

Capital Accumulation in the Informal Sector: A Bibliometric Analysis

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Abstract

The role of capital accumulation in economic growth is widely discussed. The role of the informal sector in the economic growth of many emerging and least developed economies is also widely discussed. This paper explores the role of capital accumulation in the informal sector. The informal sector enterprises face problems in accessing capital and funding their day-to-day operations. Hence it becomes important to understand how these firms expand their capacity.

This paper evaluates the existing literature on capital accumulation in the informal sector with the help of bibliometric analysis. A bibliometric analysis is a quantitative analysis of bibliometric data that helps in understanding the trends in any research topic. The bibliometric tools have helped us analyse the theoretical framework, research collaboration, country-wise contribution, thematic evolution of research themes, and emerging areas for research in capital accumulation in the informal sector. In the conclusion, we reconfirm the growing popularity of capital accumulation and the informal sector and the role of capital accumulation in the growth of informal enterprises. The study suggests future research areas such as the role of social capital, intellectual capital, and human capital in capital accumulation and its impact on the growth of the informal sector.

Plain English Summary

Entrepreneurs and small informal firms crave social, intellectual, and human capital.

This is a bibliometric study of research papers published in capital accumulation in the informal sector domain in the last 30 years. The study focuses on the theoretical evolution of capital accumulation and informal sector concepts. It has used bibliometric data of well scrutinized 284 documents for statistical analysis to find out the most relevant publications, authors, sources, and annual productivity in the said domain. The study has also looked at the thematic evolution of research topics in this area over the last three decades.

The findings of the study suggest that though capital accumulation has been an important element in the growth of firms its role in the informal sector is yet to be established. However, social capital, knowledge, and human capital are emerging topics that need to be explored further. The study has explored the probable research topics and emerging research areas in capital accumulation in the informal sector domain.

Introduction

Capital accumulation is the process in which the productive capacity of the firm or an economy is built or expanded. It consists of the addition and maintenance of physical assets (Robinson, 1969). It is widely discussed and accepted that capital accumulation positively impacts economic growth through technological progress and productivity growth (Solow, 1956; Swan, 1956). It leads to the higher Total Factor Productivity (TFP) which causes shifts in the production function (Arrow et al., 1961; Hulten, 2000;

Kendrick & Sato, 1963; Solow, 1957). The role of capital accumulation in the growth of the firm is evident however when it comes to the firms in the informal sector they hardly accumulate physical assets as they face capital constraints (Banerjee & Munshi, 2004; Romatet, 1983).

The International Labour Organisation (ILO) differentiates the informal sector from the formal sector based on characteristics like the reliance on indigenous resources, ease of entry, family ownership of enterprises, labour-intensive and technology adapted, the small scale of operation, skills acquired outside the formal schooling system, and unregulated and competitive markets (International Labour Organisation, 1972). The sector is majorly made up of voluntary entrepreneurial small firms and self-employed entrepreneurs (Charmes, 2012; Hart, 1973) rather than the residual comprised of disadvantaged, workers rationed out of good jobs (Maloney, 2004).

In this study, we analyse the current body of the literature available on capital accumulation in the informal sector with the following objectives.

1. To understand the current research trends in the field of capital accumulation in the informal sector.
2. To understand the thematic evolution of research in the field of capital accumulation in the informal sector.
3. To explore the new avenues of research in the field of capital accumulation in the informal sector.

To meet the research objectives stated above the paper is structured as follows. At first, we state the theoretical background of the study. Then we briefly discuss the evolution of concepts of capital accumulation and the informal sector. After that, we talk about the research methodology used in carrying out this study. Followed by the bibliometric analysis of available bibliometric data on capital accumulation in the informal sector. After that, we discuss the major trends in the field of capital accumulation in the informal sector followed by the conclusion of the study.

Theoretical Background

Capital has always been a challenge for informal sector enterprises. Their ability to raise capital has been very limited in almost all developing and underdeveloped countries. It is quite evident that the majority of informal enterprises are financed by informal sources of finance. Many informal enterprise owners invest their own money, some of them get it through inheritance, some borrow it from friends and relatives, and some borrow it from moneylenders at a very high rate of interest (Romatet, 1983). Many organizations use retained earnings as their source of capital (Göbel et al., 2011). Very rarely they will get money from formal sources of finance. It is very hard for informal sector enterprises to get money from commercial banks as they lack the necessary documents. Many times these enterprises face credit rationing by the financial institutions and commercial banks also due to the problems of moral hazard (Marjit & Kar, 2007). Informal enterprises do not have access to the capital market and cannot borrow money at the market rate. As a result, many of these enterprises pay a very high cost of capital. This is because of the inefficiency of the capital markets. There are some markets in which community financing plays a vital role in funding (Banerjee & Munshi, 2004).

It is obvious that due to the constraints of getting proper capital, informal enterprises suffer from low levels of investment. They rely more on unskilled workers or manual processes of working. Informal enterprises often use second-hand machinery (Banerjee & Munshi, 2004). There are certain enterprises where you will find the use of self-made machines or manual machines or hand tools. Their investment in machinery remains low due to which the majority of informal enterprises use low capital-intensive technology. This reduces their capacity to produce as well as makes them inefficient. The majority of the informal sector businesses rely on labour-intensive activities as in many developing countries the capital remains scarce and the labour in abundance (Romatet, 1983).

Informal sector activities are highly differentiated in nature but they share one factor in common that is a low level of capital accumulation. Due to this, they can enter any market or any sphere of production with low capital-intensive activities. It is observed that informal activities flourish where capital-intensive businesses have not entered. Capital intensive production could not penetrate in these markets due to the nature of demand generated from such markets as retail trading or personal services or sub-contracting in housing. All these activities are highly labour-intensive activities that result in the rise of the informal sector (Bienefeld, 1975). When compared to the formal organizations it is evident that formal organizations employ more capital and as well as more workers. They also enjoy higher total factor productivity. Informal enterprises often cover up the lack of physical assets with low-cost unskilled workers (Pratap & Quintin, 2008).

It is also observed in many countries that the informal sector cover-ups for the contraction of the formal sector or in other words informal sector work as supplementary to the modern industry. In India, it was observed that informal manufacturing has grown at a substantial rate after the liberalization of the economy. It was also said that the capital freed from the traditionally protected industry could be better used in the informal manufacturing units. This will reduce the problem of credit rationing faced by informal units (Marjit & Kar, 2007). Empirically it was found that capital rather than labour played a vital role in the growth of formal as well as informal manufacturing units in India (Kathuria et al., 2010). It is observed that a large part of the informal sector originated from the specific development of the capital accumulation by the large capital global commodity chains and the fluid organization forms as well as the organizational restructuring activities undertaken by them (Bhattacharya, 2007). The large presence of the informal sector in India is found to be the result of the process of capital accumulation by the informal sector which is the source of the economic surplus for many capitalists firms (Maiti & Sen, 2010).

When more money is infused into the informal sector initially it has led to the growth of the sector. When government grants have been infused into the informal sector it was found that profits of microenterprises have increased to a great extent. The grants have led to an increase in the capital stock and the involvement of the owner in the business activities (de Mel et al., 2008). It is found that the marginal returns to capital are very high at the low level of capital but they tend to fall as the level of the capital stock goes up. They decline very rapidly as the investment in the informal enterprises rises (Grimm et al., 2011). The return on capital in the informal sector is the result of total factor productivity

and level of capital in the enterprise as well as the risk associated with the expected effect on capital accumulation. These observations support the phenomenon of high returns on capital at a low level of capital (Göbel et al., 2011). Some other observations have identified a few more factors like strong market fundamentals, low level of assets ownership, and access to reliable markets with regards to variability in the sales to explain high returns at the low level of capital (Siba, 2015).

3.1 The Concept of Capital Accumulation

The debate over the concept of capital spans more than two and a half centuries. The term capital was initially used as *Capitate* from *Caput* to indicate the principal amount in the money loan which earned the interest (Böhm-Bawerk, 1889). Eventually, the concept evolved as it was applied in various contexts. The very initial use of the concept of capital considered capital as money. The money one receives as revenue on his land or as the salary for his labour or the interest on his investments. The money, which is left after spending on consumption is accumulated over the period is called capital. This capital can take the form of anything that consists of metals or any other matter because the value is still calculated in terms of money (Turgot, 1770). This was further broadened by considering it as stock, which consists of different kinds of goods that are stored up somewhere and are capable to assist in sustaining human life. As the division of labour evolves, new machines get invented that help in business operations. The capital is further divided into two forms, namely the “circulating capital” and the “fixed capital”. The circulating capital consists of money that is invested largely in manufacturing and purchasing the goods, which can later be sold to earn profits. In the process, the capital changes its form from one to another. In the case of fixed capital, it is the improvement in the land or the purchase of new machinery and instruments, which yield profit without changing the masters (Smith, 1776).

The capital is also treated as the circulation of commodities. In the first step, the money is converted into some means of production or labour-power in the quantum of value, which functions as the capital. In the second step, the production takes place, and additional value is created as a commodity and the overall value of the commodity exceeds the total value of the original inputs. Hence, the total value is comprised of the original capital and surplus value. After the sale of the and the revenue is reinvested in the production. The cycle repeats itself over time. This cyclic movement of the money forms the circulating capital and the whole process results in the accumulation of capital. The surplus value is the key element of accumulation (Marx, 1867).

The debate on the relationship between circulating capital and fixed capital further got extended, when economists started to differentiate between capital and capital goods. Some economists viewed capital as something that lasts and is mobile, which supported the significance of circulating capital, the mobility is restricted in the case of fixed capital; it is quite impossible to take physical assets of one industry and use them in another industry (Clark, 1899). Capital goods also represent the accumulation of knowledge, skills, and technological advancements that happened over the ages (Veblen, 1908).

