

The liaison between Intellectual Capital and Financial Performance: A Bibliometric scrutiny

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Abstract:

Intellectual Capital administers a colossal involvement in strengthening the accomplishment for business organisations. The intent of this article is to decipher development over the period and find fresh tendencies in the theme of Intellectual Capital and Financial Performance. Bibliometric analysis was executed on the merged data from Scopus and Web of Science databases, retrieved after confining it on the basis of subject area and document type in March 2023. In total, 727 articles have been utilised for this study, primarily authored by 1571 researchers from Italy, China etc. An annual growth rate of 9.81 % in this study field was discovered over the time period of 1996 to 2023. “Journal of Intellectual Capital” has been found to be the most significant source. This paper aims to cognise vital research works, ascertain the contemporary themes of research foci and help synergise fresh efforts towards further research in this field.

Keywords: Intellectual Capital, Financial Performance, Bibliometrics analysis, Biblioshiny, Collaboration network

Paper type: Literature review

Introduction:

Technological escalations and innovations have altered the traditional system where tangible assets were considered significant. But now the focus has shifted to intangibles assets. Intangibles specifically Intellectual Capital, constitute an indispensable role in enhancing the commercial worth and providing competitive ability to a company. According to Nuryaman (2015), capitalists give higher economic merit to the company that has a greater intellectual capital. Xu et al. (2017) derives that IC is the unrivalled resort for generating corporate worth. According to Lev (2000), “Intangible assets are non-physical sources of value claims to future benefits/generated by innovation (discovery) unique organizational design or human resource practices. Intangibles often interact with intangibles and financial assets to create corporate value and economic growth”. Sullivan (2000) explains, “Intellectual Capital has the ability to leverage the profitability of the firm”. IC is bifurcated into human capital, relational capital and structural capital where human capital is the value of proficiency, understanding and dexterity of the manpower of an undertaking. Relational capital is the undertaking’s relation with its clients, stakeholders, vendors and government while structural capital is the corporate structure,



database, processes, policies, patents, trademarks etc. that remain in possession of the organisation. If all parts of IC are managed with expertise and efficiency, then this will enhance firm value and boost its performance.

Financial performance of an organisation is the comprehensive assessment of its standing in classes like capital, debts and obligations, equity, overheads, revenue, net profitability and a quantitative gauge of company's ability of using its business resources for generating income. It relates with a firm's comprehensive economic fitness over a particular period. Primary dimension is converting input into output effectively. Second dimension is profit earning ability and the third is market premium.

This paper's intent is to ascertain development over the period and analyse emerging trends in the theme of IC and FP of undertakings by conducting bibliometric analysis, using Bibliometrix library and Biblioshiny on the data that has been extracted by unifying the collected data of Scopus and Web of Science.

This research will comprehend the undermentioned problems:

R1. At what rate are the publications growing over the years?

R2. Enumerating the utmost prominent journals of Intellectual Capital and Financial Performance among researchers?

R3. Who are the greatly persuasive researchers on Intellectual Capital and Financial Performance?

R4. Which are the leading countries with most of the researches done?

R5. What is the status of author' keywords used in publications in the current co-occurrence network?

R6. What is the contemporary status of collaboration network of authors working on Intellectual Capital and Financial Performance?

This research is spilt into four parts where first part covers introduction, second is summarisation of previous studies, third includes data, methodology and result while the last part includes discussion, conclusion, limitations and further implications.

Definitions of Intellectual Capital:

Galbraith has been the forerunner in use of the keyword: Intellectual Capital post which multiple researchers defined Intellectual Capital in different ways.

Table 1: Definitions of Intellectual Capital

RESEARCHERS	DEFINITIONS
(Edvinsson and Sullivan, 1996)	"Intellectual capital is knowledge that can be converted into value".
(Roos and Roos, 1997)	"Intellectual capital is the sum of the hidden assets of the company not fully captured on the balance sheet, and thus includes both what is in the heads of organizational members, and what is left in the company when they leave".
(Wiig, 1997)	"Intellectual Capital consists of assets created through intellectual activities ranging from acquiring new knowledge (learning) and inventions to creating valuable relationships".
(Stewart, 1998)	"IC is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth".
(Sullivan, 1998, p.4)	"Knowledge that can be converted into profits".
(Nahapiet and Ghoshal, 1998)	"Intellectual capital refer to the knowledge and knowing capability of a social collectivity, such as an organization, intellectual community, or professional practice".



(Lev, 2001)	“An intangible asset is a claim to future benefit that does not have a physical or financial (a stock or a bond) embodiment”.
(Pablos, 2003, p. 63)	“A broad definition of intellectual capital states that it is the difference between the company’s market value and its book value. Knowledge based resources that contribute to the sustained competitive advantage of the firm from intellectual capital”.
(Rastogi, 2003)	“IC may properly be viewed as the holistic or meta-level capability of an enterprise to co-ordinate, orchestrate, and deploy its knowledge resources toward creating value in pursuit of its future vision.”
(Andriessen, 2004)	“Intellectual capital has encapsulated an organization's non-monetary sources of wealth creation. Significantly, the word capital indicates that intellectual capital has value, and as such, can be measured and managed”
(Chu <i>et al.</i> , 2006)	“Intellectual capital is the group of knowledge assets that are attributed to the value creation of an organization”.

