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University Business Incubators: A Systematic Literature Review from 2000 to 2019

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Abstract

Business incubation initiatives have gained increased attention of researchers, practitioners, and policymakers due to its unique ability to provide a conducive environment that develops and accelerates entrepreneurship. University-based incubation centers have become an essential part of the entrepreneurship support services at campuses to offer critical support and provide various services to newly established start-ups. Recognizing the importance of university incubation centers, researchers are studying various aspects related to university-based business incubators to promote entrepreneurship among university students. In this study, a systematic literature review on university business incubators is conducted on 61 research articles selected after a rigorous process from three databases (ISI-Web of Knowledge, Taylor & Francis, Emerald). Studies were analyzed to answer four main questions related to university business incubators' methodological considerations, proximal and distant outcomes, theoretical lenses, and major research streams. Results revealed that the majority of the research is being done in European countries and the majority of research articles (50%) were published in 2017 to 2019 most having qualitative designs that indicate the importance of campus-based incubation initiatives to promote entrepreneurship. Proximal and distant outcomes revealed various factors at individual, team, firm, institutional, and policy levels. Institutional, network, and resource based-view (RBV) is the main theoretical underpinnings focused on institutional and firm-level studies. This study contributed by analyzing, summarizing, and evaluating UBI's literature concerning methodological considerations, proximal and distant outcomes, and trend of major research streams.

Key Words; University, Business, Incubation, Entrepreneurship, Start-ups

Entrepreneurship plays a substantial role in the economic, social and human capital development of any country (Brandstätter, 2011; Bruton, Ahlstrom, & Obloj, 2008) by establishing and developing new start-ups, innovating existing ventures, and exploiting entrepreneurial opportunities which result in the creation of widespread employment opportunities across the various sectors of the economy. Apart from its practical importance, in the intellectual community, several research studies have been conducted on new venture creation and bringing innovation in existing firms i-e products, processes, methods, and advancement in technology. Entrepreneurship carried on for the pursuit of exploiting business opportunities, spurs expansion in business volume, technological advancement, and creation of wealth for both start-ups and existing firms (Lumpkin & Dess, 1996). Rodríguez-Gutiérrez, Moreno, and Tejada (2015) argued that research investigations in the Small and Medium-Sized Enterprises (SMEs) have flourished during the last few decades due to the major contribution of this sector to the overall development of the economy and between 90 to 99 % of business enterprises worldwide are SMEs, upon which majority are small, single owner enterprises. SMEs are considered to be a major contributor to economic prosperity (Henderson & Weiler, 2009; Rigtering, Kraus, Eggers, & Jensen, 2014), and especially growth-oriented firms

are an important driver of job, and revenue creation in emerging market economies (Parker, 2004; Valliere, 2006).

Knowing the increased importance of creativity, innovation, and entrepreneurship, researchers, industry professionals, and especially governments worldwide have adopted initiatives to foster industry-academic linkage and collaboration for fulfilling the needs of start-ups as enablers for creating employment opportunities.

Entrepreneurship education is not only important for business graduates but it is also equally important for for the students of other disciplines by motivating them and providing them necessary entrepreneurial skills (Shah, Anwar, & Khan, 2018). Nevertheless, from the last 3 decades a shift has been observed in entrepreneurship development literature which highlights the role of business incubation as a policy instrument to create new firms, assist them in their early stage take off, and to provide them conducive environment and necessary facilities for their sustainable development (Lewis, Harper-Anderson, & Molnar, 2011; Theodorakopoulos, K. Kakabadse, & McGowan, 2014). Business incubators are established to support and spin-off new firms and to provide them with the necessary business support which is needed by the start-ups for their survival and growth. Moreover, it is pertinent to mention here that from the last two-decade business incubators all over the world has changed their focus along with the provision of conventional services like providing office space and administrative services to more efficient and effective business support services with innovation which are less tangible but provide higher value-added services the start-ups (Bruneel, Ratinho, Clarysse, & Groen, 2012; Lukeš, Longo, & Zouhar, 2018).

Business incubation is a very concerted and systematic effort to nurture new firms in the early stage of their activity in a controlled environment. It is a dynamic process, which offers a blend of services and infrastructure, development-support processes, and professional expertise needed to safeguard against failure and steer incubatee's firms into a growth and sustainability path (Khorsheed, Alhargan, & Qasim, 2012). Thus, business incubators are the entities that support entrepreneurs to establish new firms, bring innovation and creativity into existing ventures to add value to their services (Wann, Lu, Lozada, & Cangahuala, 2017).

Moreover, business incubation networks, types, and services vary between countries and regions depending on the indigenous conditions, culture, and the range of opportunities available for entrepreneurs to exploit. To support entrepreneurs for start-ups initial needs like office space, seed money, provision of various services, and consultancy for getting trademarks, registration, and patents, different types of business incubators are working being led by governments, universities, NGOs, and private sector consultants.

The university-based business incubators (UBI's) being the most important have attained the attention of researchers from the last two decades owing to their critical role in the promotion of entrepreneurship. Business incubation centers established at universities are considered to provide services for research, innovation, and commercialization to instigate business ideas and to facilitate the new start-ups in getting intellectual property registrations.

UBIs (University-based incubators) provides start-up firms with physical facilities like office space, necessary furniture, work stations, and a variety of other resources and support services which help the start-ups to survive and sustain in the competitive business environment. Across the world, many universities are involved in entrepreneurial initiatives such as establishing science parks, innovation centers, and business incubation centers, along with teaching programs and courses on entrepreneurship education (Guerrero & Urbano, 2012; Guerrero, Urbano, Cunningham, & Organ, 2012).

