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University business incubators and opportunities for collaboration with companies within the start-up 2

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Abstract

Business incubators based on the university mainly target social impact by creating opportunities for job creation, and profit is not the primary objective. However, companies are doing business, and there should be strong reasons to attract them in collaboration with the university. This paper aims to find the possibilities for collaboration between university business incubators and companies. To achieve this purpose, we used the data from scientific articles. The review is based on the content analysis of the relevant papers in the three-level approach (individual, organisational and institutional). Similar to other entrepreneurship-supporting organisations, university business incubators connect start-ups with mature companies or industry leaders to allow faster growth for new ventures. This research illustrates that the most significant types of collaboration for all three levels (individual, organisational and institutional) are mentorship and networking. The suggestions of this paper give an overview of the incubation process to entrepreneurship researchers.

Keywords: Business incubator, entrepreneurship, networking, start-ups, university, university-industry collaboration;

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1. Introduction

Research interest in the entrepreneurial ecosystem from leading scholars, who impact policymakers and practitioners, is growing as entrepreneurial activities could be promoted by local communities and culture (Allahar & Sookram, 2019). Moreover, universities are not limited to teaching and research anymore. Their role in society is expanding, and transformation into the entrepreneurial university is a time requirement, leading to launching business incubators for students to have a sustainable high education system (Bikse et al., 2016). Shrinking government funds for research push universities to look for alternative sources, and one of the possible solutions is commercialisation and knowledge transfer.

Consulting and promotion on the market and the practical research outcomes for the industry are supported by unique mechanisms (e.g., University Business Incubators) (Dang et al., 2019). Incubation is one of the main contributors to innovations (Barbero et al., 2014). Hence, spin-offs are at the centre of academics' and policymakers' attention; therefore, universities move to focus on the teaching and research of entrepreneurship. This activity is compulsory for regional economic development through knowledge transfer (Berbegal-Mirabent et al., 2015).

In comparison with the early stage of the phenomenon, a growing number of business incubators, up to 7,000 in 2015, have changed their attitude to the field by gaining popularity and research significance, as they play a meaningful role in recruiting society to the entrepreneurship (Jamil et al., 2015; Suprobo, 2018). Growing popularity changed approaches in the organisation and forms of work. In the US, they were renting office space and infrastructure for a reduced price to fill the industrial zones, which became less needed after the Second War.

After a while, it was understood that this was not enough to create an environment capable of creating technology-based firms. This understanding increased the demand for knowledge in soft skills, market understanding and company management (Soetanto & Jack, 2013). This situation brought link creation between industry and academia by giving new direction for research in stakeholders' collaboration in developing the entrepreneurial ecosystem (Dang et al., 2019).

This issue is relevant for practitioners of the actual economic sector, as research shows that the activities in bridging the industry and university are under government support in many countries. For example (Suprobo, 2018), in Indonesia, the Indonesian Ministry of Research, Technology and Higher Education has a state programme supporting business incubators to encourage applied research with the potential to be commercialised and provide students with practical skills. Incubators are a part of the innovation system, which means that attention has been increasing over the years (Barbero et al., 2014; Blank, 2023). They provide an entrepreneurship development platform and are fruitful to the country's economy (Jamil et al., 2015; Ssekiziyivu & Banyenzaki, 2021). However, incubators with suitable competencies must respond to particular entrepreneurs with special needs in innovations (Gonthier & Chirita, 2019).

Entrepreneurs should pay attention if the typology of the support centre is relevant to them (Alkaabi et al., 2023; Barbero et al., 2014; Theodoraki, 2020). This effort from the policymaker's side is crucial because new technology-based small and medium enterprises are vulnerable and have low survival rates. Still, the regional economy will benefit significantly from these companies in the long-term run (Soetanto & Jack, 2013). The situation is complicated because students and academics are the main incubators that usually do not have a relationship with the real business world (Redondo & Camarero, 2019). One of the options to overcome these obstacles is that universities should accept that creating an ecosystem that allows building a solid network with mature entrepreneurs is one of the main strategic priorities (Jones & Parry, 2011).

1.1. Purpose of study

Although much research work was done on business incubators and their role inside the entrepreneurial ecosystem, there is still much space to be explored. Our objectives are to explore incubators and companies' opportunities to work together in the start-up creation process. This research paper analysed the published scientific articles about the collaboration between University Business Incubators as a unique type of entrepreneurship-supported centre and companies working in the real business world. The framework is presented on three levels institutional (e.g., state programmes supporting entrepreneurship), organisational (e.g., management of involved companies) and individual (e.g., personal feelings of actors inside the process).

