows.

5.2.2 Regional entrepreneurship and the birth of new firms

As for the second sub-stream, i.e., entrepreneurship and new firms' formation, a first contribution is provided by Eliasson and Westlund (2013), who investigate the differences regarding self-employment propensity in cities and in the countryside, as well as the choice to become self-employed. They find that entering self-employment is influenced by the same factors in rural and urban areas, but with different likelihood of self-employment transition. A similar approach is followed by Cala et al. (2016): authors analyse the determinants of firms' entry in Argentine provinces and demonstrate that despite entrepreneurs have greater difficulty in finding appropriate resources in poor areas, high levels of poverty can spur the creation of small firms. More recently, focusing on Polish regions, Fritsch et al. (2022) find a positive linkage between historical regional levels of knowledge-intensive entrepreneurship and the current start-up activity, independently from the local population's mobility. These results may explain the most recent evidence on entrepreneurship across Polish territories.

Kibler (2013) explores the influence of regional factors on the formation of entrepreneurial intentions within the theory of planned behaviour (TPB) and examines the predictive validity of the TPB in different regional contexts. Guiso et al. (2015) investigate the selection into entrepreneurship and the learning opportunities at local level. Authors highlight that individual who live in high firm density areas are more likely to become entrepreneurs. Moreover, individuals growing up in high density

areas acquire more managerial skills, but also exhibit risk aversion and aversion to ambiguity, factors that may potentially inhibit entrepreneurship.

5.3 Population ageing and entrepreneurship in regional context

The second research stream includes studies focused on the relationship between population ageing and entrepreneurship in a regional context. We divide the literature between the European and the American case.

In Europe, the research is mainly focused on the German economy, that shows a demographic change higher than in other industrialized countries (Sinn 2007; Fuchs 2016; Piontek and Wyrwich 2017). A first evidence is provided by Wagner and Sternberg (2004), who study the role of regional policy for entrepreneurship in ten German regions. The probability to become an entrepreneur is related to the regional policy and individual characteristics of would-be entrepreneurs. This propensity is also influenced by age, level of education, past experiences, unemployment and self-employment, personal contact with young entrepreneurs and the growth rate of population. Consistently, Bönte et al. (2009) confirm that individual decision is influenced by the age distribution observed in the region where the individual lives. Empirical results confirm that for different shares of population age, the likelihood of becoming an entrepreneur follows a U-shaped relationship. Fritsch et al. (2015) estimate the impact of factors that drive changes in the overall level of self-employment in Germany. These changes are driven by demographic developments, the shift towards the employment in the service sector, and a larger share of the population with a tertiary degree. Age has a key role and an impact on policy implication, with a non-linear relationship; population ageing has a positive effect on self-employment, whereas the age-squared variable has a negative one.

Focusing on England and Wales, Fotopoulos and Storej (2017) explore interregional differences in self-employment rates and analyse how the regional age structure impacts entrepreneurship: the influence of age on regional entrepreneurship is positive, with older individuals displaying characteristics favourable to business proprietorship. Kachlami et al. (2018) investigate the determinants of social entrepreneurship in the Swedish context. Between Swedish municipalities, those with higher proportions of elderly people tend to experience a higher rate of social venture creation. They also confirm that the age of social entrepreneurs follows a U-shaped pattern, as in Bönte et al. (2009). Figueiredo and Paiva (2019) investigate the case of senior entrepreneurship as a solution for unemployed people in the Northern regions of Portugal. Authors show that senior entrepreneurship is an effective and useful tool in fighting the unemployment of older professionals, stimulating the economic and social growth.

Moving to U.S. context, an important contribution is provided by Glaeser and Kerr (2009), who analyse why some places are more entrepreneurial than others and what local determinants affect start-ups across U.S. cities and industries. Population ageing has a positive and significant effect, even if older people have a negative propensity to start new businesses. Cities with a higher share of young workers tend to have larger entry rates in manufacturing, whereas older people are strongly associated with higher self-employment rates. Also focusing on U.S. cities, Buntén

et al. (2015) study the role of U.S. entrepreneurs in determining regional endogenous economic growth. Results show that entrepreneurial ventures have a positive effect on employment growth in local economies. Furthermore, they find that population age has a negative impact on employment growth rate, while population growth has a positive impact.