University-based business incubation centers have become an essential part of entrepreneurship support services at campuses to offer critical support and provide a conducive environment for newly-formed start-ups.

Recognizing the importance of university incubation centers, researchers are studying various aspects related to university-based business incubators to promote entrepreneurship among university students. Keeping in view the importance and significance of university-based business incubation centers for the promotion of entrepreneurial activities and to instigate entrepreneurial spirit among university students, this study conducted a systematic literature review of university business incubators with an intention to find answers to the following questions;

1. What is the methodological orientation of UBIs research studies?
2. What are the proximate and distant outcomes of UBIs research studies?
3. What are the main theoretical lenses being used in UBIs literature?
4. What are the main research streams about UBIs and at which level they are being proceeded?

This systematic review is the maiden initiative to explore and study the literature on university business incubators with a lens to understand, analyze, summarize and evaluate UBI's literature concerning methodological considerations, theoretical underpinnings, proximate and distant outcomes, and trend of major research streams.

Methodology

This systematic literature review was conducted meticulously with a clear and deliberate step by step process. Research studies conducted on university-based incubation programs to promote campus entrepreneurship were included objectively.

A comprehensive search on three main online databases named ISI-Web of Knowledge, Taylor & Francis, and Emerald was performed to identify and select relevant research articles. A period of 2000 to 2019 was selected to included maximum research studies and the last search was performed in September 2019.

There were about 2150 articles that appeared in the first search and finally, 61 most relevant research articles were included in this SLR based on eligibility criteria. Table 1 represents the detailed search parameters used to search for articles.

Table1. *Literature search criteria*

Sr.	Search Parameters	Details
1	Literature Search Discipline	Economics, Finance, Business, and Industry
2	Literature Language	English
3	Literature Publication Period	2000 – 2019
4	Literature Search Databases	ISI-Web of Knowledge Taylor & Francis Emerald
5	Literature Search Key Words	University business incubators: campus-based incubators; university incubation centers

Source: Authors

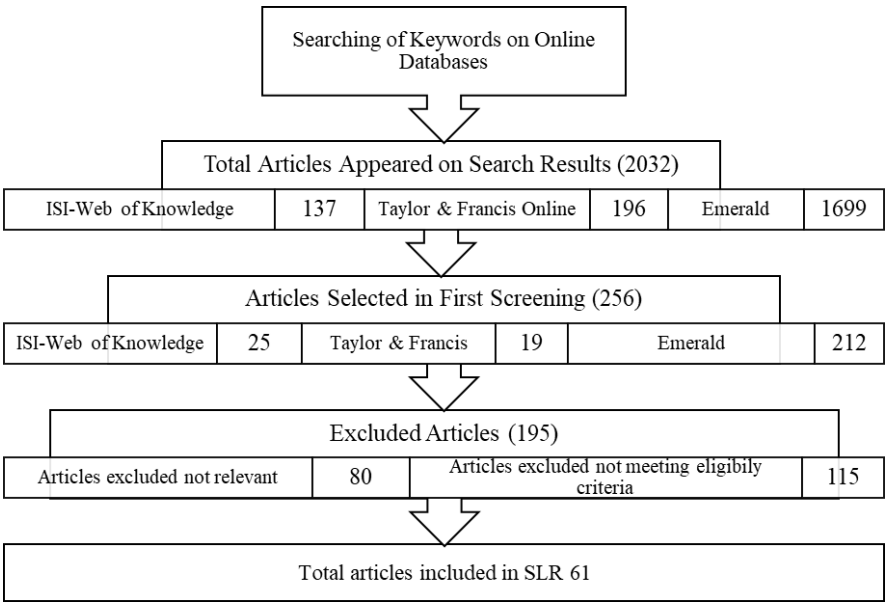


Figure 1. Articles Searching, Screening and Selection Flowchart
Source: Authors

After conducting a thorough search on three main databases (ISI-Web of Knowledge, Taylor & Francis, and Emerald), a rigorous eligibility criterion was devised to select articles to be included in this SLR. Table;2 represents the detailed eligibly criteria and particulars of studies.

Table 2. *Eligibility criteria for studies selection*

Sr.	Eligibility Parameters	Details
1	Field of Research Studies	Entrepreneurship promotion through university-based Incubation programs
2	Topics/Issue of research Studies	Articles should address "university business incubation" as the issue of their main investigation. Articles titles, abstract and objectives were studied for eligibility.
3	Design of Research Studies	Conceptual, theoretical and empirical research studies were included.
4	Literature Publication Status	Articles published in research journals were included in final selection.

Source: Authors

All the selected articles (61) were thoroughly read by the researchers to draw relevant excerpts and a detailed excel spreadsheet having these legends sr. the number allotted to each article, article title, journal, year of publication, country where the study was conducted, study objective, study type, unit of analysis, data collection tool, keywords, variables (Independent, moderating/meditating, dependent) to identify proximate and distant outcomes, study contribution, main findings, theoretical lenses, major research streams, and managerial implications were maintained.