The contribution of this research to the literature is insights into possible ways of collaboration between University Business Incubators and companies on three levels (individual, organisational and institutional) and both ways (tangible and intangible). These insights will assist in getting an understanding of the current situation and identify gaps for future research.

2. Materials and Method

2.1. Data collection

We reviewed 422 papers and based our review on the data extracted from 29 science journal articles published in January 2020. As a model, we took the systematic literature review published previously in the Journal of Management (Saebi et al., 2019). During the review, we tried to find out what business incubator means and how they are different from other centres of supporting spin-offs and start-ups. Also, among the range of incubators, it was essential to distinguish university-based ones as a separate group. Moreover, understanding how collaboration with mature companies could be mutually beneficial also was under our investigation.

Based on this, we used the Scopus database as one of the leading platforms recognised by the international scientific community. We used the keywords ‘university business incubator’ in the search and received n = 422 papers. We did not want to lose the start of the investigation of the research area, so all levels of journals were taken into account. However, we secured against inappropriate data and restricted the search to only ‘articles’ on the ‘final’ stage in ‘English,’ and n = 258 papers appeared as a result. A significant part of the papers is irrelevant to the collaboration between UBI and companies. Thus, the keyword ‘collaboration’ was taken as an additional criterion, and the number of articles shrunk to n = 62. The abstract screening was moving us away from the focus of the research topic because some papers were still out of the scope of the research questions. After the scan reading, it was decided to leave n = 35 articles in the review. However, the final sample of the papers is n = 29 because even responding to criteria during the task whole texts, some irrelevant documents were still appearing. For example, written by Di Marino and Lapintie (2015), ‘Libraries as transitory workspaces and spatial incubators’ is about organising the working space of incubators and does not cover the collaboration with any of the incubation actors.

2.2. Analysis

Then as soon as the sample of the papers for the research was chosen, we started to analyse the documents to understand the view of the situation. It was done by full-text screening and coding relevant ideas, which allowed us to segment them into research approaches and levels (individual, organisational and institutional) of investigating the phenomena. Then, in the data collection stage, based on the aim of the research, we code the text of the articles appropriately. Once the data is collected, the search for patterns begins. This allowed us to build the ‘definition’ as a part of the research. Next, to segmentise the unit of analysis and see the research focuses of scholars, a comparative analysis of the articles has been done. We found agreements and

debates among scholars who work in this area. Below are the results of the study, respectively comments on them.

The following structure organises the article: defining UBI and collaboration ways, then summarising the data for each level (individual, organisational and institutional), the following framework for future research is proposed, and finally, the conclusion gives an overall view of the paper.

2.3. Procedure

A sample of *n* = 29 papers related to the theme was collected. Then the sources have divided by the level of the research and the method used by authors to explore the phenomena. This was done to segment the articles and then collect the data for each group separately. The results show that for individual-level research papers *n* = 5, organisational-level research papers, *n* = 14, and institutional level, *n* = 10. Then each article was carefully read and coded on NVivo software which allowed us to create the dataset for future analysis. Papers analysis for coding consists of two parts: qualitative and quantitative. In the qualitative part, we tried to understand the overall results of each author, find a general view as a whole, and see if there were any agreements or debates on the received results. On the quantitative part, text mining has been done at each level for all collaboration types by counting the frequency of using the terms (e.g., funds, networking) in the papers and the number of researchers who touched on these topics. This was done as we believe that the number of references to the term and the number of authors who have addressed this issue are directly related to the importance of the topic. After receiving the data, the measurement of the value of the variables was begun.

This study adhered to all ethical standards related to conducting this type of research. All data were referenced to the sources and the procedure and results of the study pose no harm to the environment, people, or the field of study.

3. Results

3.1. The value of each collaboration form

To measure which collaboration form is most significant and relevant for university business incubators and companies, the frequency of using the term in each paper and the number of documents were counted for each level as a separate group. For the following data analysis step, we found the average (¦*1*) of the use of terms for the one paper for each level. This gave the picture of the frequency of the stressing on time, hence each collaboration form's value.

$$\boldsymbol{M_u} = \frac{\sum \boldsymbol{n_t}}{\boldsymbol{n_p}} \qquad (1)$$

Here the symbols have the following meanings:

$\boldsymbol{M_F}$ – The mean (average) of the use of the terms;

$\sum \boldsymbol{n_F}$ – The total number of the use of the term (average);

$\boldsymbol{n_{total}}$ - The total number of papers that used the term.