Hammond and Gurley-Calvez (2014) focus on self-employment growth across US regions. They confirm that self-employment growth depends on age-class, population with high education levels and high shares of female residents. However, they do not find significant correlations between the human capital and self-employment growth. Liu et al. (2021) explore regional factors associated with entrepreneurship in US micropolitan areas and point out that demographic factors and population growth are associated with entrepreneurship. Population growth and the middle age group are positively associated with entrepreneurship both in metropolitan and micropolitan areas. In addition, adjacency to large metropolitan areas is positively correlated with high-tech new-firm formation in micropolitan areas.

6 Discussion

6.1 Major results from the analysis

Despite the heterogeneity in methods and topics, the analysis of the extant literature has highlighted three main topics: (i) the role of the spatial factor, as identified in terms of regional development; (ii) existing opportunities for entrepreneurship and (iii) the effect of ageing on entrepreneurial activity. We will briefly discuss each point in this section.

First, the role of the spatial factor, specifically the regional scenario, has been explored by several scholars as a key factor for understanding entrepreneurship, with respect to both incumbent firms and start-ups. Specific regional features are very likely to influence the entrepreneurial dynamics. Among these, differences in territories may play a key role in explaining entrepreneurship (Willis et al. 2020; Piacentino et al. 2017; Buntén et al. 2015; Barkley and Dudensing 2011; Bosma and Schutjens 2011; Brunow and Hirte 2006): living in rural or urban areas (Dziekanski 2021; Delfmann et al. 2014), near or far from the city centre (Eliasson and Westlund 2013), living in a high-density area (Zheng and Zhao 2017) or where industrial districts are established (Guiso et al. 2015; Glaeser and Kerr 2009; Honjo 2004). Besides, recent studies also exhibit differences in entrepreneurship between micropolitan and metropolitan areas as distinguished by population density, age structure, patenting from the business sector and the wider surrounding economic environment (Liu et al. 2021; Audretsch et al. 2015).

Focusing on entrepreneurial opportunities, the literature has pointed out also some regional drivers that could increase the likelihood of becoming an entrepreneur or that improve the growth opportunities of incumbent firms. Among these drivers, the quality of life in specific regions, as specified in terms of welfare system and income level, may generate positive effects on the growth rate of the entrepreneurial activity (Willis et al. 2020; Cala et al. 2016). Besides, the quality of life can be

referred also to personal characteristics, as education and personal skills. A higher level of education or of firm-specific and technic skills improve the probability of founding a new activity or developing the existing firm (Liu et al. 2021; Hammond and Gurley-Calvez 2014).

Finally, the literature has deeply investigated the personal characteristics of individuals as key drivers in entrepreneurial choices. Among the personal characteristics, e.g., past-experience, self-employment propensity and personal contacts (Sinn 2007; Wagner and Sternberg 2004), scholars have constantly stressed the role of age within the regional entrepreneurship literature (Leporati et al. 2021; Figueiredo and Paiva 2019). The literature agrees that ageing has significant implications on the would-be entrepreneur's propensity to undertake the entrepreneurial venture and represents a key determinant of the entrepreneurship and self-employment at regional level. Empirical findings show that that ageing is strongly linked to entrepreneurship development, but the evidence is far from being settled as three main types of relationship between ageing and local entrepreneurship are observed: (i) positive relationship (Fotopoulos and Storej 2017), (ii) negative relationship (Bunten et al. 2015) and (iii) U-shaped relationship (Lévesque and Minniti 2006), with the last one being the most explored one, especially when related to different industrial sectors and territories (Kachlami et al. 2018; Fritsch et al. 2015; Bönte et al. 2009; Lévesque and Minniti 2006). Specifically, given different ranges of age, entrepreneurs within the 35–50 age group are the most likely to be growth-oriented and successful entrepreneurs (Azoulay et al. 2020; Leporati et al. 2021; Figueiredo and Paiva 2019; Hammond and Gurley-Calvez 2014). However, younger people are more likely to become a successful entrepreneur in the case of high-tech firms, whereas older people show better results in the case of manufacturing firms (Liu et al. 2021). These findings are largely associated to the trade-off between the benefits of youth, e.g., creativity, freshness, innovation, energy, and those of maturity, i.e., business skills, knowledge and technical ability, usually observed when junior and senior entrepreneurship are compared.