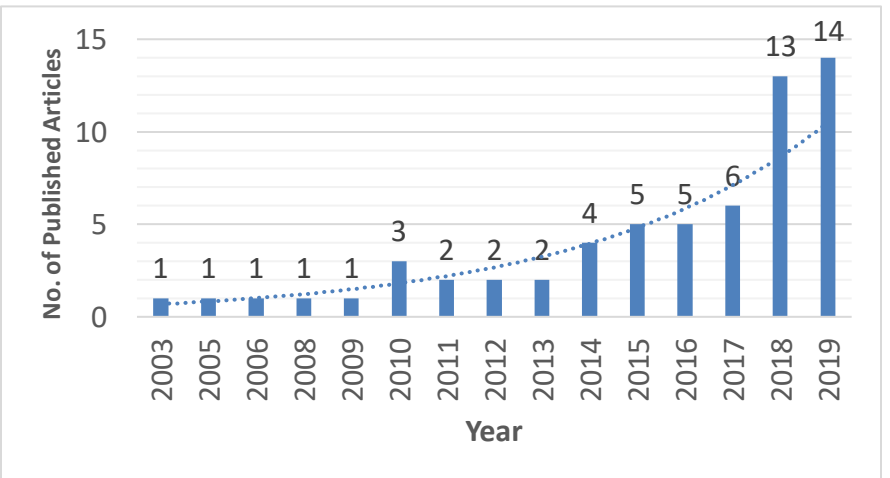
Quantitative data analysis was performed on excel and subsequently, NVIVO12 software was used for words count on most frequent 20 words in all articles, and most frequent 20 words in keywords and major codes and themes were identified in qualitative sections to answer the main study questions.

While adopting a methodology for this SLR, guidance is taken from a very comprehensive SLR written by (De Vries, Bekkers, & Tummers, 2016) conducted on innovation in the public sector. The next section represents the complete results.

Results

This section presents the results of this systematic review conducted in university business incubators.

Figure 1. Year-wise No. of Published articles from 2000 to 2019



Source: Authors

Year-wise distribution of articles revealed an upward increasing trend of research studies nevertheless more than 70% of research studies included in this SLR were published between 2015 to 2019 which indicates the significance and more interest of researchers in university-based incubation activities to promote entrepreneurship among students. Interestingly the first article was published in 2003 although a literature search was done between 2000 to 2019 which indicates that from 2003 to 2009 research in university business incubation was less focused and very stagnant as only 5 articles were found between 2000 to 2009 and then 2010 to 2014 thirteen (13) articles were found in the literature.

Table3. *Country and Region Wise Description of Articles*

Sr.	Country	Studies	Percentage%	Region	Studies	Percentage %
1	Ethiopia	1	1.45			
2	Ghana	1	1.45	Africa	3	5
3	Nigeria	1	1.45			
4	China	4	5.80			
5	India	1	1.45			
6	Iran	1	1.45			
7	Malaysia	2	2.90	Asia	14	20
8	Singapore	1	1.45			
9	Taiwan	2	2.90			
10	Thailand	2	2.90			
11	UAE	1	1.45			
12	Italy	5	7.25			
13	Spain	6	8.70			
14	UK	7	10.14			
15	Ireland	4	5.80			
16	Sweden	4	5.80			
17	Portugal	3	4.35	Europe	38	55
18	Belgium	1	1.45			
19	Czech Republic	1	1.45			
20	France	1	1.45			
21	Lithuania	1	1.45			
22	Netherlands	3	4.35			
23	Norway	2	2.90			
24	USA	5	7.25	North America	7	10
25	Canada	2	2.90			
26	Brazil	7	10.14	South America	7	10
	Total Studies	69	100	Total Studies	69	100

Note; 6 studies were conducted in two countries and 1 study was conducted in three countries.

Source: Authors

Brazil and UK are the 2 most researched countries having 7 research studies conducted in each country followed by Spain (6), Italy (5), USA (5), China (4), Ireland (4), and Sweden (4). More than 55% of studies were conducted in Europe, followed by Asia (20%), North America (10%), South America (10%), and Africa (5%). Europe is the hub for research studies on university business incubation initiatives as revealed through the data.

Table4. *Journal Wise Description of Articles*

Sr.	Journal Name	Published Articles	Percentage (%)
1	Education + Training	4	6.56%
2	Management Decision	4	6.56%
3	European Journal of Innovation Management	3	4.92%
4	The Journal of Technology Transfer	3	4.92%
5	Academia Revista Latinoamericana de Administración	2	3.28%
6	Innovation & Management Review	2	3.28%
7	International Journal of Entrepreneurial Behaviour & Research	2	3.28%
8	International Journal of Gender and Entrepreneurship	2	3.28%
9	Journal of Entrepreneurship in Emerging Economies	2	3.28%
10	Journal of Intellectual Capital	2	3.28%
11	Journal of Science and Technology Policy Management	2	3.28%
12	Journal of Small Business and Enterprise Development	2	3.28%
13	Journal of Technology Management in China	2	3.28%
14	Regional Studies, Regional Science	2	3.28%
15	Technology Analysis & Strategic Management	2	3.28%
16	World Journal of Entrepreneurship, Management and Sustainable Development	2	3.28%
17	World Journal of Science, Technology and Sustainable Development	2	3.28%
18	Baltic Journal of Management	1	1.64%
19	Benchmarking: An International Journal	1	1.64%
20	Business Process Management Journal	1	1.64%
21	Cuadernos de Gestión	1	1.64%
22	Economics: The Open Access, Open Assessment E-Journal	1	1.64%
23	Entrepreneurial Business and Economics Review	1	1.64%
25	Higher Education, Skills and Work-Based Learning	1	1.64%
26	IMP Journal	1	1.64%
27	Industrial and Corporate Change	1	1.64%
28	International Journal of Innovation	1	1.64%
29	Journal of Business & Industrial Marketing	1	1.64%
30	Journal of Business Research	1	1.64%
31	Journal of Engineering and Technology Management	1	1.64%
32	Journal of Enterprising Communities: People and Places in the Global Economy	1	1.64%