Table 1 displays the data of the collaboration forms.

Table 1
The Data of the Collaboration Forms

Level	Collaboration form	Source	References	*M* (u)	Authors (%)
Individual		5			
Individual	Networking	5	71	14.2	100
Individual	Mentorship	4	7	1.75	80
Individual	Knowledge	5	29	5.8	100
Individual	Infrastructure	2	5	2.5	40
Individual	Funds	3	12	4	60
Individual	Projects	5	69	13.8	100
Organisational		14			
Organisational	Networking	13	83	6.38462	92.8571
Organisational	Mentorship	9	38	4.22222	64.2857
Organisational	Knowledge	14	387	27.6429	100
Organisational	Infrastructure	13	40	3.07692	92.8571
Organisational	Funds	13	132	10.1538	92.8571
Organisational	Projects	12	132	11	85.7143
Institutional		10			
Institutional	Networking	4	17	4.25	40
Institutional	Mentorship	3	15	5	30
Institutional	Knowledge	10	181	18.1	100
Institutional	Infrastructure	1	2	2	10
Institutional	Funds	2	6	3	20
Institutional	Projects	9	33	3.66667	90

Do all the papers cover all collaboration types, or did some authors not pay attention to some of the collaboration forms (e.g., funds and mentorship) in their works, and how does this impact the picture? To understand this, we looked at the percentage of the total number of articles related to the topic of the particular type of collaboration for each level separately. Hence, the following formula is proposed.

$$\boldsymbol{P_m} = \frac{n_p}{n_{total}} * 100 \qquad (2)$$

Here the symbols have the following meanings:

$\boldsymbol{P_m}$ – The percentage of papers that mentioned the topic;

n_p – The total number of the use of the term (average); and

n_{total} - The total number of papers that used the term.

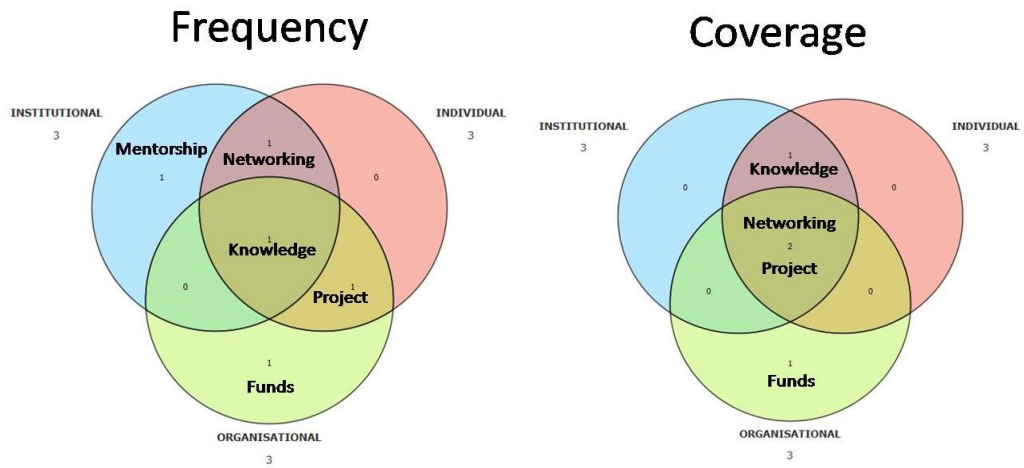
The results are proposed in (Table 1).

3.2. The data analysis process

Before the results interpretation stage, the data analysis should be readable. Hence, it requires converting the tables into visualisation, which consists of two steps in this research. First, we compared the significance of each collaboration form at each level to see if there are common denominators between groups. Second, we build the scatter plot of the correlation between the use of the term number (frequency) and the number of papers that mentioned the terms (coverage) (Figure 1). To achieve this purpose, we used 'Orange' data analysis software.

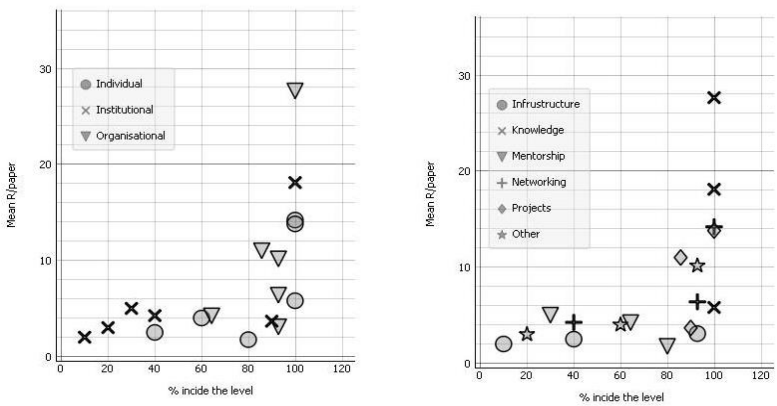
It is evident that in this illustration, the 'funds' only match the same level in both cases. It is one variable out of 5 possible, and this is only 20% of the similarity. This is not enough to conclude. Hence, to be more precise, it is decided to take a second step described next.