6.2 Future paths of research

After reviewing the literature on the topic, we outline some open research questions that emerged from the reviewed papers and that can be addressed in future studies.

Eliasson and Westlund (2013) study the modernity gap and how this aspect could be a serious problem for the countryside's growth potential. From a policy perspective, they suggest future research to implement a special entrepreneurship policy to increase the impact of entrepreneurship on countries' growth rates and reduce the growth gap among regions. Similarly, focusing on Italian context and after considering Renski's critique (2014)⁶, Piacentino et al. (2017) suggest that policy should be mostly focused on smaller areas. Besides, Bosma and Schutjens (2011) suggest emphasizing the time dimension, not only the geographic one, in explaining differ-

⁶ Renski (2014) affirms that: "From an economic development perspective, it is not simply a region's capacity to create new business that matters, but also whether it can survive and expand".

ences in entrepreneurial activity in the European context and in setting the scene for the entrepreneurship policy.

The reviewed literature emphasizes the necessity to include several additional factors, both at regional and entrepreneurial level, for a correct assessment of the relationship between entrepreneurship, age and the regional economic environment. Despite scholars have already delved into several factors, we have found other factors which are relevant for the analysis. They include the characteristics of the region, e.g., morphology, presence of industrial districts, level of economic development and interconnections with other territories, as well as factors related to the characteristics of entrepreneurs or self-entrepreneurs, e.g., risk aversion and human capital (Fotopoulos and Storej 2017; Liu et al. 2021; Leporati et al. 2021). Among these factors, the influence of human capital on entrepreneurship is crucial and represents a growing research area. Following Brunow and Hirte (2009) and Chojnicki and Rabesandratana (2018) the relationship between key features of local human capital and regional development is evolving into a new and promising research path, which is also contaminated by related issues that explore the role that institutions have in regional development, as in the contribution provided by Kachlami et al. (2018).

7 Conclusions and limitations

In this paper, we have analysed the literature on the impact of ageing on entrepreneurial activity under a regional perspective. The paper aimed at contributing to the literature by providing a bibliometric and a content analysis about population ageing and entrepreneurship into the regional context.

The bibliometric analysis has followed two steps. The first step was based on the relationship between entrepreneurial phenomena and ageing; the second step included the regional context, filtering further the original dataset. As a result, we provided evidence on the most relevant journal, authors, contributions, and topics for the general and regional analysis.

The content analysis has explored the most relevant contributions as split into two main streams of research: entrepreneurship into the regional perspective and population ageing, and entrepreneurship in regional context. As for the first, we have discussed the literature on entrepreneurial activity and firm start-up into different territories; as for the second, we have investigated the implications of the age factor on the local entrepreneurship. Lastly, we have shortly summarized the findings from the bibliometric analysis to highlight the state of the literature and possible future paths of research. Among these, the influence of human capital on the entrepreneurial activity at local level comes out as one of the most promising avenues for future studies.

In addition to those which are inherently related to the nature and scope of the quantitative bibliometric analysis, this analysis is not immune from limitations. The first limitation refers to the use of keywords used to extract the dataset. Indeed, the collection of articles obtained is highly sensitive to the keywords selected. Specifically, despite these keywords derive from a deep *a priori* analysis and are the most likely to identify the topic discussed in this paper, a different choice of keywords

could have generated a different dataset. This makes the above evidence and results inherently biased by the procedure of paper selection. Future studies might consider repeating the review process using different inclusion and exclusion criteria. Additional limitations relate to other technical aspects of conducting the research. As for the sources used for the analysis, future research may include other data providers different from Web of Science (e.g., Scopus, Scholar) or a wider range of journals, as there might have been some publications that were not listed in our database and were thus excluded from this study. Also, a more detailed analysis should include working papers, grey literature, non-academic media, industry reports, webinars, presentations, workshops, and other sources that are revealing on the issue and that can provide a more complete data-backed scenario, in addition to improve significantly the quality of the content analysis. Similarly, we deliberately limited the search to peer-reviewed articles published in English, thereby excluding contributions in other languages that might have provided additional insights.

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