Sr.	Journal Name	Published Articles	Percentage (%)
33	Management Research Review	1	1.64%
34	Millennial Asia	1	1.64%
35	Organization Management Journal	1	1.64%
36	Science, Technology & Society	1	1.64%
37	Technological Forecasting & Social Change	1	1.64%
38	Technovation	1	1.64%
39	Venture Capital: An International Journal of Entrepreneurial Finance	1	1.64%
	Total	61	100.00

Source: Authors

All the articles included in this SLR were published in 39 journals. About 40 articles were published in the first 17 journals as mentioned in table 4 in which the first four top journals are Education + Training, Management Decision, European Journal of Innovation Management, and The Journal of Technology Transfer.

Table5. *Nature/Strategy of Articles*

Type of Research Study	No. of Articles	Percentage %
Conceptual/Theoretical Paper	2	3.28
Review Paper	1	1.64
Quantitative	22	36.07
Qualitative	31	50.82
Mixed Methods	5	8.20
Total	61	100

Source: Authors

The majority of the articles were qualitative (51%), followed by quantitative (36%), mixed methods (8%), 2 articles were conceptual and 1 was review paper. Most of the research is being conducted by using qualitative and quantitative research designs, there is less focus on mixed methods which indicates the methodological GAP.

Table6. *Analysis of Quantitative Studies*

Article Type	N	Design	N	%	Unit of Analysis	N	%	Data Collection Tool	**N**	**%**
Quantitative	22	Survey	16	72.7	Individual	2	9.0	Questionnaire	16	72.7
					Spin-off	5	22.7			
		Secondary Data	5	22.7	Start Up	1	4.5	Panel Data	1	4.5
					TTOs	1	4.5	Secondary Data	4	18.1
					Institute	1	4.5			
		Longitudinal Design	1	4.5	Incubator	10	45.4	Benchmarking	1	4.5
					University	2	9.09			

Source: Authors

Analysis of quantitative studies reveals that 73% adopted survey design and 23% adopted secondary data. Business Incubator was the main unit of analysis as almost 46% reported it, followed by spin-off and university. The majority of the studies (73%) used a questionnaire as a tool for data collection which indicates the popularity of the questionnaire in quantitative studies on university business incubation.

Table7. *Analysis of Qualitative Studies*

Article Type	N	Design	N	%	Unit of Analysis	N	%	Data Collection Tool	N	%
Qualitative	31	Case Study	25	80.6	Entrepreneur	2	6.4	Triangulation	1	3.2
					Incubator	12	38.7	In-Depth Interviews	20	64.5
					Individual	3	9.6	Semi-Structured Interviews	4	12.9
					Project	1	3.2	Content Analysis	1	3.2
		Qualitative	5	16.1	Spin-Off	4	12.9	Semi-Structured Interviews and Content Analysis	3	9.6
								Participant Observation	1	3.2
		Comparative	1	3.2	University	9	29.0	Semi-Structured interviews, Non-Participant Observation and Content Analysis	1	3.2

The majority (81%) of the qualitative studies adopted a case study design. The leading unit of analysis in qualitative studies was incubator (38%), followed by university (29%) and a spin-off (13%). These results about the unit of analysis in qualitative studies are consistent with quantitative studies. In-depth interviews (65%) were used as data collection by the majority, followed by semi-structured and content analysis. A case study is the dominant research design adopted in qualitative studies of university business incubation literature as indicated by the data.

Table8. *Analysis of Mixed Methods Studies*

Article Type	N	Design	N	%	Unit of Analysis	N	%	Data Collection Tool	N	%
Mixed Methods	5	Qual-Quant	1	20	Spin-off	1	20	Interviews and Questionnaire	1	20
					Start-Up	1	20	Secondary Data and In-Depth Interviews	1	20
		Quant-Qual	4	80	University	3	60	survey, Content Analysis, FGDs, and Interviews	1	20
								Questionnaire and Semi-Structured Interviews	2	40

Source: Authors

Analysis of mixed methods studies indicates that 80% of studies adopted quant-qual design. The majority of the studies unit of analysis was university and mostly 40% of studies used questionnaires and semi-structured interviews.

Table 9. *Top 20 words count on keywords of articles*

No.	Word	Frequency	Weighted (%)	Similar Words
1	University	44	8.35	Universities, University, Institutional
2	Incubator	30	5.83	Incubation, Incubator, Incubators
3	Entrepreneurial	24	4.66	Entrepreneurial, Entrepreneurialism
4	Business	21	4.08	Business
5	Innovation	20	3.69	Creation, Founding, Innovation
6	Entrepreneurship	17	3.30	Entrepreneurship
7	Technology	17	3.30	Technological, Technology
8	Education	18	2.91	Development, Education, Pedagogical
9	Learning	12	2.33	Knowledge, Learning, Studies, Study
10	Transfer	12	2.33	Transfer
11	Spin-offs	10	1.94	Spin-Off, Spin-Offs
12	Academic	9	1.75	Academic, Institution, Institutionalism
13	Entrepreneurs	9	1.75	Enterprise, Enterprises, Entrepreneur, Entrepreneurs
14	Commercialization	8	1.55	Commercialization, Market, Markets
15	Networks	8	1.55	Network, Networking, Networks
16	China	7	1.36	China, Taiwan
17	Start-ups	7	1.36	Start-Ups
18	Action	6	1.17	Action, Active, Activities, Process
19	Development	8	0.97	Developing, Development, Exploitation, Growth
20	Formation	6	0.97	Formation, Organizations

Query Method; NVIVO12 Words Frequency Query run on top 20 words in keywords of all 61 studies, minimum word length was 4, grouping with synonyms.