Capital consists of commodities that are the result of past production and that are used in the process of further production of consumer goods or new tools of production. Capital formation is the process in which capital is created (Moulton, 1935). The capital formation can also be defined as the conversion of currently produced commodities and services into the stock of economic goods (Kuznets, 1938). The various concepts of capital have been tested on numerous parameters. The concept, which defines capital as “an aggregate of products not intended for immediate consumption or use, but to serve as the means of acquisition” stood all the tests (Böhm-Bawerk, 1889). The purpose of earning profit is not to indulge in consumption, but to preserve and expand the business, by increasing productive capacity. Capital accumulation is the process in which productive capacity gets expanded and consists of the addition and maintenance of physical assets (Robinson, 1969).

3.2 The Concept and Definition of the Informal Sector

The concept of the informal sector and its definition have evolved in the last four decades. Traditionally this sector has been treated as a peripheral sector that is formed around the major formal sector. The first reference to the concept can be found in the dual-sector model. The model refers to the situation when capital accumulation in the formal sector or the capitalist sector goes up, which leads to a fall in the employment level of unskilled workers due to mechanization. The surplus labour which includes casual labours, petty traders, domestic helpers, and females in the household, seeks job opportunities in the subsistence sector. The subsistence sector produces all sorts of goods and services required at a cheaper rate by the overly populated countries (Lewis, 1954).

Though the sector is known by many names like the unorganized sector, the traditional sector (Papola, 1980), the underground sector, the hidden sector, the black economy (Hart, 1985), the unofficial sector, the term “informal sector” is widely accepted since the International Labour Organisation (ILO) used it in 1972. Initially, it seemed that the term did not have any specific analytical meaning and it was used “for lack of better alternative”. Due to its vagueness, the term seemed more inclusive (Papola, 1980). The term derives its meaning from the English word “form”. The term “informal” refers to behavior that lacks form. Form refers to anything, which is regular, predictable, reproducible, and recognizable. We identify something as informal when it fails to follow the pattern of some established form (Hart, 1985).

The ILO recognized the informal sector based on its characteristics and not as a peripheral or substantial sector. They differentiated the informal sector from the formal sector based on characteristics like “the ease of entry, reliance on indigenous resources, family ownership of enterprises, the small scale of operation, labour-intensive and technology adapted, skills acquired outside the formal schooling system, and unregulated and competitive markets” (International Labour Organisation, 1972). Activities of the informal sector are rarely offered any help and are largely overlooked, often regulated, and sometimes harshly discouraged by the government. While analyzing the urban sector in Kenya they referred to two sectors as a formal or informal sector to seek an analytical terminology to describe a duality. The informal sector is often neglected and sometimes harassed by the authorities. It includes individuals and enterprises that operate largely without any government benefits and regulation and thus lack access to formal credit (International Labour Organisation, 1972).

Since many participants in the informal sector do not follow legal registrations, the informal sector was also sometimes referred to as an illegal sector. They are considered to be illegal because they generally do not follow the regulations related to taxation, health and safety standards, employment and wages, or other related regulatory processes. The legal approach assumes that the economic rationales of both formal and informal sectors are similar and the only difference between the two, is the legal status of the enterprises in these two sectors. Due to this difference in legal status, there is a significant difference in access to resources and markets for each sector (Guerguil, 1998). The legality, size of the enterprises, and the level of capital intensity appear to be at the heart of the definition of the informal sector (Mead & Morrisson, 1996).

There are a few other factors in which these two sectors are considered different. The prime factor seems to be a sense of protection. In the formal sector, employment is supposed to be protected whereas in the informal sector there is uncertainty. Even the level of wages differs in both sectors as the informal sector has to rely on a subsistence level of wages. It is quite easy to enter the informal sector and find employment opportunities. Many times, the workers seeking jobs in the formal sector enter the informal sector as a secondary source of employment. Due to easy entry, the informal sector becomes attractive for the migrants as they find it easy to get employment in the informal sector when they move to a new place (Mazumdar, 1976).

The ILO brought out an official definition for the informal sector which tries to cover all the aspects of this concept and eliminate the vagueness of the concept. In the resolution of 'The Fifteenth International Conference of Labour Statisticians, the ILO stated the concept of the informal sector as follows.

"The informal sector may be broadly characterised as consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes for the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale. Labour relations - where they exist - are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees" (International Labour Organization, 1993).

They further stated the operational definition of the informal sector for the analytical and data collection purpose as follows.

"For statistical purposes, the informal sector is regarded as a group of production units which, according to the definitions and classifications provided in the United Nations System of National Accounts (Rev.4), form part of the household sector as household enterprises or, equivalently, unincorporated enterprises owned by households. Within the household sector, the informal sector comprises (i) 'informal own-account enterprises'; and (ii) the additional component consisting of 'enterprises of informal employers'" (Husmanns & Mehran, 1993).

"The agricultural activities, and professional or technical services rendered by self-employed persons (doctors, lawyers, accountants, architects, engineers, etc.) are excluded from the scope of the informal

sector. The inclusion or exclusion of paid domestic workers engaged by households in/from the informal sector depends upon national circumstances and the intended uses of the statistics" (Husmanns & Mehran, 1993).

In the recent development of the concept, it has been discussed that the informal sector should be treated as the voluntary sector of the microenterprises. In the current era, the sector is majorly made up of voluntary entrepreneurial small firms and self-employed entrepreneurs (Charmes, 2012; Hart, 1973) rather than the leftover which includes the disadvantaged and the workers left out of good jobs (Maloney, 2004).

Methodology

In this study, we use bibliometric analysis, which is the quantitative analysis of the existing literature. The bibliometric analysis is in use for more than a century. In 1922 British librarian E. Wyndham Hulme first used bibliometric analysis in his work under "statistical bibliography" (Hulme, 1923). The usage of term "bibliometrics" was used by Alan Pritchard in 1969 (Pritchard, 1969). The bibliometric analysis does an in-depth quantitative analysis of the published research work based on various characteristics of the publications like title, authors, keywords, document type, journal, impact factor, year, the number of citations, etc. It helps us in getting a bird's eye view of any research topic. This paper has followed the bibliometric analysis process proposed by Naveen Donthu et al. (2021) and used the work of Tina Jayroe (2008) as a reference. In this study, the bibliometric analysis has been performed on the bibliometric data gathered from the Scopus database. The data is retrieved by searching for all capital accumulation-related words like "Capital Accumulation" OR "Capital Formation" OR "Fixed Capital" OR "Physical Capital" OR "Capital Equipment" in the title, keywords, and abstract of the papers. This search resulted in 15,399 academic documents. We further filtered this search to restrict the scope of the study to the informal sector. The initial search string is combined with an additional search string by using important words related to the informal sector like "Informal Sector" OR "Unorgani?ed Sector" OR "Unofficial Sector" OR "Small Firm*" OR "Small Enterpri?e" OR "Small Business*". We also restricted it to only English language articles and review papers from Economics, Business Management, Data Science, Computer Science domains published in the peer reviewed journals. These additional filters reduced the number of documents to a mere 284 that focused on capital accumulation in the informal sector. The data is gathered for the last 30 years that from 1993 to 2022.

The summary of the data is generated from the Scopus database for descriptive analysis. The data is further analyzed with the help of the Biblioshiny tool of the Bibliometrix package (Aria & Cuccurullo, 2017) in R software and VOSviewer software (Waltman et al., 2010).

Bibliometric Analysis

5.1 Main Information about data

<i>Description</i>	<i>Results</i>
Timespan	1993:2022
Sources (Journals, Books, etc)	196
Documents	284
Average years from publication	9.46
Average citations per documents	25.49
Average citations per year per doc	2.126
References	12878
<i>Document Types</i>	
Article	274
Review	10
<i>Document Contents</i>	
Keywords Plus (ID)	478
Author's Keywords (DE)	790
<i>Authors</i>	
Authors	555
Author Appearances	585
Authors of single-authored documents	99
Authors of multi-authored documents	456
<i>Authors Collaboration</i>	
Single-authored documents	100
Documents per Author	0.512
Authors per Document	1.95
Co-Authors per Documents	2.06
Collaboration Index	2.48

There is a total of 284 academic documents available on capital accumulation in the informal sector on the Scopus database for the period from 1993 to 2022. These documents are from 196 publications and have been written by 555 authors.

5.2 Annual Scientific Production

Annual scientific production shows the number of documents published over the years. There is a steady growth in the number of papers written on capital accumulation in the informal sector since 1973 with an annual growth rate of 10.15%. Annual scientific production is an important parameter to check the popularity of the topic among the research scholars and the amount of collaboration happening in the field. It is can be stated from *figure 1* that the pace of the number of publications on the topic has gone up since 2009. In the first one and half decades, only 81 articles were written whereas from 2009 to 2022 total of 203 articles have been written on the topic. This indicates that the popularity of research in this field has gone up in the last one and half decades.

5.3 Most Relevant Sources

	<i>Sources</i>	<i>Articles</i>
1	Entrepreneurship and Regional Development	7
2	Journal of Development Economics	7
3	Cambridge Journal of Economics	6
4	International Journal of Social Economics	5
5	Journal of Economic Theory	5
6	Review of Economic Dynamics	5
7	Small Business Economics	5
8	Journal of Developmental Entrepreneurship	4
9	Journal of Monetary Economics	4
10	World Development	4

The top 10 most relevant sources account for 18.31% of the total documents studied for this research. The top 10 contributing journals have contributed 52 articles out of the total of 284 articles. Entrepreneurship and Regional Development and Journal of Development Economics each have contributed the greatest number of articles i.e., 7. Whereas, the majority of the articles come from a wide range of sources as the remaining 232 articles come from 186 different journals.

5.4 Corresponding Author's Countries

The United States of America is certainly leading in the race in terms of production in capital accumulation in the informal research. It is followed by Italy, United Kingdom, China, and India. Even though Italy is second in terms of the number of research articles, the gap between the USA and Italy is significantly large. It is notable to see the USA contributes almost one-fourth of the total articles published by the top 10 countries. China and India are the only developing countries in the top 10 contributors. This certainly highlights the need for research on capital accumulation in the informal sector in South Asian and African Economies because they are home to many informal enterprises.