Previous studies:

Years of research have been completed on the repercussions of Intellectual Capital on Financial Performance of undertakings. Yet this field is conflicting and confused about the findings of various studies. This is because there are many studies which show positive role of IC on FP while there are others which show none or negative role. Also, most of researches have been done on stock market indices and in developed regions. The role and after-effects of Intellectual Capital on Financial Performance have been condensed in table 2.

Table 2: Summarisation of previous studies

Variables used in the studies	Positive effect	Negative/No effect
Profitability	Alipour (2012); Mondal and Ghosh (2012); Kusumawardhani (2012); Deep and Pal, (2014); Mohammadi (2015); Mondal (2016); (Asare <i>et al.</i> (2017); Narwal and Yadav (2017); Hasan Mohammad and Alam (2017); Khairiyansyah and Vehtasvili (2018); Xu and Li (2020); Vo and Tran (2021); Suherman (2017); Bansal and Singh (2020)	
Productivity	Bansal and Singh (2020); Kamath (2015)	Pal and Soriya (2012); Bansal and Singh (2020); Deep and Narwal (2014)



Market Performance	Chen <i>et al.</i> (2005), Wang (2008); Tui <i>et al.</i> (2017); Sharma (2018); Yovita and Amrania (2018); Restuti <i>et al.</i> (2019); Anwar <i>et al.</i> (2020); Nguyen and Doan, (2020); Ni <i>et al.</i> (2020),	Puntillo (2009); Akhavan <i>et al.</i> (2012); Pal and Soriya (2012); Trisnowati and Fadah (2014); Deep and Narwal (2014); Suherman (2017); Shubita (2019)
Growth in revenue	Chen <i>et al.</i> (2005)	

Data and Methodology:

To aggregate and accumulate appropriate information, Scopus and Web of Science database have been utilized and the data was extracted in March 2023. Both the sources have comprehensive coverage and the largest database. Keywords used for shortlisting research papers were: Intellectual Capital and Financial Performance. The collection of data was confined specifically to the subject areas of: business management, accounting, social science, economics and finance. The data has been delimited, to include only research articles. After all, the papers extracted from Scopus were 539, from Web of Science were 326. Then, data was merged by employing RStudio tools. Post this, 138 duplicates were removed and finally 727 documents were selected by merging both data-sets.

Bibliometrics analysis was executed on the extracted data with the help of Bibliometrix library and Biblioshiny tools of RStudio. These platforms were used to disclose relevant information about publications viz. the most influential author and article, most popular journal, collaboration network, dominant research country, growth rate and co-occurrence of words.

Bibliometrics Analysis:

Table 3 elucidates relevant information about data that is analysed using Biblioshiny of RStudio. A total of 727 documents were found to be published with Intellectual Capital and Financial Performance as keywords, commencing from the year 1996 till 2023. A total of 1571 researchers did their research in this field with an average of 3.65 citations per year.

Table 3: Main Information about data

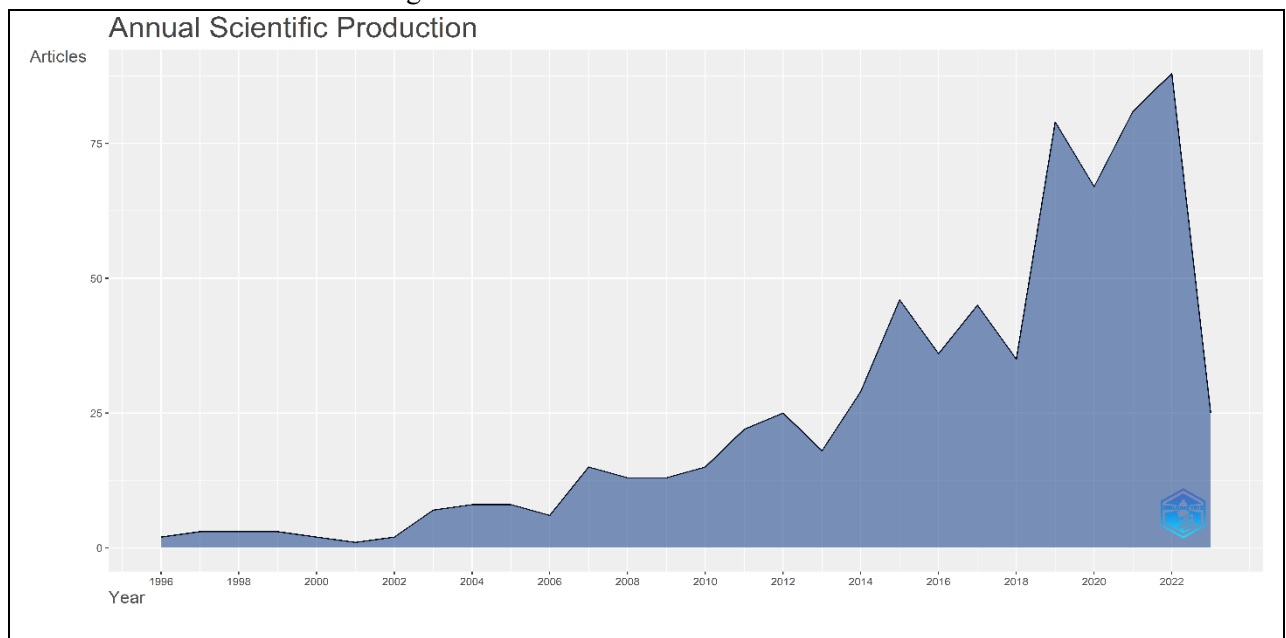
Description	Results
Basic knowledge about data	
Period of time	1996:2023
Sources (Journals, Books, etc)	283
Documents	727
Average years from publication	6.53
Average citations per documents	32.16
Average citations per year per doc	3.658
References	37556
DOCUMENT TYPES	
article	692
article; early access	30