Source: Authors

To identify the count of the top 20 words in keywords of all 61 articles, a word frequency query was performed in NVIVO12. There were about 516 total keywords out of which university, incubator, entrepreneurial, business, innovation are the top 5 keywords as per word count.

Study Variables, Proximal and Distant Outcomes

Study variables, proximal and distant outcomes are identified from selected articles at each level of studies are presented in the table;11. Level of studies are divided into individual, team, Firm (Spin-offs, Start-ups, New Venture), Institutional (University, Incubator, TTOs, Accelerator), and firm. Study factors refer to independent variables, the proximate outcome is the intended immediate result whereas a distant outcome is the offshoot of

proximal outcome and intended long-term results. The framework used in table 11 is adopted from (Björkman & Welch, 2015) which presents proximal and distant outcomes of research on international HRM.

Table10. *Proximal and Distant Outcomes*

Level of Study	Study variables	Proximal Outcome	Distant Outcome	References
Individual	• Habitual entrepreneur • Founder's Education Level • Founder's Experience • Professionalization • Innovation Experience • Training • Leadership • Entrepreneurial Support	• Openness in Knowledge Relationships • Entrepreneurial Learning	• Creation of university spin-offs • Firm Growth	(Breznitz, Clayton, Defazio, & Isett, 2018; Breznitz & Zhang, 2019; Cáceres Carrasco & Aceytuno, 2015; Fernandez-Alles, Diánez-González, Rodríguez-González, & Villanueva-Flores, 2018; Salomaa, 2019; Taheri, Ye, & van Geenhuizen, 2018)
Team	• Founding Team Size • Diversity • Social Network Structure • Entrepreneurial Support	• Early-Stage Fundraising • Creation of university spin-offs • Entrepreneurial Learning	• Firm Growth	(Breznitz et al., 2018; Cáceres Carrasco & Aceytuno, 2015; Huynh, 2016; Taheri et al., 2018)
Firm (Spin-offs, Start-ups, New Venture)	• Creation of university spin-offs • Structure • System • Strategy • Culture • Firm Size • Human capital • Financial capital • Geographical location	• Performance • Network Size • Product growth • Entrepreneurial Learning	• Firm Growth • Employment growth	(Breznitz & Zhang, 2019; Cáceres Carrasco & Aceytuno, 2015; Huynh, Patton, Arias-Aranda, & Molina-Fernández, 2017; M'Chirgui, Lamine, Mian, & Fayolle, 2018; Salomaa, 2019; Soetanto & Jack, 2016; Taheri et al., 2018; Zhang & Sonobe, 2011)

Level of Study	Study variables	Proximal Outcome	Distant Outcome	References
Institutional (University, Incubator, TTOs, Accelerator)	• Entrepreneurship Education • University Entrepreneurial Teaching Pedagogy • Organisational capacity (Technology, Human, Organization, Strategy, and Commercial Resource). • Infrastructure • Incubation strategies • Accelerator program • Complementary support structures • Knowledge exchange and collaboration • Internationalization	• Creation of university spin-offs • Networking support • Entrepreneurial Learning • Number of Firms • Relational capital	• Performance of Firms • Employment growth	(Breznitz & Zhang, 2019; Cáceres Carrasco & Aceytuno, 2015; Huynh, 2016; Huynh et al., 2017; M'Chirgui et al., 2018; Mudde, van Dijk, Gerba, & Chekole, 2019; Soetanto & Jack, 2016; Zhang & Sonobe, 2011)
Policy	• Resources and policies devoted to the promotion of university entrepreneurship. • Country Opportunity Driven Entrepreneurship • Knowledge exchange and collaboration • Preparing and supporting entrepreneurs • Governance Context • Supportive Environment • Internationalisation	• Entrepreneurial support organizations (ESO)	• Entrepreneurship Education • Entrepreneurial Learning • Socio-Economic Development	(Breznitz et al., 2018; Fernandez-Alles et al., 2018; Huynh, 2016; M'Chirgui et al., 2018; Mudde et al., 2019)

Source: Authors

Theoretical Lens/Models/ Frameworks used in University Incubation Literature

1. Agency Theory

Agency theory states that the interests of all stakeholders must be aligned. Business incubators being the principal must fulfill the institutional needs, demands, and motivations of agents (individual employees of incubators, entrepreneurs, spin-offs, and start-ups) towards the attainment of collective goals. The relationship between the principal (University or Incubation center) and agents (directors, employees, entrepreneurs) should

result in exchange contracts and agents should work in the best interest of the principal (Paoloni, Cesaroni, & Demartini, 2019).

2. Entrepreneurial Architecture Framework

The entrepreneurial architecture framework states that universities should contribute towards regional development by pursuing third mission activities. EA framework consists of five elements named structure, system, leadership, strategy, and culture. These five elements of EAF when integrated into institutional structures and core activities (Teaching, research, knowledge creation) of the universities would reinforce the third mission (Salomaa, 2019).