5.5 Most Globally Cited Documents

Global citation is the citation of the paper without any filter. These 284 documents have a total citation of 7240 with an average of 25.49 citations per document. The top 10 documents contribute around 41.7% of the total citations. Only 7 documents have more than 200 citations and 56 documents have never been cited. Table 1 showcases the top 5 globally cited documents. These all articles are from highly ranked journals. All of these five documents are published in high-impact journals.

The top four documents have worked on variables related to entrepreneurship. Martin et al. (2013) have carried out a meta-analysis of studies on entrepreneurship education. They could confirm the positive association between Entrepreneurship Education and Training (EET) and entrepreneurship development.

However, they found many studies on entrepreneurship education to be of low rigor. Dean Yang (2008) has studied the impact of international remittances on human capital accumulation and entrepreneurship development in the developing and least developed countries. Anderson and Jack (2002) have addressed the conceptual issues in social capital as well as the role of social capital in the entrepreneurial society. Audretsch (2014) has highlighted the changes in the role of universities in the entrepreneurial society. Guiso and Parigi (1999) have studied the impact of demand and factor cost uncertainty on various investment decisions of the firm.

Table 1: Top 5 Globally Cited Documents

<i>Rank</i>	<i>Article Title</i>	<i>Author/s</i>	<i>Journal</i>	<i>Year</i>	<i>ABDC Rank</i>	<i>Total Citations</i>	<i>Major Findings</i>
1	Examining the formation of human capital in entrepreneurship: A meta-analysis of entrepreneurship education outcomes	Bruce C. Martin, Jeffrey J. McNally, and Michael J. Kay	Journal of Business Venturing	(2013)	A*	620	Entrepreneurship education and training (EET) has a positive association with human capital development for entrepreneurship as well as entrepreneurship development. Academic-focused EET has a better positive association with entrepreneurship outcomes than training-focused EET.
2	International migration, remittances and household investment: evidence from Philippine migrants' exchange rate shocks	Dean Yang	The Economic Journal	(2008)	A*	482	Remittances have a positive impact on investment-related expenditure and the development of capital-intensive entrepreneurial enterprises in developing countries. Hence the policies related to migrant workers in the developed countries can have a positive impact on human capital accumulation and entrepreneurship development in poor countries.
3	The articulation of social capital in entrepreneurial networks: a glue or a lubricant?	Alistair R. Anderson and Sarah L. Jack	Entrepreneurship & Regional Development	(2002)	A	401	Social capital is a process than a thing. It is the bond between individuals that help them share information and resources among themselves. These bonds are organic but require efforts and maintenance to make them robust to

							carry a heavy load of exchange of a wide range of information and resources. Investment in social capital can be more beneficial in the long run compared to firm-level investments that might turn into sunk costs in the long run.
4	From the entrepreneurial university to the university for the entrepreneurial society	David B. Audretsch	The Journal of Technology Transfer	(2014)	B	318	As the source of economic growth has shifted from accumulation of physical capital to accumulation of intellectual capital the role of universities in society has become more important. The entrepreneur universities have been focusing more on technology transfers and the generation of new ventures. However, the role of the university in the entrepreneurial society is more of providing thoughts, leadership, and action to enhance the entrepreneurship capital in the society.
5	Investment and demand uncertainty	Luigi Guiso and Giuseppe Parigi	The Quarterly Journal of Economics	(1999)	A*	279	Uncertainty about the factor cost and future demand has a negative effect on the investment decisions of the firm. Firms with higher uncertainty also find it difficult to access credit. Though uncertainty has a negative impact on

							all sorts of investments of the firm the intensity of the impact can differ for firms in various sub-groups. Firms that can sell their machinery and other capital equipment relatively easily in the secondary markets have a lesser impact of uncertainty on their investments than firms that find it difficult to sell their machinery and other capital equipment in the secondary markets.
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5.6 Keywords Analysis

Table 2: Keywords and occurrences

	<i>Author Keywords</i>	<i>Occurrences</i>	<i>Keywords Plus</i>	<i>Occurrences</i>
1	Entrepreneurship	32	Capital Formation	28
2	Human Capital	15	Entrepreneur	27
3	Social Capital	15	Human Capital	16
4	Informal Sector	14	Informal Sector	14
5	Capital Accumulation	12	Small And Medium-Sized Enterprise	11
6	Innovation	12	Business Development	9
7	SMEs	11	Capital Flow	9
8	Economic Growth	9	China	9
9	Investment	9	Financial Crisis	9
10	China	7	Industrial Investment	9

Keywords analysis helps us understand the prevailing trends in the given research area over a period of time. Author keywords are the keywords selected by the authors, whereas, keywords plus are the keywords automatically generated from the text of the papers. Figure 3 depicts the trends of the keywords provided by the authors in capital accumulation in the informal sector research. It can be observed that the keyword 'Entrepreneurship' has gained popularity over time along with 'Informal Sector', 'Social Capital', 'Human Capital', 'Innovation', and 'Capital Accumulation'. These keywords are related to

either capital accumulation or the informal sector. This indicates the growing interest of research scholars in this field as well as helps us understand the connections between these terms.

Keywords plus are unintended keywords captured by the database. It helps us understand the natural trend in the given research area. Figure 4 depicts that 'Capital Formation', 'Entrepreneurship', 'Human Capital', 'Informal Sector', and 'Small and Medium Size Enterprises' are natural keywords that reflect the rising popularity of these concepts in capital accumulation in the informal sector research.

5.7 *Co-occurrence Analysis of Keywords*

Co-occurrence analysis helps understand the direction and concentration of research around the key concepts. In *figure 5* all the keywords that appeared in the past literature are put together along with their connection strengths and number of appearances. The colors are provided based on the clusters that bring related keywords together.

Cluster 1 (yellow cluster) represents keywords related to growth and productivity. Cluster 2 (green cluster) represents keywords related to factor inputs like capital accumulation, human capital, and labour. Cluster 3 (green cluster) represents keywords related to social capital and its benefits like network and innovation as well as entrepreneurship. Cluster 4 (blue cluster) represents keywords related to financial development and constraints related to credit access.

5.8 *Country-wise Bibliographic Coupling*

Bibliometric coupling is a technique, which can help us to identify closely related work. This technique shows the strength and relationship between the two documents published by the two countries. In *figure 6*, the size of the bubble shows the quantity whereas the distance between the bubbles shows the strength. The bubbles which are close to each other show higher strength. The timescale reflects the popularity of the research in a particular country.

The bibliometric coupling for countries shows the collaboration of work between the two countries. In *figure 3* the collaboration is shown along with the time scale which suggests the direction of the research in the given area. It can be observed that there is a great amount of collaboration in research in this field between advanced countries. The USA, Canada, Australia, and European countries show greater collaboration. China, India, Russia, South Africa, Mexico, and Ethiopia are the only developing countries that have some collaboration with these developed countries. China and Ethiopia have increased their contribution in recent years. This highlights that research scholars from emerging economies have started showing greater interest in carrying out research on capital accumulation in the informal sector field.

5.9 Bibliographic Coupling of Documents

Bibliographic coupling of documents helps us understand closely related work. In figure 4 various sub-domains in the capital accumulation in the informal sector research area are represented by various clusters. The detailed analysis of each cluster and the most prolific publications in each cluster is given in below Table 3.

Table 3: Bibliographic Clustering Documents and Most Prolific Publications

<i>Cluster</i>	<i>Cluster Description</i>	<i>TP</i>	<i>Most Prolific Publications</i>	<i>(Author/s, Year)</i>	<i>TC</i>	<i>C/Y</i>	<i>Links</i>
Cluster 1 (Red): Social Capital, Human Capital, and Entrepreneurship	<p>The papers in this cluster are majorly focused on the role of social capital and human capital in entrepreneurship and firm-level development. Some of the articles are also touching on some firm-level factors like capital, investments, and labour.</p> <p>Human capital helps entrepreneurs in building their internal capabilities. Whereas, social capital which is the network of entrepreneurs helps them with having access to information and resources that build their external capabilities.</p>	49	Examining the formation of human capital in entrepreneurship: a meta-analysis of entrepreneurship education outcomes	(Martin et al., 2013)	621	69.00	30
			The articulation of social capital in entrepreneurial networks: a glue or a lubricant?	(Anderson & Jack, 2002)	401	20.05	29
			The firm as a dedicated hierarchy: a theory of the origins and growth of firms	(Rajan & Zingales, 2001)	222	10.57	27
			A longitudinal study of habitual entrepreneurs: starters and acquirers	(Ucbasaran et al., 2003)	116	6.11	29
			Risk, entrepreneurship, and human-capital accumulation	(Iyigun & Owen, 1998)	111	4.63	19
			Has firm level analysis reached its limits? time for a rethink	(Scott & Rosa, 1996)	87	3.35	5
			Attracting cross-border venture capital: the role of a local investor	(Mäkelä & Maula, 2008)	83	5.93	24
			Social capital and agricultural trade	(Fafchamps & Minten, 2001)	80	3.81	3
			On the past and future of China's township and village-owned enterprises	(Putterman, 1997)	77	3.08	15
			Building international entrepreneurial virtual networks in cyberspace	(Sigfusson & Chetty, 2013)	53	5.89	23
			Determinants of	(Buli &	37	5.29	5