article; proceedings paper	5
DOCUMENT CONTENTS	
Keywords Plus (ID)	1055
Author's Keywords (DE)	1716
AUTHORS	
Authors	1571
Author Appearances	1961
Authors of single-authored documents	103
Authors of multi-authored documents	1468
AUTHORS COLLABORATION	
Single-authored documents	111
Documents per Author	0.463
Authors per Document	2.16
Co-Authors per Documents	2.7
Collaboration Index	2.38

Figure 1 exhibits development over the years, initiating from 1996 till 2023. The number of publications is growing year on year with a 9.81% annual growth rate. Publications on Intellectual Capital and undertakings' Financial Performance is swelling gradually year on year, notably in the year 2022, with 88 as the highest number of articles published. Till now 727 articles have been published, amongst which 596 papers have been published from the year 2010 onwards. This is almost 81.98 per cent of the total number of published articles. This demonstrates increasing interest of researchers in this field.

Figure 1: Annual Scientific Production



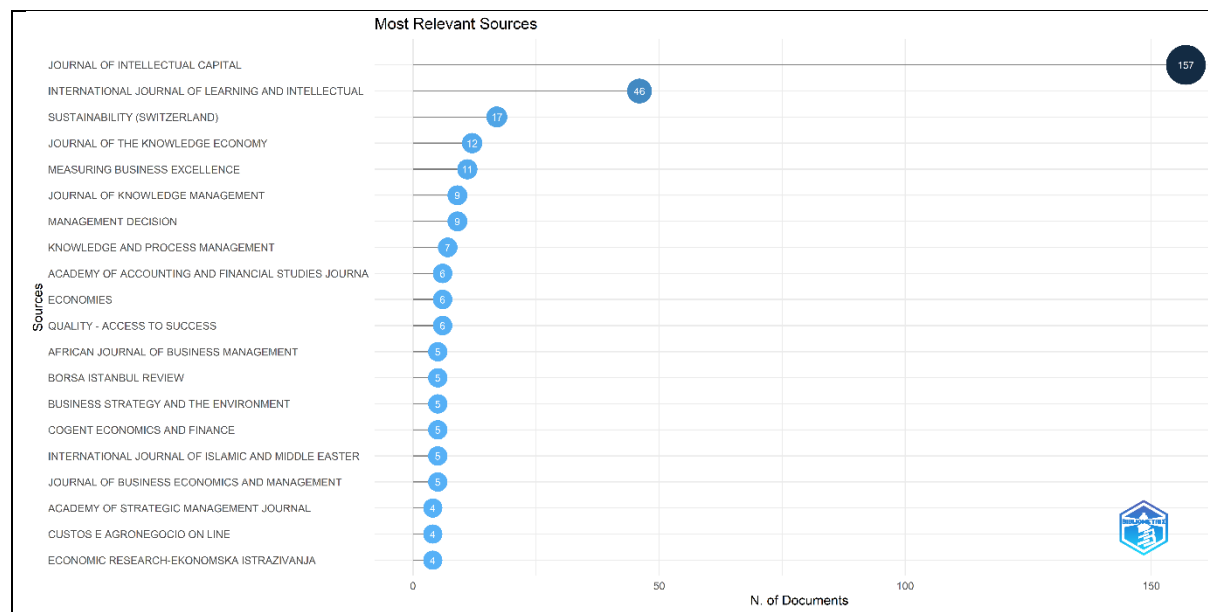
Most relevant source:

Figure 2 displays top 20 journals in which most of the articles have been published. "Journal of Intellectual Capital" is the foremost journal in which highest number of articles have been published



