

## **A review of technology commercialization research: Current research trend and directions for future research**

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### **Abstract**

This study explores academic research on technology commercialization. Technology commercialization is currently a popular research topic. Universities urgently need the topic of commercialization of technology to capitalize on research products. Many universities are having difficulties with this issue, but this is also a moment for them to benefit from innovation and commercialization. The present study offers opportunities, especially regarding the critical success factors affecting technology commercialization. Therefore, the present study discusses both existing and future research related to technology commercialization. By using publish or perish (PoP) 8, the Authors collected 200 papers related to studying future research opportunities. From 200 papers, 127 papers 127 journals for further study. Among them are 53 papers from Q1 (Scopus indexed), 27 papers from Q2, nine papers found from Q3, and five papers from Q4. It was found that current research trends on this topic predominantly come from developed countries such as the USA, UK, and Italy. Many of them used a qualitative approach that focused on prominent and state universities. Future research may focus on the context of emerging market economies. In addition, combining both qualitative and quantitative approaches from different universities may also provide a greater understanding of technology commercialization and academic entrepreneurship as a whole.

**Keywords:** *Technology Commercialization, University, Government, Industry*



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### **INTRODUCTION**

Academic studies competencies mirror the quantity to which a university can use and use sources to provide educational studies results. Scientific innovations are the source of university technology commercialization [1]. Journal publications can be seen as an intermediate output in technology commercialization. Universities are investing more resources, increasing faculty size [2], and funding and grants [3], which can lead to better academic research performance. However, even if universities have the same level of resources, their academic research results may differ. Because a university may not be able to sustain a supply of research output without the university's research capacity, this capacity has been considered one of the important aspects in determining the performance of technology commercialization [4].

Technology's speed to market indicates a company's ability to introduce new products faster than its competitors [5]. When core technologies are widely available and short product life cycles, getting to market is crucial. A company that is first to market for the first time can often charge a premium because it is, in effect, a monopoly. Leaders also achieve volume breakouts in purchasing and production earlier than latecomers, and as a result, they capture larger market shares and higher profit margins. In terms of market breadth, given the high and rising costs of technology development, companies need to spread costs across as many products and geographic markets as possible to maintain price parity. These skills in expanding market reach provide new businesses with competitive advantages and lead to higher profit margins. In addition, in many markets, products are integrating more and more technologies to provide more functions to satisfy customers. Therefore, new firms must be able to master or absorb and integrate technologies to

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remain competitive in the markets in which they must compete [6]. Many factors can influence the method chosen to commercialize the invention. These factors include the quality of management available to direct the commercialization effort, availability of financial capital, external factors, and technology characteristics such as the strength of property protection intelligence towards technology [7]. Technology commercialization is currently a popular research topic. This is because the commercialization of innovation is earnestly required by colleges to underwrite research items. Many universities are having difficulties in this issue, yet this is likewise a second for them to profit from advancement and commercialization. Besides, Commercialization of technology is an vital portion of the innovation prepare [8] which implies that technologies and items cannot effectively enter the showcase without going through the commercialization handle. Nowadays, huge companies are constrained to present their unused advances through commercialization in arrange to realize benefit and hold their showcase share [9]. Due to the critical affect of technology commercialization on the development and esteem of companies, numerous organizations appreciate its key significance and point to create novel innovation items [10]. However, success in this way isn't simple [11], as there are a few limitations and challenges relating to commercialization that lead to the disappointment of numerous commercialized items. This study is limited to analyzing research on the commercialization of technology in universities by looking at the aspects of the year of publication, methodology, variables, and research locations based on previous research. Future research may extend into other topics such as technology transfer in technology commercialization, technology transfer industry, etc.

#### **METHODOLOGY**

Data acquisition, transcription, encoding, and analysis are also part of this technique. These steps are divided into three parts in total. The initial stage consisted of searching for papers using Scopus and Publish or Perish (PoP). Publish or Perish is the tool for searching academic papers and analyzing academic citations [12]–[14]. PoP is often used to analyze the systematic literature review on particular topics. Two combinations of keywords and titles are used related to the topic being searched for at this stage. The titles and keywords used included "commercialization; technology; university; industry, and technology commercialization." By combining these words, two hundred papers were obtained consisting of journals, proceedings, conferences, symposia, books, and papers/theses.