			entrepreneurial intentions: technical-vocational education and training students in Ethiopia	Yesuf, 2015)			
Cluster 2 (Green): Informal Sector, Small Firms, and Productivity	Papers in this cluster are focused on assessing the performance of informal and small firms as well as the comparison between the performance of informal firms and formal firms. Productivity in the informal firms is a result of internal factors like physical capital accumulation and human capital accumulation as well as external factors like social capital which includes the welfare of informal workers and export capabilities of the firm. Government policies related to taxation and social welfare schemes also have an impact on the performance of informal enterprises.	36	A competitive model of the informal sector	(Amaral & Quintin, 2006)	128	8.00	26
			Determinants of technical efficiency in small firms	(Alvarez & Crespi, 2003)	108	5.68	5
			Tax collection, the informal sector, and productivity	(Leal Ordóñez, 2014)	62	7.75	28
			Entrepreneurship, income distribution and economic growth	(Galindo Martin et al., 2010)	46	3.83	9
			Do firms learn by exporting or learn to export? evidence from small and medium-sized enterprises	(Eliasson et al., 2012)	34	3.40	6
			The extension of social security coverage in developing countries	(Jung & Tran, 2012)	14	1.40	16
			Informality and long-run growth	(Docquier et al., 2017)	13	2.60	39
			Returns to physical capital in Ethiopia: comparative analysis of formal and informal firms	(Siba, 2015)	11	1.57	18
			The role of the informal sector in the early careers of less-educated workers	(Cano-Urbina, 2015)	9	1.29	14
			Investments, export entry and export intensity in small	(Esaku, 2020)	8	4.00	8

			manufacturing firms				
Cluster 3 (Dark Blue): Investments and Capital Accumulation	Papers in this cluster are majorly focused on investments in small and medium enterprises and their impact on capital accumulation and physical capital. Some papers have also studied the impact of investments and capital accumulation on firm-level innovations. Investment and capital decisions of the firm and working capital management can have a greater impact on the profitability of the firm. Capital structure and source of capital decide the capital available for the business as well as its usage.	19	Investment and demand uncertainty	(Guiso & Parigi, 1999)	280	12.17	17
			External finance constraints and the intertemporal pattern of intermittent investment	(Whited, 2006)	112	7.00	26
			Does internal finance matter for R&D? new evidence from a panel of Italian firms	(Ughetto, 2008)	82	5.86	27
			One cost of the Chilean capital controls: increased financial constraints for smaller traded firms	(Forbes, 2007)	80	5.33	15
			Employment protection legislation, capital investment and access to credit: evidence from Italy	(Cingano et al., 2016)	36	6.00	7
			How does working capital management affect the profitability of Vietnamese small- and medium-sized enterprises	(Tran et al., 2017)	32	6.40	2
			Product innovation and the decision to invest in fixed capital assets: evidence from an SME survey in six European union member states	(Skuras et al., 2008)	25	1.79	23
			Capital structure determinants of	(Pacheco & Tavares,	19	3.80	11

			hospitality sector SMEs	2017)			
			Direct and configurational paths of open innovation and organisational agility to business model innovation in SMEs	(Liao et al., 2019)	16	5.33	1
			Corporate investments in Asian markets: financial conditions, financial development, and financial constraints	(Gochoco-Bautista et al., 2014)	14	1.75	27
Cluster 4 (Yellow): Macroeconomic Factors and Internationalisation	<p>Papers in this cluster have touched upon the impact of macroeconomic factors, credit availability, internationalisation, migration, and financial constraints on the performance of small firms. Some papers have studied the impact of capital structure and human capital formation also.</p> <p>Factors like global integration and level of education create a distinct set of entrepreneurs those are have more access to knowledge or money. Whereas, factors like the rate of unemployment and borrowing constraints create necessity-driven entrepreneurs.</p>	19	International migration, remittances and household investment: evidence from Philippine migrants' exchange rate shocks	(Yang, 2008)	482	34.43	6
			Out of sight, out of mind: migration, entrepreneurship and social capital	(Wahba & Zenou, 2012)	94	9.40	25
			Heterogeneity among Mexico's microenterprises: an application of factor and cluster analysis	(Cunningham & Maloney, 2001)	60	2.86	23
			Entrepreneurs, professionals, and growth	(Iyigun & Owen, 1999)	59	2.57	48
			Financial integration, entrepreneurial risk and global dynamics	(Angeletos & Panousi, 2011)	43	3.91	17
			Entrepreneurship, taxation and capital investment	(Kitao, 2008)	36	2.57	29
			Financial	(Erosa,	36	1.71	33

			intermediation and occupational choice in development	(2001)			
			Entrepreneurship versus joblessness: explaining the rise in self-employment	(Falco & Haywood, 2016)	33	5.50	25
			Uninsured idiosyncratic production risk with borrowing constraints	(Covas, 2006)	20	1.25	12
			Demographic growth, Harrodian (in)stability and the supermultiplier	(Allain, 2019)	14	4.67	1
Cluster 5 (Purple): Knowledge, Education, and Entrepreneurship	Papers in this cluster are majorly focused on the impact of knowledge and education on entrepreneurship development and entrepreneurial society. These papers have highlighted the importance of intellectual capital for entrepreneurs and small firms. Along with physical capital and human capital knowledge or intellectual capital has become an important ingredient for the success of the business. Accumulation of intellectual capital is dependent on social and regional factors like education, research and development, and culture.	18	From the entrepreneurial university to the university for the entrepreneurial society	(Audretsch, 2014)	318	39.75	22
			Exploring the knowledge filter: how entrepreneurship and university-industry relationships drive economic growth	(Mueller, 2006)	254	15.88	26
			Exploiting entrepreneurial opportunities: the impact of entrepreneurship on growth	(Mueller, 2007)	111	7.40	28
			Financiers versus engineers: should the financial sector be taxed or subsidized?	(Philippon, 2010)	60	5.00	53
			The transition to a globalized economy: poverty, human capital and the informal sector in a	(Gibson, 2005)	23	1.35	15

			structuralist CGE model				
			Skills and regional entrepreneurship capital formation: a comparison between Germany and Portugal	(Mendonça & Grimpe, 2016)	12	2.00	31
			The more you spend, the more you get? the effects of r & d and capital expenditures on the patenting activities of biotechnology firms	(Piergiovanni & Santarelli, 2013)	9	1.00	17
			Evaluating firm training, effects on performance and labour demand	(Ottersten & Mellander, 1999)	8	0.35	3
			Development paths in the knowledge economy: innovation and entrepreneurship in Greece	(Liargovas & Repousis, 2015)	7	1.00	29
			Religion, human capital and growth	(Autiero & Vinci, 2015)	3	0.50	1
Cluster 6 (Light Blue): Capital Accumulation and Innovation in Developing Countries	Papers in this cluster have studied various capital models and their impact on capital accumulation. They have also studied the impact of capital accumulation on innovation culture and the technical progress in the business society of developing countries. Some papers have studied the impact of microfinance on the capital accumulation of small firms. Availability of capital and cost of capital have	17	Law, stock markets, and innovation	(Brown et al., 2013)	155	17.22	29
			Technology adoption and accumulation in a vintage-capital model	(Barucci & Gozzi, 2001)	34	1.62	7
			Investment in a vintage capital model	(Barucci & Gozzi, 1998)	31	1.29	9
			Female entrepreneurship in China: opportunity- or necessity-based?	(Hernandez et al., 2012)	22	2.20	7
			Innovative performance of Iranian	(Noori et al., 2017)	14	2.80	3

	an impact on investment in the innovation by the firms. The firms that invest in innovation and technology adoption grow faster.		knowledge-based firms: large firms or SMEs?				
			Social sanctions or social relations? microfinance in Mexico	(Griffin & Husted, 2015)	13	1.86	6
			A Schumpeterian model of endogenous innovation and growth	(Englmann, 1994)	10	0.36	9
			The macroeconomics of microfinance	(Buera et al., 2021)	6	6.00	15
			Raising capital for the family firm for sustainability: whence the advantage?	(Xiang et al., 2020)	4	2.00	2
			An assessment of entrepreneurial disposition and culture in Sub-Saharan Africa: some lessons from Ghana	(Adom et al., 2018)	4	1.00	5
Cluster 7 (Orange): Banking, Investors, and Financial Development	Papers in this cluster focus on the impact of banking, investors, and financial development on the development of business and capital accumulation. These have touched upon the impact of financial development and integration on new firm creation. Some papers have also studied the risk associated with financing and investor protection. Financial development and integration allow firms to increase their pace of capital accumulation. It also offers a range of financial products like insurance that allow	14	Global banking and international business cycles	(Kollmann et al., 2011)	107	9.73	5
			Investor protection, optimal incentives, and economic growth	(Castro et al., 2004)	86	4.78	18
			Innovation, bank monitoring, and endogenous financial development	(de la Fuente & Marín, 1996)	77	2.96	40
			Idiosyncratic production risk, growth and the business cycle	(Angeletos & Calvet, 2006)	56	3.50	34
			Credit quantity and credit quality: bank competition and capital accumulation	(Cetorelli & Peretto, 2012)	24	2.40	20
			How do financial frictions affect the spending	(Carrillo & Poilly, 2013)	21	2.33	1

entrepreneurs to take the risk and innovate.	multiplier during a liquidity trap?				
	Financing of investment in eastern Europe: a theoretical perspective	(Holmström, 1996)	17	0.65	18
	Strategic versus financial investors: the role of strategic objectives in financial contracting	(Arping & Falconieri, 2010)	9	0.69	1
	Financial contracts and the political economy of investor protection	(Ševčík, 2012)	8	0.80	34
	Finance and technology in early industrial economies: the role of economic integration	(Da rin, 1997)	6	0.24	17

TP: Total Publications

TC: Total Citations

C/Y: Citations per Year

5.10 Thematic Evolution

Thematic evolution helps us understand how various themes have evolved in a given area. It can be seen in Figure 8 that capital accumulation has evolved into two themes namely capital accumulation and social capital between 1993 and 2022. Similarly, entrepreneurship has also evolved into three different themes of entrepreneurship, social capital, and knowledge that can also be stated as intellectual capital in the same period. We can also see how human capital has evolved as social capital between 2003 and 2022. Similarly, the informal sector has evolved into the informal sector and capital accumulation in the same period. This clearly highlights the importance of social capital and how it evolved to become one of the most popular topics in this research area. These themes can be further analysed by slicing them into three different periods of a decade each.