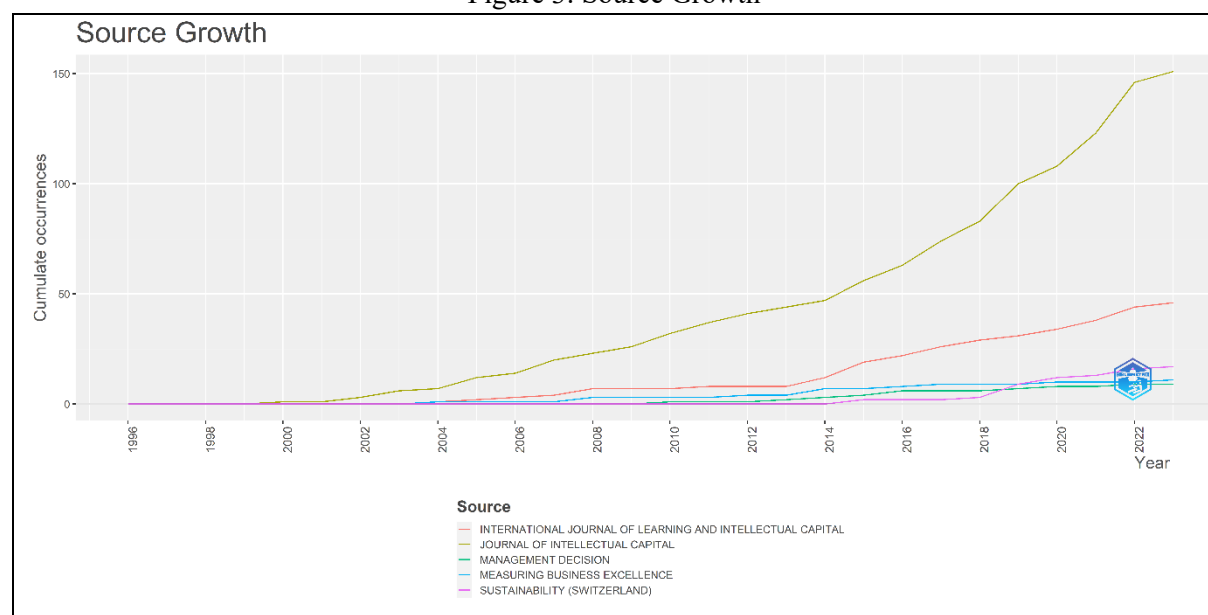
with highest H-index of 47. “International Journal of Learning and Intellectual Capital” with 46 published articles and second highest H-index of 14 follows in the list. Compared with all, the 20 journals in the figure 2 cover 328 articles comprising of almost 45.12% of the total. A total of 284 journals have contributed the 727 published papers that have been used in this study. Amongst these, 170 journals have single paper publications while the other journals have multiple publications to their credit.

Figure 2: Most Relevant Source



Growth of journals can also be seen from Figure 3 which exhibits journals growing, especially “Journal of Intellectual Capital”.

Figure 3: Source Growth



Main Contributing Author:



Figure 4 elucidates most eminent researchers in the research area of Intellectual Capital and Financial Performance. Bontis N is the most influential researcher in this field with the highest number of 22 articles published and a highest impact factor of 16 along with 1573 as the highest total citation count. He is followed by Lu W with 10 published articles. Some other researchers like Xu J, Kweh Q, Ting I, Iazzolono G, Dzenopoljac V, Nawaz T, Asiaei K, Dalwai T, are amongst the top 15 authors. A total of 1571 researchers have published their researches.