Figure 1
Frequency Versus Coverage



The purpose of the second step of the data analysis process is twofold. The first is to draw the ranking of the collaboration forms from the paper's perspectives. The second is to see the relationship between the levels in the collaboration forms. In the first case, we did the correlation analysis of the frequency of terms to the number of papers that mentioned the word. The research is done for each level separately and illustrated in the scatter plot (Figure 2).

Figure 2
Correlation Analysis of the Frequency to the Number of Papers Mentioned the Term



a. Level **b. Collaboration**

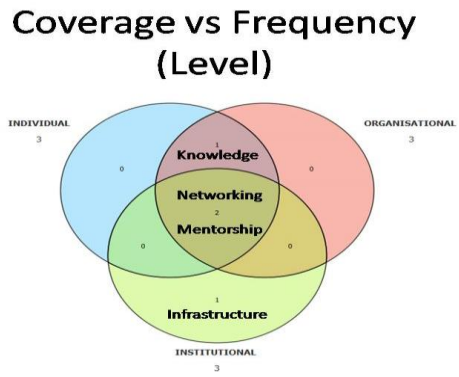
Having this data allows us to make the hierarchical clustering and rank the collaboration forms for each level (Table 2).

Then the data used to create the final (Figure 3) shows the most significant variables for each level separately and matching points. In this case, 'matching points' are collaboration forms.

Table 2
The Most Significant Collaboration Form at Each Level

Level	Collaboration form	Source	References	*M* (u)	Authors (%)
				Frequency	Coverage
INDIVIDUAL		5			
Individual	Networking	5	71	14.2	100
Individual	Mentorship	4	7	1.75	80
Individual	Knowledge	5	29	5.8	100
ORGANISATIONAL		14			
Organisational	Networking	13	83	6.38462	92.8571
Organisational	Mentorship	9	38	4.22222	64.2857
Organisational	Knowledge	14	387	27.6429	100
INSTITUTIONAL		10			
Institutional	Networking	4	17	4.25	40
Institutional	Mentorship	3	15	5	30
Institutional	Infrastructure	1	2	2	10

Figure 3
Coverage Versus Frequency



4. Conclusion

University Business Incubators are undergoing organisational changes in their business model. In the initial stage, they focused on keeping the industrial material assets in working condition by attracting entrepreneurial skills to the factories. It was a time requirement because,

in the middle of the twenty's century, these factories were losing their actuality due to economic structure changes after World War II.

However, nowadays, in the digital era and sharing economy conditions, incubators reshape the organisation, focusing primarily on intangible assets such as networking and knowledge. This research shows that knowledge transfer and supporting networking activities are common for all process stakeholders starting from start-up idea holders to decision-makers on the institutional level. Hence, some recommendations could be given to scholars and practitioners interested in this area.

The outcomes of this research are limited by the secondary data from other scholars' research. However, exploring the already published articles in the field gives us a clue about the current situation and predicts some directions and future trends. Moreover, there is enough space for research and filling the gaps. For example, scholars could direct their focus on the challenges and opportunities caused by sharing economic conditions. The digital era also may influence the working process as professional-oriented social media (e.g., LinkedIn) may devalue networking activities. Any person could connect with the industry leaders avoiding intermediaries, and directly present their ideas to decision-makers. This is an open issue that could be used in future research.

5. Recommendations

Relevant recommendations derive from the theoretical framework of this literature review which points to the need for deliberate actions toward advancing the collaboration between university business incubators and companies:

- University management should pay attention to the agenda of their business incubators and take into account the importance of collaboration with companies toward the execution of the 'third mission'.
- Companies might benefit from cooperative work with academia by gathering innovative ideas and recruiting graduates with an entrepreneurial mindset who could contribute to their organisation's development.
- Policymakers, to increase economic activities, should implement state programmes to support academia-industry collaboration through entrepreneurial centres at universities like business incubators.

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