A thematic map is a graphical representation of the various themes prevailing in the given research area in the given period based on two parameters, centrality and density. Based on these two parameters the map is divided into four quadrants. Quadrant 1 shows themes with high centrality and high density known as motor themes. These are the most popular themes in the area with high impact and high production. Quadrant 2 shows themes with high centrality but low density known as basic themes. These

are general themes in the field. Quadrant 3 shows themes with low centrality and low impact known as emerging or diminishing themes. It's difficult to evaluate whether the theme is emerging or diminishing without looking at the other time slices. Quadrant 4 shows themes with low centrality and high density known as niche themes. These are very specific topics in the field.

It can be seen that capital accumulation was an emerging theme in the first decade (figure 9) of this analysis then it evolved as a basic theme tending towards a motor theme in the second decade (figure 10) and finally evolved as a motor theme in the third decade (figure 11). This has made capital accumulation one of the popular themes in the research field at present. It can also be observed for the informal sector as it was a basic theme in the second decade and evolved as a motor theme in the third decade. The informal sector has also become another popular theme in this research area at present. Social capital, knowledge or intellectual capital, and human capital are certainly some of the other popular themes in this research area at present.

Discussion And Future Research

The above analysis helps us study all three research objectives of understanding the current research trends in the field of capital accumulation in the informal sector, understanding the theme and evolution of research in the field of capital accumulation in the informal sector, and exploring the new avenues of research in the field of capital accumulation in the informal sector.

Capital accumulation is an ongoing process of the creation of physical capital. The theory of capital accumulation has established the positive relationship between capital accumulation and the growth of firms as well as nations. There is limited research carried out on capital accumulation in the informal sector. One of the major reasons for this could be the unavailability of capital data in the informal sector. The sector initially faced a technical definitional problem but now it is well defined by the ILO. Many countries alter the definition as per their domestic requirements. This shall help improve the availability and quality of data on informal sector enterprises. The role of the informal sector in many developing and underdeveloped economies creates an opportunity for research scholars to put more effort to understand the role of capital accumulation in the informal sector.

The advanced countries especially the USA and the European countries have published more papers on capital accumulation in the informal sector. The reason could be the availability of the data as these countries have robust databases. China and India are also the major contributors but given the size of the country and proportion of the informal sector in these economies, it highlights the need for research scholars to carry out more research on the informal sector in these two major economies. The significance of the informal sector is more in the developing and least developed countries compared to the developed countries. Hence it is important that developing and least developed countries devote more resources to research on capital accumulation in the informal sector.

Social capital, knowledge or intellectual capital, and human capital are certainly emerging areas of research in this field. Hence while researching capital accumulation in the informal sector research

scholars will have to consider the broader definition of capital which includes social capital, knowledge, and human capital.

Conclusion

The bibliometric analysis has highlighted the characteristics and trends in capital accumulation in the informal sector. Though the concept and theories of capital are in discussion for the last three centuries, research in capital accumulation has widened its scope in the last few decades. The majority of the contribution comes from advanced countries except for China and India.

The conceptual evolution of capital has provided the direction for research in this field. The initial studies have established a positive association between physical and monetary capital with the growth of the firms and countries. Eventually, the addition of knowledge, technology, and information that can be considered as social capital, intellectual capital, and human capital (Aghion & Howitt, 1990; Lucas, 1988; Swan, 1956; Veblen, 1908) has provided a new dimension to research in this field. The bibliometric analysis supports this progression as we see the popularity of keywords “social capital”, “knowledge”, and “human capital” is increasing along with “capital accumulation” and “informal sector”. The emerging areas are further going into a detailed analysis of industries, their productivity, input-output analysis, financial aspects of capital accumulation, technological developments, and social capital and its impact on capital accumulation in the informal sector.