Figure 4: Most Contributing Author

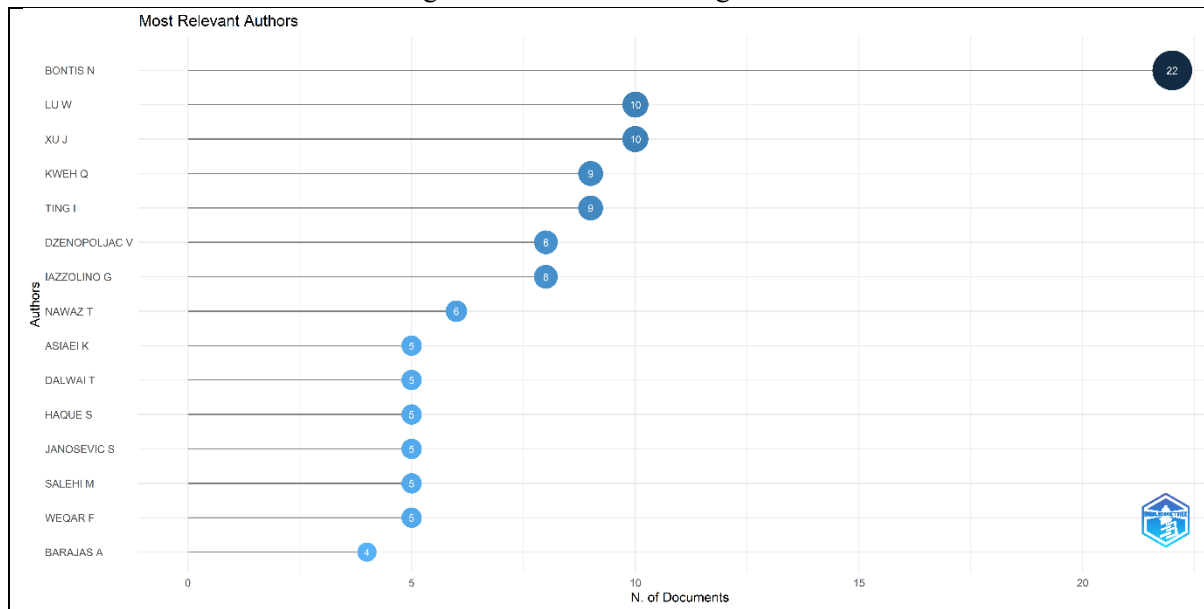


Table 4 mentions the H-index and total citations for all the top authors. (Bontis, 2002) in his paper studying the 25 financial services companies has been cited a maximum number of 436 times. (Bontis, 2010) in his research on Jordan pharmaceutical sector has been cited 242 times while other researchers' papers follow in the order after him. (Lu, 2014) in his study in Chinese life insurance industry, has been cited 88 times, the maximum for this author.

Table 4: Top 15 contributing authors

Element	Articles	H-Index	TC
Bontis N	22	16	1573
Lu W	10	5	231
Xu J	10	7	334
Kweh Q	9	4	181
Ting I	9	4	257
Iazzolino G	8	3	157
Dzenopoljac V	8	6	336
Nawaz T	6	5	145
Asiaei K	5	5	249
Dalwai T	5	3	58
Haque S	5	4	55
Janosevic S	5	5	236
Salehi M	5	4	58

Wegar F	5	4	55
Barajas A	5	3	45

(TC = total citations)

Top papers as per citation count:

There have been published multiple top cited papers by various authors in this field. Edvinsson (1997) studied about IC at Skandia and his published work has been cited 710 times till date. Chen *et al.* (2005) in their work related to Taiwan listed firms has been cited a total of 652 times till date. Other good quality works have also been cited multiple times thereby contributing in further researches as shown in Table 5.

Table 5: Top papers as per citations count

Researcher	Title	Year	Source	Total Citations	TC per year
Edvinsson	"Developing intellectual capital at Skandia"	1997	"Long range planning"	781	28.925
Chen <i>et al.</i>	"An empirical investigation of the relationship between intellectual capital and firms market value and financial performance"	2005	"Journal of intellectual capital"	732	38.52
Baum and Silverman	"Picking winners or building them alliance intellectual and human capital as selection criteria in venture financing and performance of biotechnology startups"	2004	"Journal of business venturing"	677	33.85
Youndt <i>et al.</i>	"Intellectual Capital profiles an examination of investments and returns"	2004	"Journal of management studies"	631	31.55
Roos and Roos	"Measuring your company's intellectual performance"	1997	"Long range planning"	553	20.48
Bontis and Fitzenz	"Intellectual Capital ROI a causal map of human capital antecedents and consequents"	2002	"Journal of intellectual capital"	461	20.95
Guthrie <i>et al.</i>	"Reflections and projections a decade of intellectual capital accounting research"	2012	"The british accounting review"	406	33.83
Reed <i>et al.</i>	"Proposing and testing an intellectual capital-based view of the firm"	2006	"Journal of management studies"	348	19.33
Tan <i>et al.</i>	"Intellectual Capital and financial returns of companies"	2007	"Journal of intellectual capital"	323	19
Riahi-Belkaoui	"Intellectual Capital and firm performance of US multinational firms' study of"	2003	"Journal of intellectual capital"	327	15.57



	the resource based and stakeholder views”				
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Dominant contributing countries:

Figure 5 depicts top 15 researching countries in this field. Amongst all the 67 countries contributing to this field of research work done, China leads the list, where 65 articles have been produced amongst which 52 are single country publications and 13 are multiple country publications. It is then followed by Italy (58), Indonesia (45), India (44), U.S.A (43), U.K. (33) and Canada (29). Italy is the one whose multiple country productions (MCPs) is more than others. Then comes China with 13 MCPs. Canada is the most cited country with 3097 citations and after that USA, UK, Australia and China, Italy and India follow in order according to total citations.