3. Human Capital Theory

The human capital theory states that the knowledge and experience of entrepreneurs, founders, incubator managers, and staff contribute towards the success of start-ups and spin-offs in a university setting. Knowledge, skills, and experience of all persons involved in incubation would act as a resource. All the initiatives taken by the universities to promote entrepreneurial education among students would result in their entrepreneurial learning (Hahn, Minola, Van Gils, & Huybrechts, 2017).

4. Imprinting Theory

Imprinting theory states that learning is associated with time and life stage. Network elements (structure, governance, and content) play an important role in the development of entrepreneurial capabilities among students. So, the capabilities of founding teams developed by networks, influence the performance of university spin-offs (Huynh et al., 2017).

5. Incubation Theory

Incubation theory as stated in the article is associated with the internal dynamics of university incubators. It is based on general principles that govern idiosyncratic human relations between the management of incubators and their clients. These principles can help the incubator managers to attain resources (infrastructure for incubation, formulate organizational design and strategy), and influence the growth and success of spin-offs (Ahmad & Ingle, 2011).

6. Institutional Theory

The institutional theory states that external forces shape the formal structures and policies of the organizations which increases their legitimacy in the overall context. Structure components are maintained by the forces which become necessary and appropriate and are widely accepted in the larger context of organizations. These institutions play a significant role in the growth and development of entrepreneurship by providing legitimate incentive structures (Cinar, 2019; Dvouletý, Longo, Blažková, Lukeš, & Andera, 2018; Gstraunthaler, 2010).

7. Network Theory

Network theory states the importance of networks in terms of structure, governance, and content. Business incubators and entrepreneurs being open to the partners and diverse knowledge networks can gain crucial internal and external resources which enables them to grow and sustain in a competitive environment. Internal networks refer to the collaborations, information sharing among tenets, and joint ventures whereas external networks refer to industry, universities, or collaborations with knowledge transfer institutes (Huynh, 2016; Huynh et al., 2017; Soetanto & Jack, 2016; Taheri et al., 2018).

8. Resource Dependence Theory

Resource dependence theory states that organizations maintain their networks to ensure their access to critical resources which helps them to survive and grow in the competitive environment. Organizations are dependent upon certain resources which would only be possible to access if they work in networks, in isolation access to these resources would be difficult. Incubators play a significant role in the formation of these networks for start-ups (Galvão, Marques, Franco, & Mascarenhas, 2019).

9. Resource-Based View (RBV)

The resource-based view (RBV) states that internal resources accessed by the start-ups including their initial capital, funding, access to office space, provision of training, IT support, and access to social and professional networks give the strength to perform better and gain a competitive advantage as compared to those start-ups which were not incubated (Dvouletý et al., 2018; Huynh, 2016; Huynh et al., 2017; M'Chirgui et al., 2018).

10. Triple Helix Model (THM)

The triple helix model (THM) hypothesizes an interaction among the institutional realms to stimulate the conditions for growth and innovation. Three important institutions (University, Industry, and Government) plays an important role to support and nurture business venture (Lu, Etzkowitz, Pei-Lee, & Chen-Chen, 2008; Wonglimpiyarat, 2014).

11. Value Creation Perspective

The value creation perspective indicates that it should be the embedded and inherent objective of new ventures to create value. One of the key factors of start-up failure is the failure of value creation and not clearly defining how and for whom they want to create value. University business incubators help the start-ups in the entrepreneurial value creation process by ensuring the interaction of start-ups with the external environment (Nair & Blomquist, 2019).

Major Research Streams in University Incubation Literature

Research streams identify from university incubation literature are summarized into four levels. Individual, firm, institutional, and policy levels. Further areas of research at each level are presented in the following tables.

Table11. *Individual Level Research Streams*

Level	Major Research Streams	References
Individual	• Identity discovery of artist-entrepreneurs • Antecedents of Entrepreneurs' cognitive resources • Entrepreneurial mind-set • Relational capital building styles of entrepreneurs • Synergizing between different entrepreneurial roles	(Bass, 2017; Gately & Cunningham, 2014; Lundqvist & Middleton, 2013)

Source: Authors

At the individual level first section of research is focused on the identity of entrepreneurs as individuals could hold multiple identities, who they are, and what do they do in their professional realms (Bass, 2017) so here focus of research is to explore the identity discovery patterns of entrepreneurs and understand how different individual identities shapes the entrepreneurial process.

Further research is focused on the relational capital of entrepreneurs which indicates that entrepreneurs are engaged in four types of relational capital building activities named getting memberships of professional associations, building networks, relations and contacts building, and approaching knowledge experts in their field (Gately & Cunningham, 2014). Moreover, researchers are also understanding the changing role of university scientists towards venture creation and understand how university entrepreneurship promotion initiatives influence individual entrepreneurs while creating new ventures (Lundqvist & Middleton, 2013). So it could be concluded that research at an individual level is focused on an entrepreneur's mindset, identity discovery, understanding antecedents of cognitive resources, relational capital building strategies, and various entrepreneurial roles adopted by the entrepreneurs.