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Figures

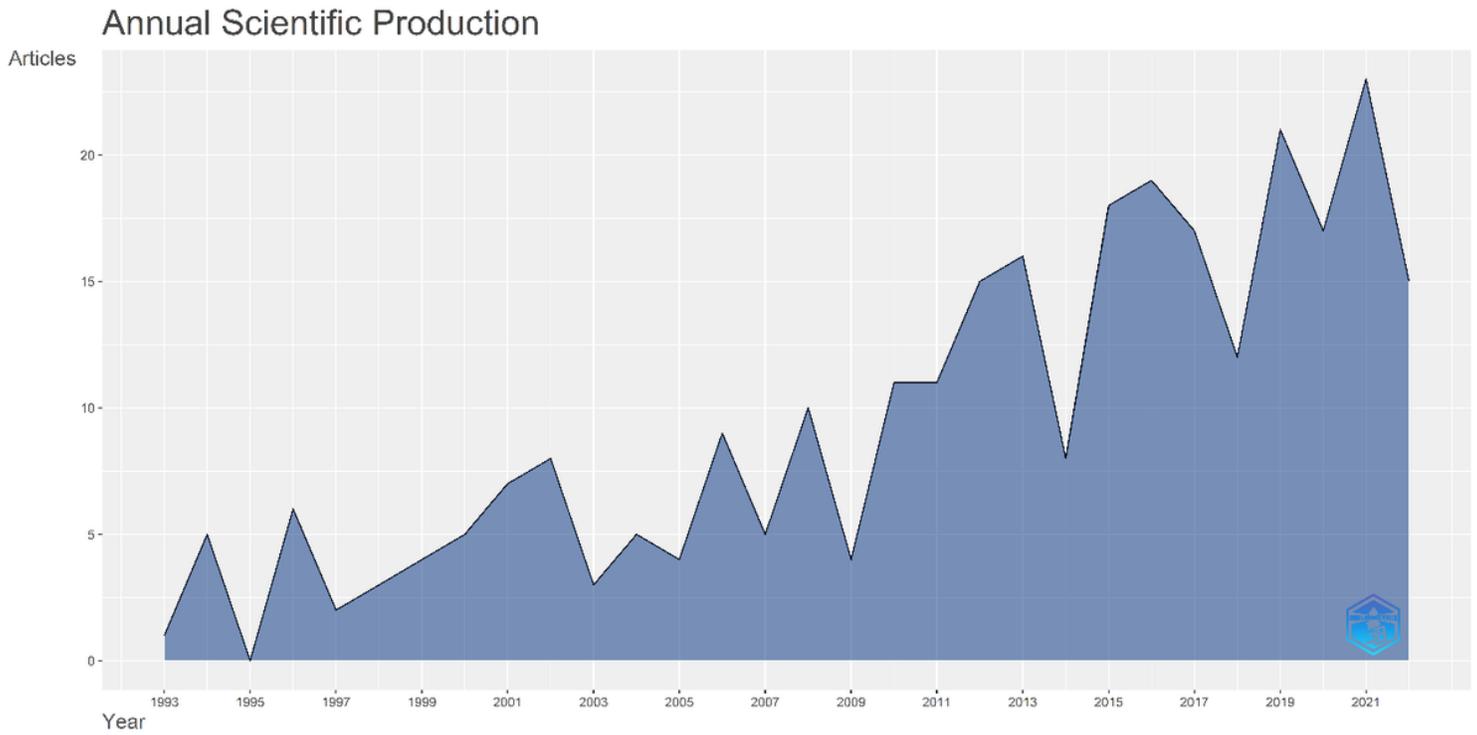


Figure 1

Annual Scientific Production

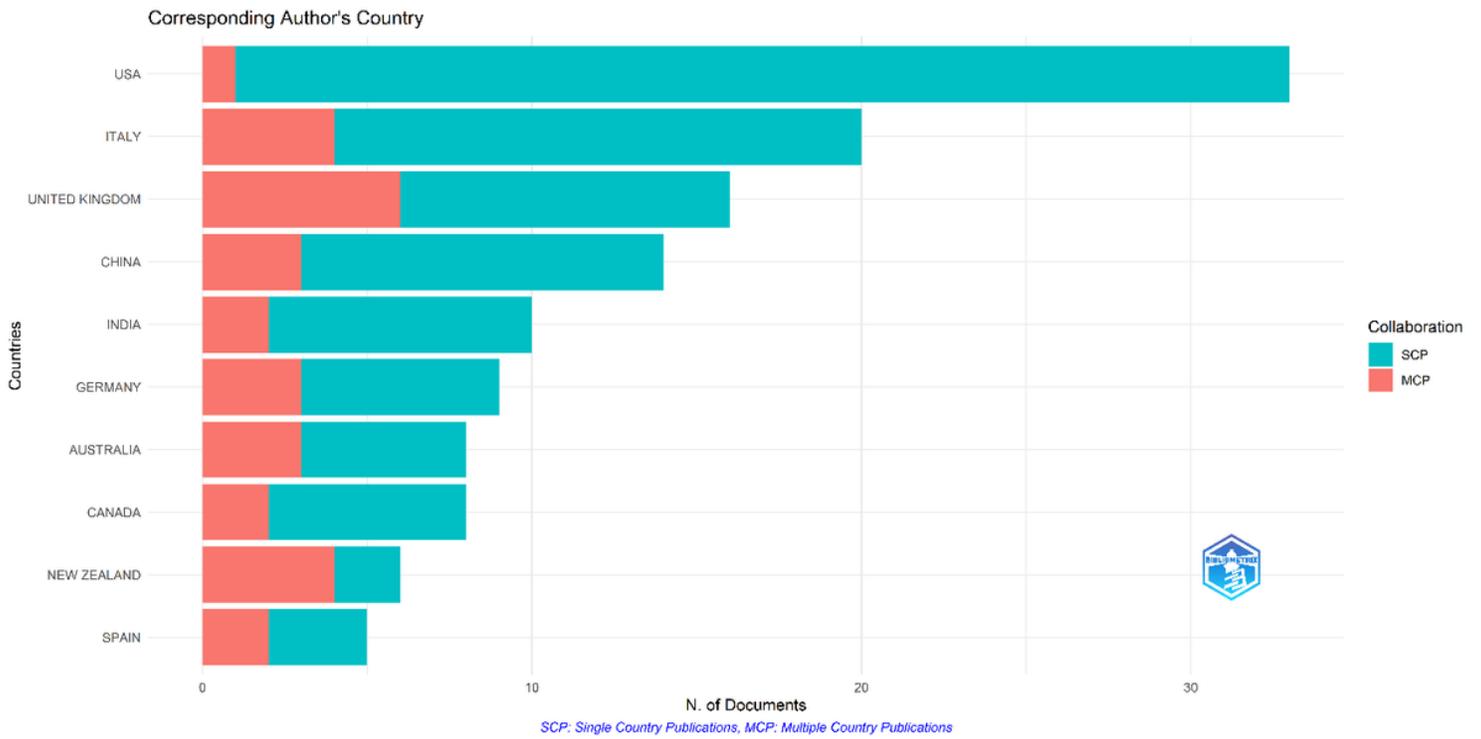


Figure 2

Corresponding Authors' Country

SCP: Single Country Publications

MCP: Multiple Country Publications

Word Growth

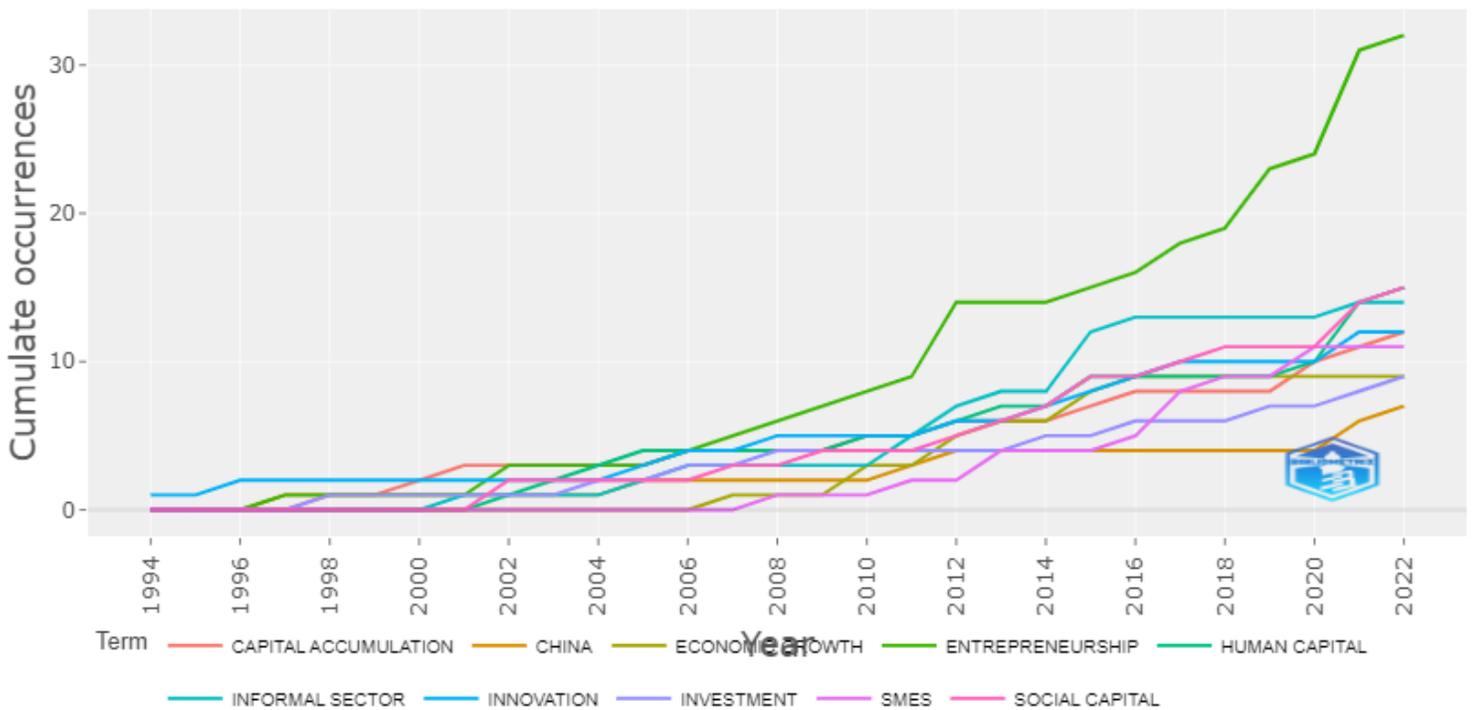


Figure 3