Figure 5: Top 15 Dominant countries

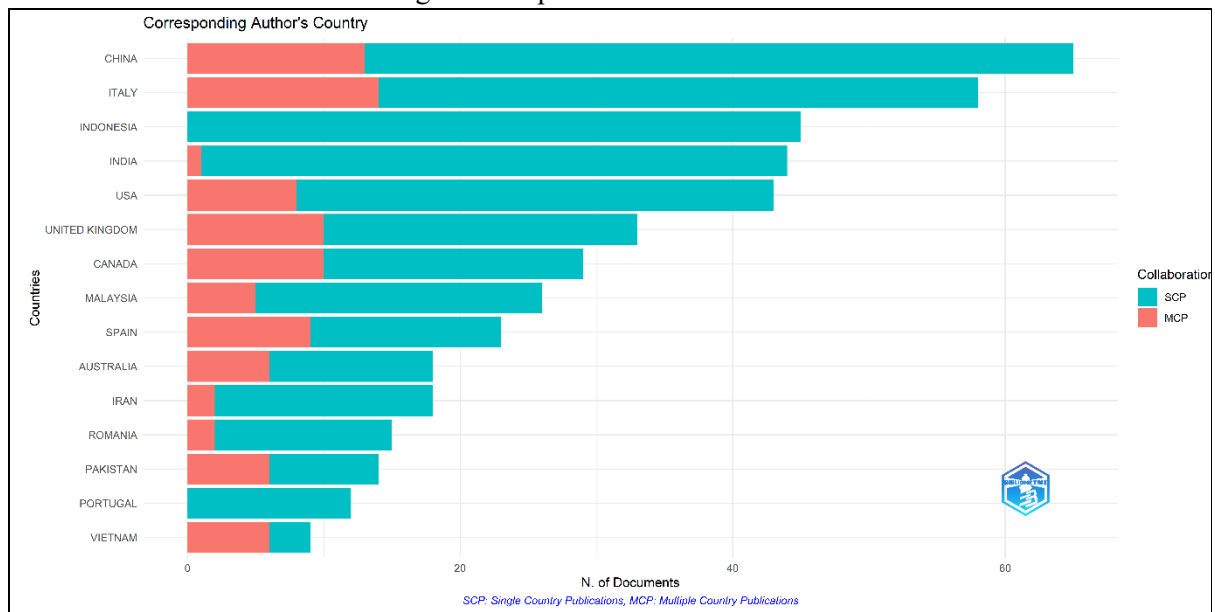


Table 6: Top 15 Dominant countries

Country	Articles	Total Citations	SCP	MCP
China	65	1489	52	13
Italy	58	1401	44	14
Indonesia	45	261	45	0
India	44	1182	43	1
USA	43	2250	35	8
United Kingdom	33	1645	23	10
Canada	29	3097	19	10
Malaysia	26	521	21	5
Spain	23	387	14	9
Australia	18	1534	12	6
Iran	18	432	16	2
Romania	15	202	13	2
Pakistan	14	113	8	6



Portugal	12	438	12	0
Vietnam	9	104	3	6

(SCP = Single country publications, MCP = Multiple country publications)

Word cloud of author's keywords:

Word cloud is a segregation or group of keywords shown in varying dimensions. Larger or more prominent keyword depicts that it has been used more often and is more vital in a particular publication. It reveals that Financial Performance with Intellectual Capital is most frequently used by researchers in their publications. This is succeeded by Human Capital, and subsequently the list comprises of the keywords: intangible assets, VAIC, and performance.