Table12. *Firm-Level Research Streams*

Level	Major Research Streams	References
Firm	• Founding team capabilities and network influence on start-up performance • Managing the complexity of the patenting and commercialization activities • Development and commercialization of technologies • Environments that facilitate the knowledge transfer process • Design characteristics of incubators • TTOs and entrepreneurial performance of universities • TTOs' entrepreneurial identity • Managing incubators resources • Interaction among the incubation parties • Gender equality in campus-incubators • Stages of Spin-off creation • Determinants of Spin-off development • Intra-organizational social networks • Institutional logics (academic or commercial) • Interlocking directorates	(Ahmad & Ingle, 2011; Dahlstrand & Politis, 2013; Fernandez-Alles et al., 2018; Galvão et al., 2019; Gstraunthaler, 2010; Huynh et al., 2017; Lala & Sinha, 2019; M'Chirgui et al., 2018; Mansano & Pereira, 2016; Miranda & Borges, 2019; Ng, Chen, Wong, & Chandran, 2019; Parmentola & Ferretti, 2018; Redondo & Camarero, 2017; Treanor & Henry, 2010)

Source: Authors

At the firm level major research areas could be summarized into six sections, the first section of research is focused on the founding team's entrepreneurial capabilities, it explores how the founding team's entrepreneurial capabilities and networks which are developed at the venture creation stage, impact the performance of spin-offs at growth stage (Huynh et al., 2017). Second, the research section is exploring how women entrepreneurs facing gender-specific barriers when they engage in ventures like basic training, financial assistance, access to networks, and other socio-cultural barriers (Treanor & Henry, 2010). Third, how incubation intermediaries like innovative science and technology parks promote commercialization activities of university spin-offs (Ng et al., 2019) so here research is focused on understanding how spin-offs manage the complexity of commercialization and patents activities. The fourth section is exploring certain features of TTO's (technology transfer offices) like their resources, age, experience, and professional competence influence on academic spin-offs in their early growth and development (Fernandez-Alles et al., 2018). The fifth section is focused on the institutional logic of incubator managers that how academic versus commercial, business incubator manager's profile influences the professional development of university start-ups like training opportunities, business assistance, and access to networks (Redondo & Camarero, 2017). The last section at firm level literature is focused on business incubators role to establish networks for the start-ups either they are formed within the incubator or with the external environment by providing a conducive

environment (Galvão et al., 2019). So it could be concluded that at the firm level the major research streams in university business incubation literature are focused on understanding the influence of founder's capabilities, managing resources, creation, growth, and development of spin-offs, access to networks (institutional logic), and managing complexity regarding patents and technology transfer.

Table 13. *Institutional Level Research Streams*

Level	Major Research Streams	References
Institutional Level	• Openness in knowledge networks • Social networks and development of university spin-offs • External networking and collaboration • New venture creation, early-stage fundraising, and entrepreneurial learning • Formal and informal entrepreneurial ventures • Models of creative enterprise and "pull" learning in venture creation • Patents generation and registration • University technology commercialization • IP and technology/knowledge transfer • University ecosystem and value creation through intangible activities • University entrepreneurial ecosystems • Institutionalization of incubators • Entrepreneurial characteristics of universities • Institutional responses to third-stream activities • Effectiveness of business incubators • Quality assessment ranking of UBIs with multi-criteria decision-making technique • Campus based entrepreneurship • Implications for incubator failure strategies • Relational capital of business incubators • Relationship between individual firms and the incubator environment • University–industry interaction	(Breznitz et al., 2018; Cantù, 2015; Carvalho & Vasconcelos Ribeiro Galina, 2015; Chais, Ganzer, & Olea, 2017; Cinar, 2019; Di Berardino & Corsi, 2018b; Huynh, 2016; Marques, de Oliveira, Andrade, & Zambalde, 2019; Mascarenhas et al., 2019; Mavi, Gheibdoust, Khanfar, & Mavi, 2019; Mudde et al., 2019; Nair & Blomquist, 2019; Paoloni et al., 2019; Rae, 2012; Ricci, Colombelli, & Paolucci, 2019; Salomaa, 2019; Silva, Vasconcellos, Tonholo, & Godinho, 2017; Taheri et al., 2018; Wonglimpiyarat, 2014; Xu, 2010)

Source: Authors

At the institutional level, major research streams could be summarized into four sections. The first section of research is understanding how various types of networks i-e openness in knowledge networks, social networks, external networking, and collaboration supports university spin-offs in their growth and development (Breznitz et al., 2018; Cantù, 2015; Carvalho & Galina, 2015; Taheri et al., 2018). The second section of research is focused on how institutions facilitate new venture creation and entrepreneurial learning, development of formal and informal entrepreneurial ventures, models of creative enterprise learning in venture creation, patents generation and registration, IP and technology/knowledge transfer, and technology commercialization (Carvalho & Galina, 2015; Chais et al., 2017; Marques et al., 2019; Mascarenhas et al., 2019; Ricci et al., 2019; Silva et al., 2017; Wonglimpiyarat, 2014). Third, major areas of research are focused on exploring and understanding university entrepreneurial ecosystem, entrepreneurial characteristics and institutionalization, the effectiveness of incubators, institutional response to third-mission activities, and implications for incubator failure strategies (Di Berardino & Corsi, 2018a; Mudde et al., 2019; Rae, 2012; Salomaa, 2019; Xu, 2010). Further, the fourth research section is focused on understanding the relational capital of business incubators, the relationship between individual firms and the incubator environment, and university-industry interaction (Mavi et al., 2019; Paoloni et al., 2019). So it could be concluded that at the institutional level research streams are focused on networks, new venture creation, entrepreneurial learning, patents, and technology transfer, and business incubators strategies in failure and relational capital of business incubators.