Word Dynamics of Author Keywords

Word Growth

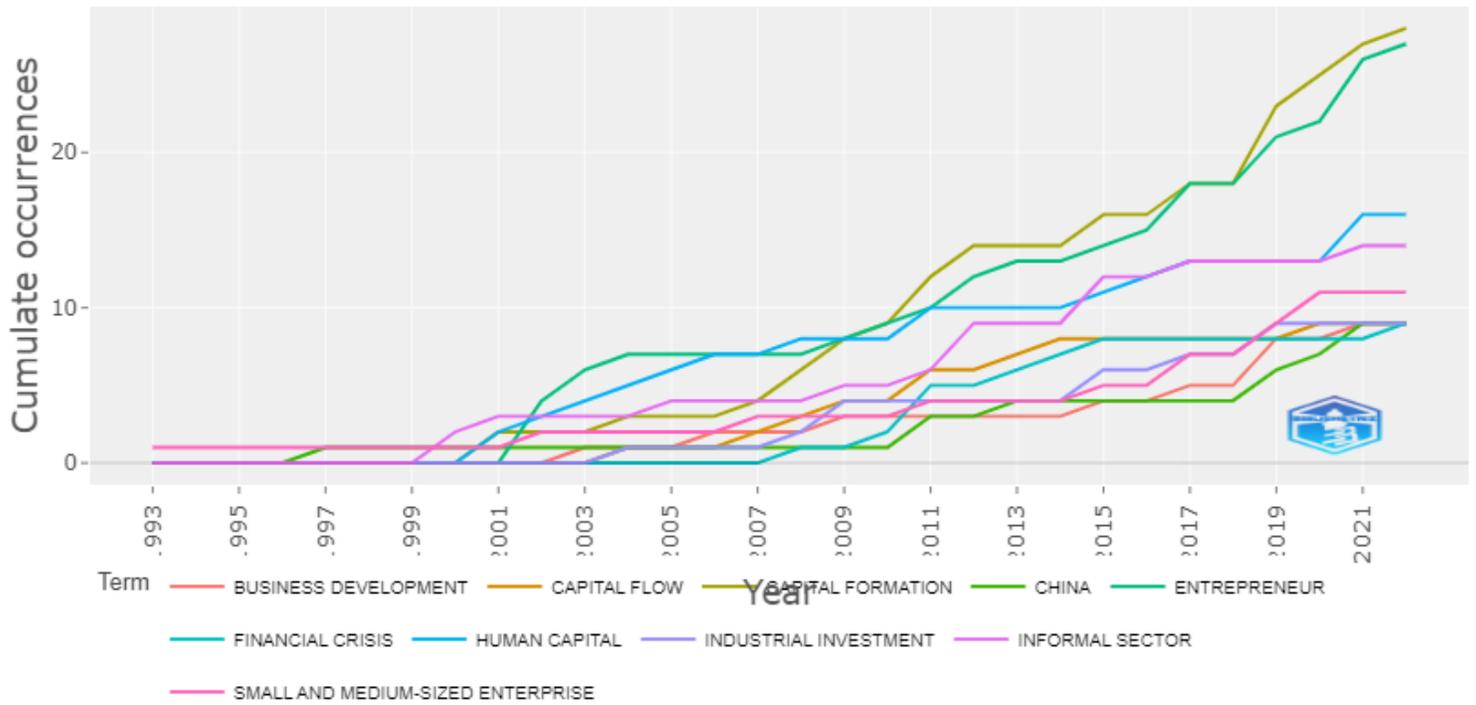


Figure 4

Word Dynamics of Keywords Plus

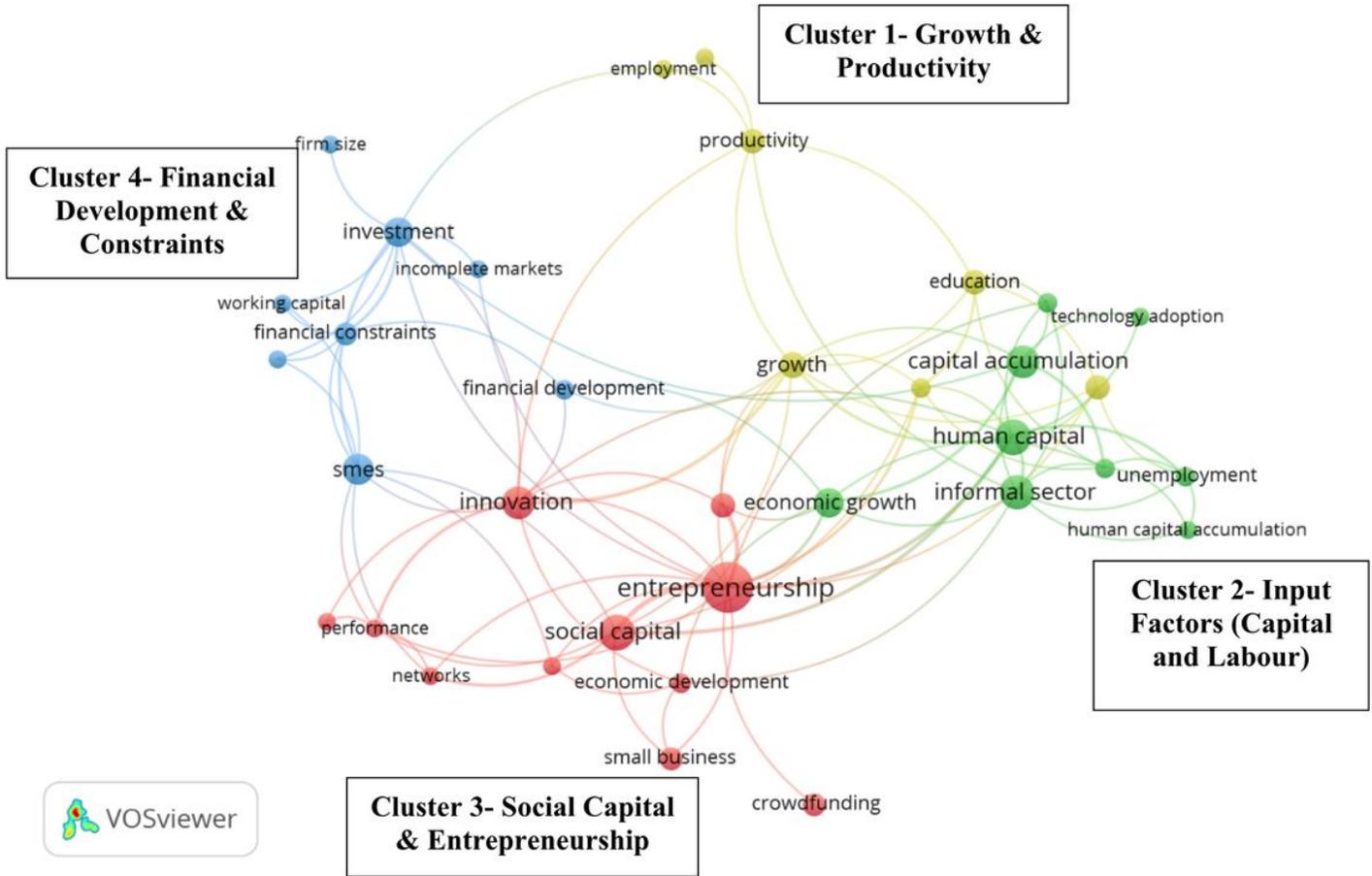


Figure 5

Cooccurrence Map of Author Keywords

Figure 6

Country-wise Bibliometric Coupling

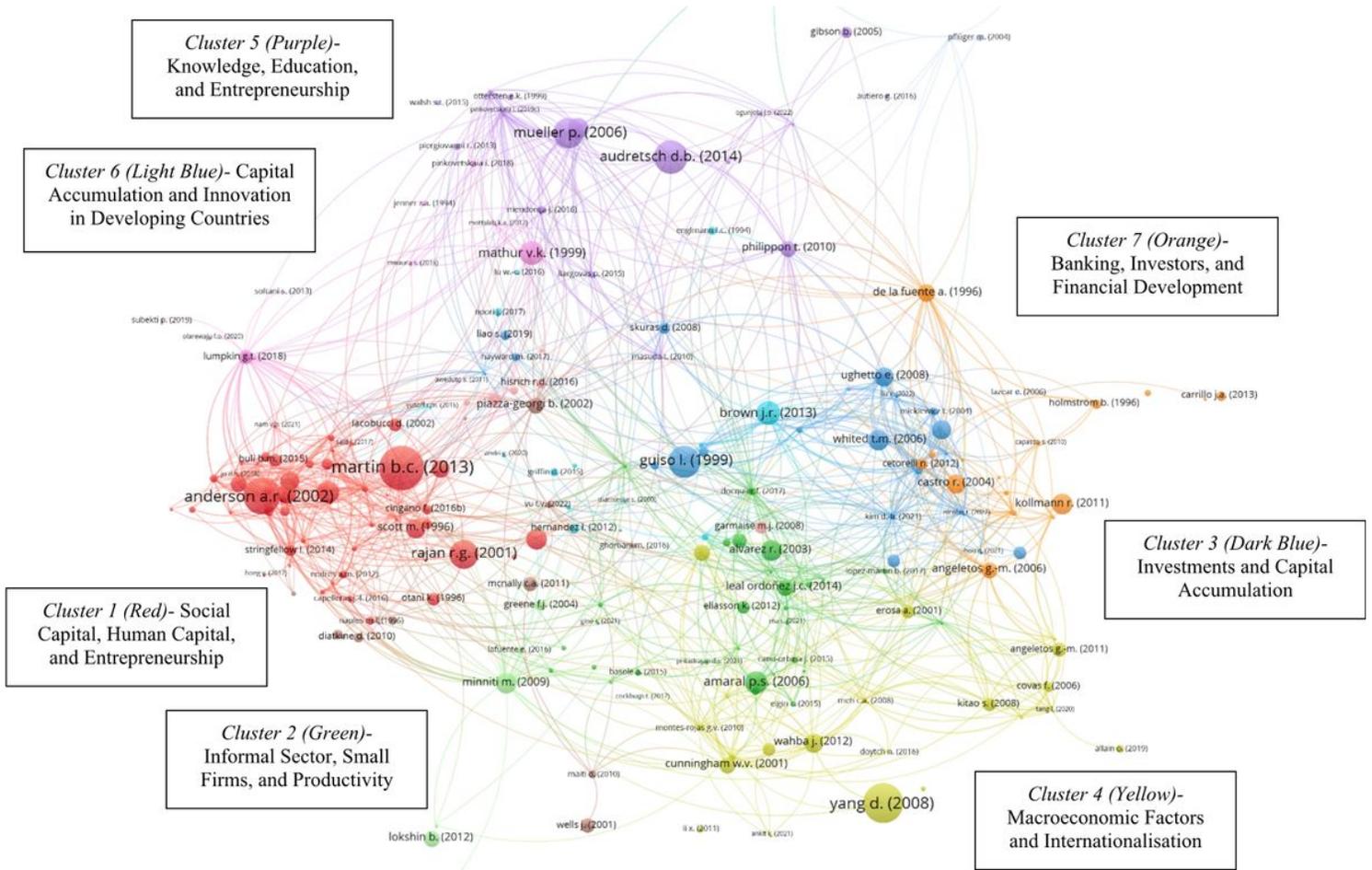


Figure 7

Bibliographic Coupling of Documents