Figure 6: Word Cloud

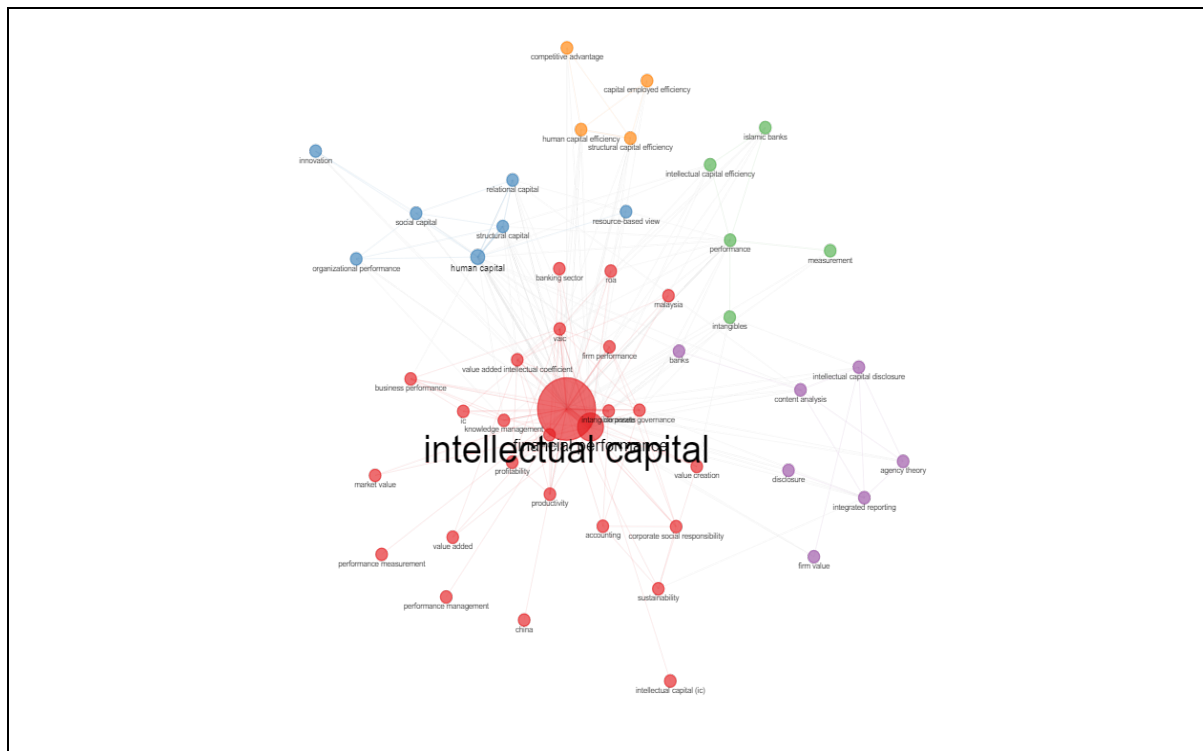


Co-occurrence network:

Co-occurrence is the combined interrelatedness of words based on frequency of words used in the same place or publication. Different combinations of colours show different association of words used together, calculated on the basis of how frequently words co-occur. Likewise, four colours are shown in the figure 7 which depicts different association of words. Red cluster shows Intellectual Capital and Financial Performance keywords being used extensively in Indian and Malaysian banking sector studies. Purple cluster shows Intellectual Capital disclosure and reporting being interconnected in research studies done on global scale. Blue cluster depicts Intellectual Capital components and organisational performance while green and yellow cluster shows Intellectual Capital efficiency, performance and measurement.

Figure 7: Co-occurrence network





Collaboration Network:

Collaboration analysis studies the alliance amongst scholars in any specific component. It is a conventional method of measuring academic connection amongst investigators. Therefore, it is crucial to understand how researchers associate amongst themselves. With the increasing intricacy in studies/researches, partnerships have today become essential. The same enhances the quality of contemporary work being done by the virtue of comprehensive inter-communications happening amongst researchers from varied fields thereby allowing plentiful and mindful insights. Collaboration network when set of researchers collaborate to work in the same field to publish their work. Figure 8 elucidates the network of researchers' joined hands to act together on the publications. Here different colours show different associations of a researcher. Researchers working in a social structure is the requirement in this knowledge driven society. This type of collaboration will help boost innovation and also enhance productivity.

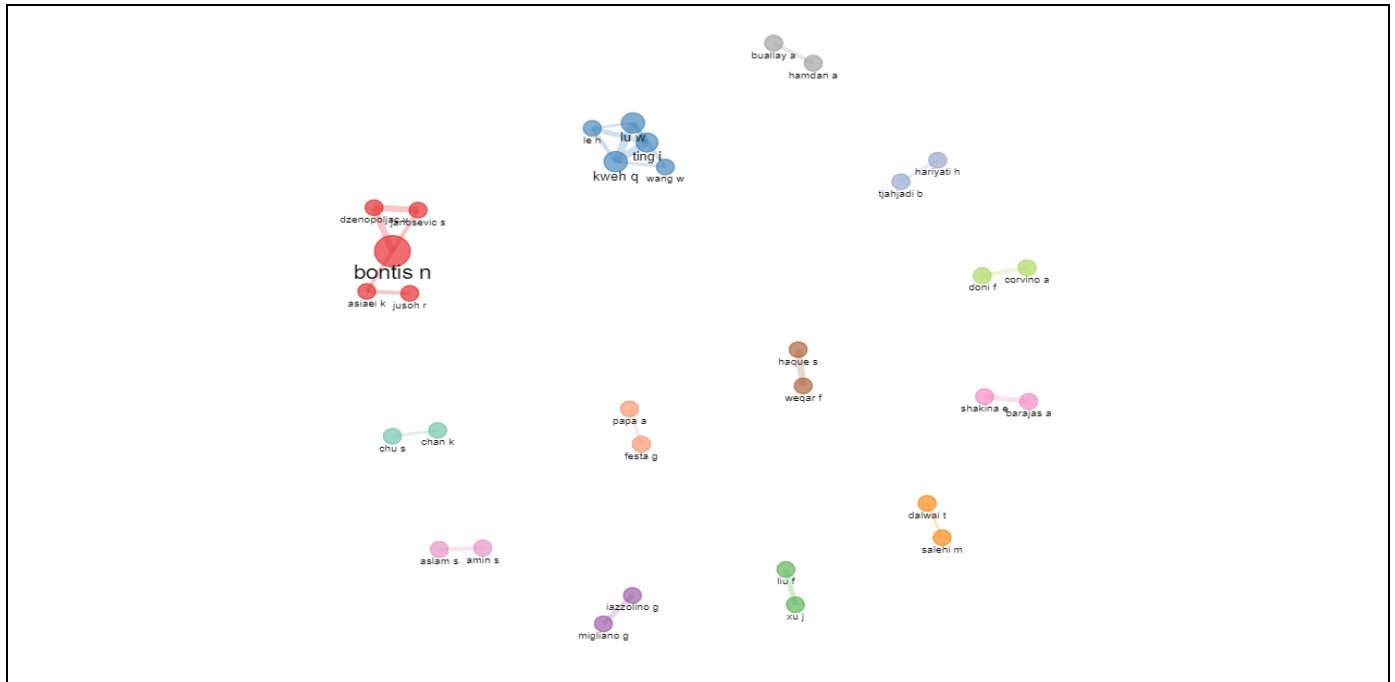
Red colour combination illustrates Bontis N collaborated with Dženopoljac and Janošević. They conducted three studies on Intellectual Capital and Financial Performance in Serbia for three different sectors (ICT, hotel industry, real estate sector). All three studies show similar results depicting minimal role of Intellectual Capital on financial performance. It majorly depends on physical capital of undertakings. He also collaborated with Asiaei K in three of his studies focused on Intellectual Capital and Undertakings' performance association in Iran. In these studies, results were contrary to his other studies with Dženopoljac and Janošević, the latter showing positive association with IC.