Table 14. *Policy Level Research Streams*

Level	Major Research Streams	References
Policy	• Policy initiatives about spin-off support programs • Enterprise curriculum development and implementation • Institutional underpinnings for building commercial linkages • University policies for innovation diffusion • Models for entrepreneurial university	(Beraza-Garmendia & Rodríguez-Castellanos, 2015; Cao, Zhao, & Chen, 2009; Carey & Naudin, 2006; Reyes, 2016)

Source: Authors

At policy levels research studies are focused on understanding and devising policy initiatives regarding curriculum development for entrepreneurship education, spin-off support programs at higher education institutes, institutional policies for building commercial linkages, models for entrepreneurial university and to explore how university policies and institutions shape the nature and fruitfulness of innovation diffusion.

Conclusion

Entrepreneurship plays a substantial role in the economic, social, and human capital development of any country (Brandstätter, 2011; Bruton et al., 2008) by establishing and developing new start-ups, innovating existing ventures, and exploiting entrepreneurial opportunities. Business Incubation Centers have gained increased attention of researchers, practitioners, and policymakers due to its unique ability to provide a conducive environment that develops and promotes, and accelerates entrepreneurship in developing and developed countries (Mahmood et al., 2015). UBIs (University-based incubators) provides start-up firms with physical facilities like office space, necessary furniture, work stations, and a variety of other resources and support services which help the start-ups to survive and sustain in the competitive business environment. Across the world, several universities are involved in entrepreneurial initiatives such as establishing science parks, innovation centers, and establishment of business incubation centers, along with teaching programs and courses on entrepreneurship (Guerrero & Urbano, 2012; Guerrero et al., 2012) to promote campus entrepreneurship.

University-based business incubation centers have become an essential part of the entrepreneurship support services at university campuses to offer critical support and provide a conducive environment for newly-formed start-ups. In literature all major stakeholders are trying to define, identify, measure, formulate and evaluate various aspects related to these initiatives taken by university business incubators to promote entrepreneurship at universities. Keeping in view the importance and significance of university-based business incubation centers for the promotion of entrepreneurial activities and to instigate entrepreneurial spirit among university students this study conducted a systematic literature review to understand, analyze, summarize and evaluate UBI's literature concerning methodological considerations, theoretical underpinnings, proximate and distant outcomes, and trend of major research streams. In this study, 61 research articles were selected after a rigorous process from three main databases. Year-wise distribution of articles revealed an upward increasing trend of research studies nevertheless more than 70% of research studies included in this SLR were published between 2015 to 2019 which indicates the significance and more interest of researchers in university-based incubation activities to promote entrepreneurship among students.

Brazil and the UK are the 2 most researched countries and the whole European region is the hub for research studies on university business incubation initiatives as revealed through the data. About 40 articles were published in the first 17 journals as mentioned in table 4 in which the first four top journals are Education + Training, Management Decision, European Journal of Innovation Management, and The Journal of Technology Transfer. Most of the research is being conducted by using qualitative and quantitative research designs, there is less focus on mixed methods which indicates the methodological GAP. Survey and case study was the main research designs used in literature and questionnaire and in-depth interviews were the main research tools used to collect data. There were about 516 total keywords out of which university, incubator, entrepreneurial, business, innovation are the top 5 keywords as per word count. Whereas, university, incubators, business,

researching, and technology are the top five words appeared in all 61 articles as there was a total of 20232 words calculated at keeping minimum word length to four.

Study variables, proximate and distant outcomes were identified from selected articles at each level of studies. Level of studies are divided into individual, team, Firm (Spin-offs, Start-ups, New Venture), Institutional (University, Incubator, TTOs, Accelerator), and firm. Institutional, network and resource based-view (RBV) is the main theoretical underpinnings focused on institutional and firm-level studies. Research streams identify from university incubation literature are summarized into four levels. The individual, firm, institutional and policy levels and at individual level major research is focused on entrepreneurs mindset, identity discovery, understanding antecedents of cognitive resources, relational capital building strategies and various entrepreneurial roles adopted by the entrepreneurs. Whereas, at the firm level the major research streams in university business incubation literature are focused on understanding the influence of founder's capabilities, managing resources, creation, growth and development of spin-offs, access to networks (institutional logic), and managing complexity regarding patents and technology transfer. Moreover, at institutional level research streams are focused on networks, new venture creation, entrepreneurial learning, patents, and technology transfer, and business incubators strategies in failure and relational capital of business incubators. At policy levels research studies are focused on understanding and devising policy initiatives regarding curriculum development for entrepreneurship education, spin-off support programs at higher education institutes, institutional policies for building commercial linkages, models for entrepreneurial university and to explore how university policies and institutions shape the nature and fruitfulness of innovation diffusion. This study contributed to the literature by analyzing, summarizing, and evaluating UBI's literature concerning methodological considerations, proximate and distant outcomes, and trend of major research streams. Future, research may be conducted by considering articles from other databases as well.

Limitations

This SLR is conducted on articles derived from three databases only hence results may not be considered or generalized to other databases. Moreover, time duration of 20 years from 1999 to 2019 is considered for this study and previous studies are not considered. Although best efforts are made to keep this review meticulous, rigorous, and objective but authors declare and acknowledge the possibility of any omission, variation in subjective understanding of themes/factors identified from articles. A complete list of articles used in this SLR, may be requested at (asghar.phd.ias@pu.edu.pk).

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