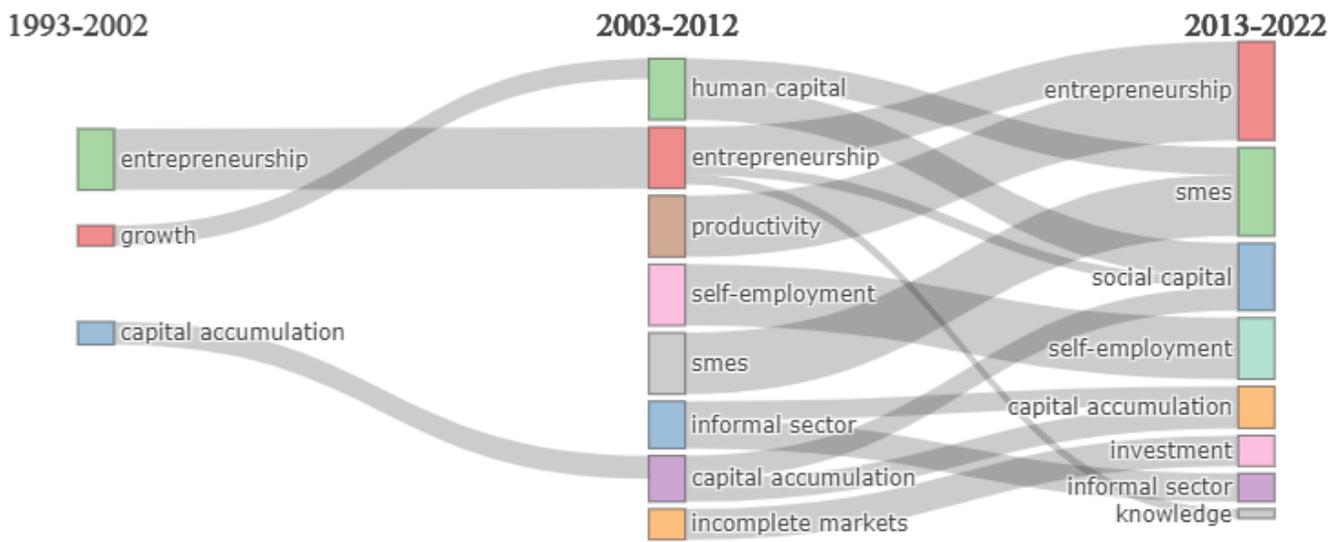


Figure 8

Thematic Evolution of Author Keywords

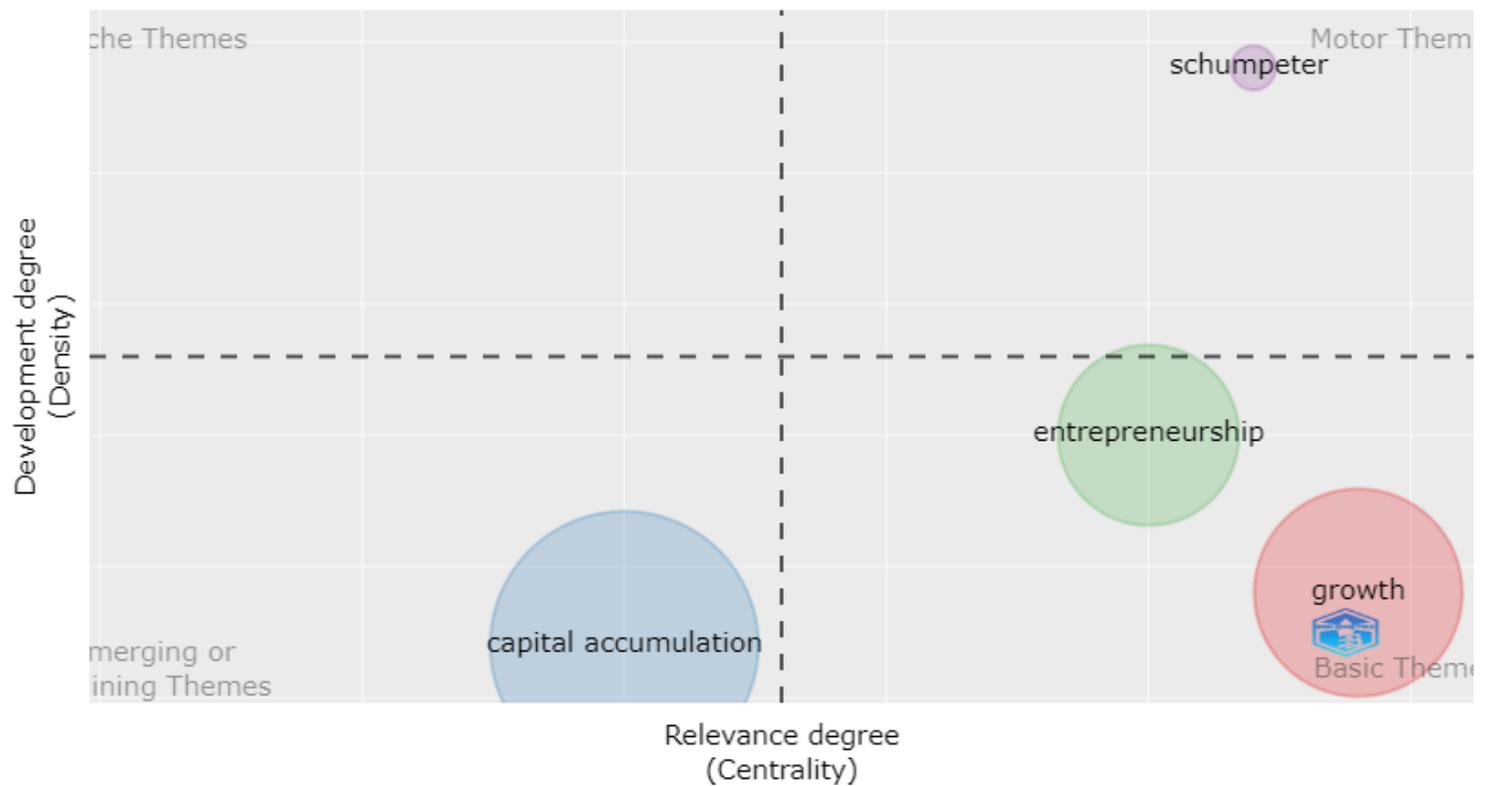


Figure 9

Thematic Map Time Slice 1 (1993-2002)

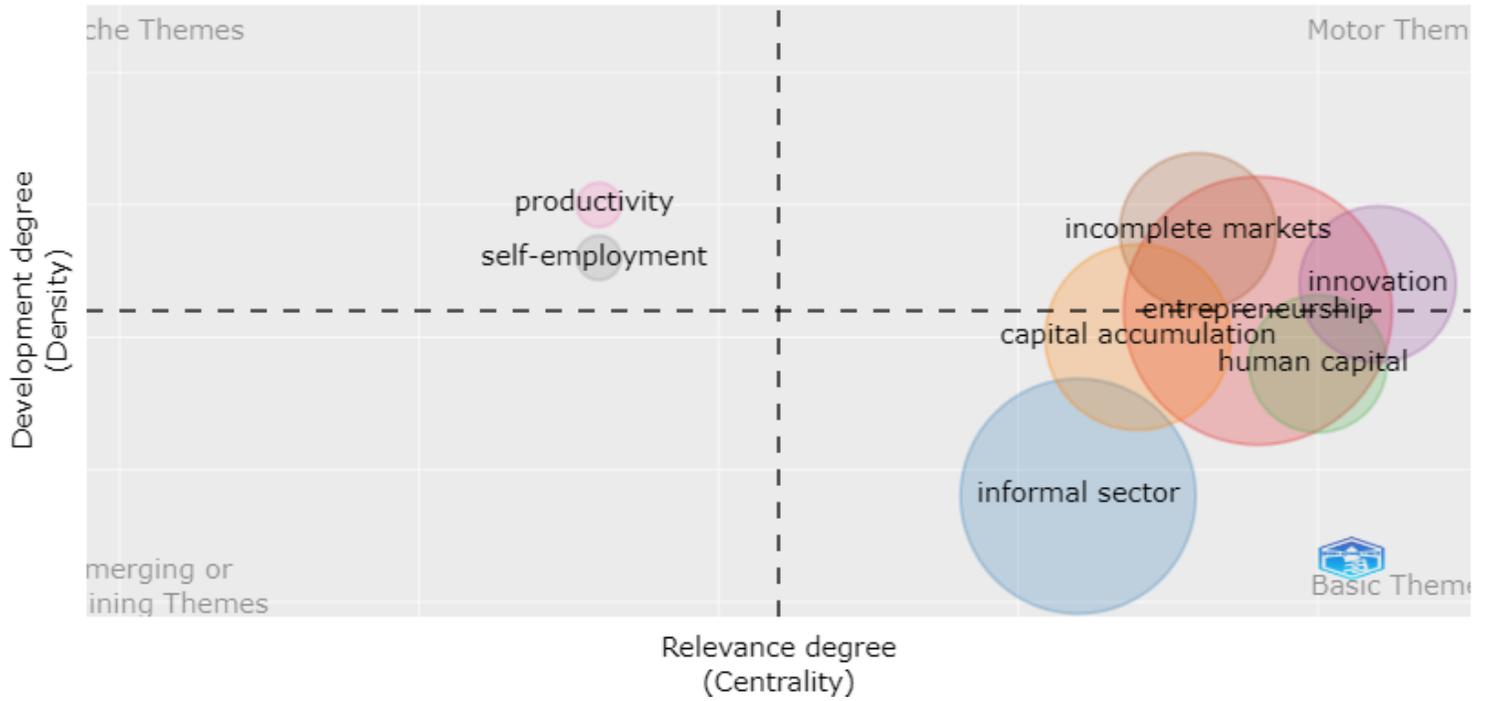


Figure 10

Thematic Map Time Slice 2 (2003-2012)

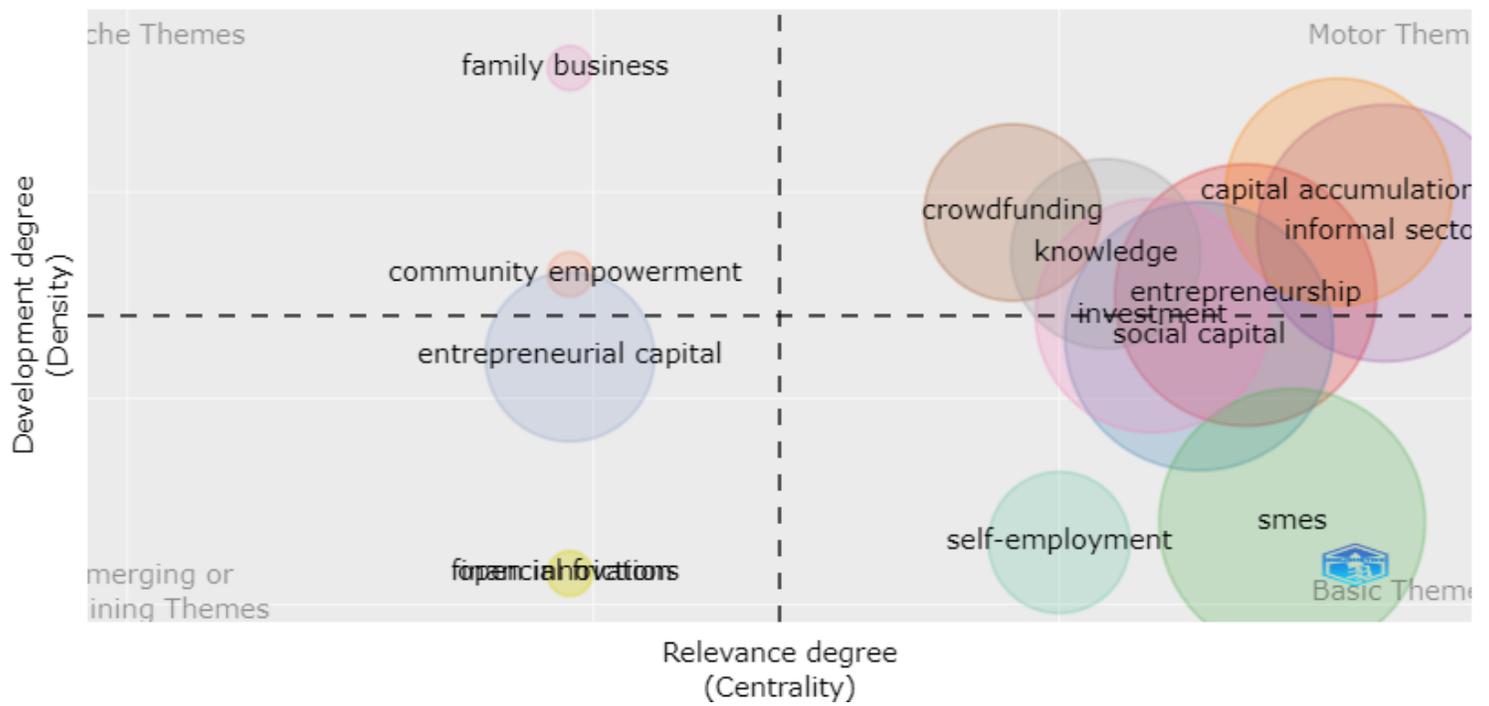


Figure 11

Thematic Map Time Slice 3 (2013-2022)