Blue cluster illustrates another top researcher, Lu W collaborated with Wang and Kweh. They conducted studies in China, one on life insurance industry and another on non-life insurance industry, on the concept of Intellectual Capital and Performance by analysing operating efficiency of undertakings. The results deduce favourable association. In another study Lu W worked with Ting I. In one study, he examined the role of Intellectual Capital on enterprise performance in listed enterprises of Vietnam from 2010 to 2018. The results depict IC enhance business output, both business



productivity and enterprise efficiency. In another work with Ting I, the researcher examined involvement of Intellectual Capital in productive efficiency of listed electronic undertakings of Taiwan thereby revealing undertakings with better IC having better productive efficiency. In the same collaboration, researcher measured Intellectual Capital and Firm efficiency's interconnection and concluded both as having positive interconnection.

Figure 8: Collaboration Network



Discussion:

Over the years, ample research enquires have been administered on Intellectual Capital. All the studies show noteworthy contribution of IC in accelerating financial performance of undertakings and shows the role of IC in enhancing value and providing competitive benefit to undertakings. This study analysed development over the period and emerging trends in the theme of intellectual capital and financial performance of undertakings studied for the period of 1996-2023. Bibliometric review of the merged data of Scopus and Web of Science databases have been carried out using Biblioshiny tool of RStudio. This discloses the development of: research over the period, most relevant source, main contributing author, dominant contributing country, Co-occurrence network, Collaboration network.

On the basis of analysis of extracted data on intellectual capital from 1996 to 2023, four major stages can be demarcated. In the first stage from 1996 to 2004, researchers majorly focussed on Intellectual Capital as intangible assets and also on knowledge management. Second stage starts from 2005 till 2010 when researchers focus on measurement of Intellectual Capital with its components and its reporting part. Third stage from 2011 to 2016 includes Intellectual Capital and its role in undertakings' performance and their value, strategic management. Lastly the fourth stage from 2016 onwards focusses on relation of Intellectual Capital with innovation, competitiveness, corporate governance and integrated reporting. Years of research has been conducted on Intellectual Capital but still this area is evolving and needs further exploration.

Moreover, studies connecting IC and FP have been done from multifold perspectives within different study geographies. Some results show positive, while others depict negative or ambiguous correlation among the two and its various components.



Conclusion:

With the help of analytical techniques, this study can help researches fine tune their own work in this subject area. Findings from total citation count enable to acknowledge important works and research in an impartial and objective manner. There needs to be renewed vigour amongst researchers from various nationalities/institutions for improved partnerships to better comprehend the determinants of Intellectual Capital across the world. Synergised and collaborative researches shall enhance scientific acumen and interest in this field. This shall also enable us to realise various recurring and important keywords in this study area vis-à-vis developing economies.

The findings from this study provide a concise description of researches on Intellectual Capital, furnishing a prompt cue to commence fresh research by researchers.

Limitations and further research direction:

The limitation of this study is that it has only used Scopus and Web of Science database for the analysis. Also, this study only uses one bibliometric analysis tool: Biblioshiny of RStudio. Furthermore, other tools like Vosviewer, Cite Space, Bib Excel, Pajek, Netdraw can be used in the study. Further researcher can focus on other variables of study such as competitive advantage, innovation. Results show that most of the researches are related to the stock market indices, manufacturing sector and banking sector. Furthermore, research could be conducted on organizations which have more innovation, creation like automation companies, fintech, renewable energy, defence, food processing, AI based consumer services.

This work has important meanings for both academicians and professionals. This study has significant implications either for scholars or practitioners. It enables one to delineate primary study fields, its course and its coherence/uniformity. New researchers in this field can use it to ascertain study gaps and align their work accordingly.

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