The second part is called the selection stage, where the journals that have been collected are selected manually, and this second stage produces 127 journals for further study. Among them are 53 papers from Q1 (Scopus indexed), 27 papers from Q2, nine papers found from Q3, and five papers from Q4. Furthermore, in the third part, an analysis of the selected journals is carried out, including the year of publication of the journal, the research methods used, data processing methods, quartiles, and research settings (sector/industry and country of origin) and research universities.

#### **FINDINGS AND DISCUSSION**

This section discusses the results of technology commercialization research from various references. This section contains the year of publication, research methodology, data processing methods, research quartiles, a research setting (i.e., sector and country of origin), and type of university.

Based on the results of data processing from 127 research titles on technology commercialization, it was found that only 101 journals could be found. The following are the data processing results

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regarding the year of publication of the technology commercialization journal. Based on the data shown in Figure 2, it can be seen that research on technology commercialization has been carried out previously from 2010 to 2021. The most research was in 2019, and the least was in 2010.

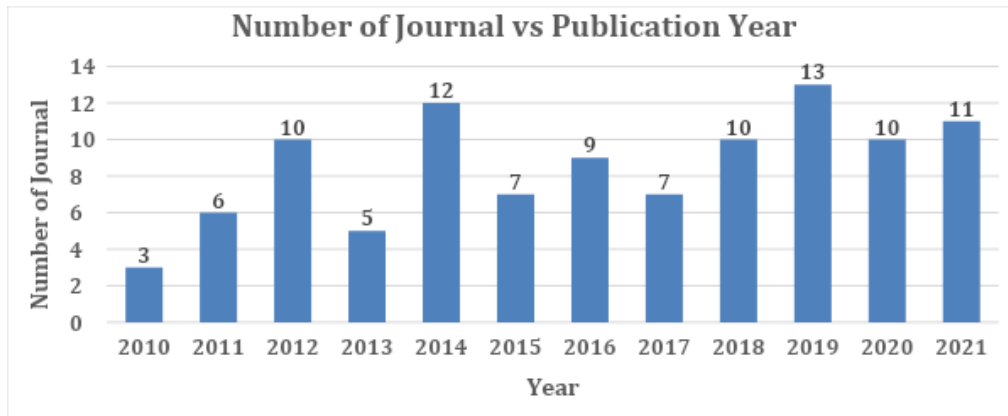


Figure 2 Technology Commercialization Research Publication Year Data

The following is the data for the year of publication of research on technology commercialization from the various journal. Based on Figure 3, research methods that use quantitative methods are 40 studies, while 59 studies use qualitative methods. It can be seen that research on technology commercialization mainly uses qualitative research methods, with a percentage of 59,6%.

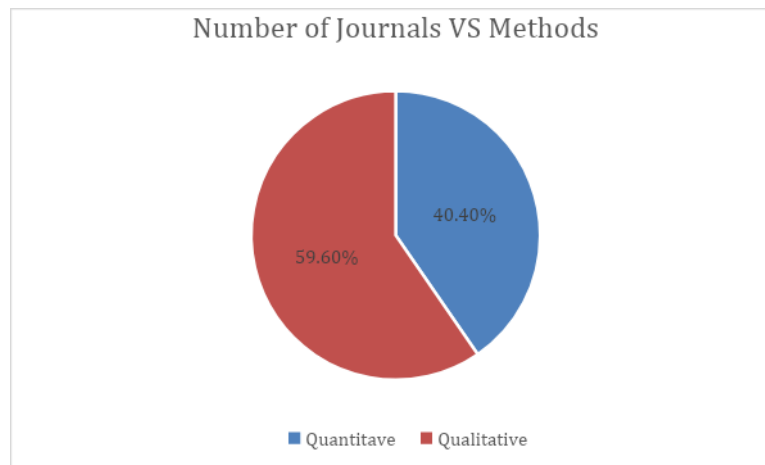


Figure 3 Technology Commercialization Research Methods

The research method is the approach used when researching. There are two types of methods: quantitative and qualitative methods. In this technology commercialization research, quantitative methods such as Pairwise Correlation, descriptive statistics, Pearson Correlation, comparison matrix, Logit Regression, and others are used. The qualitative research method used is a literature review.

In technology commercialization, research also determines the quartiles of the research. Based on the study results, it was found that technology commercialization research from various sources produced quartiles, which can be seen as follows. Based on Figure 4, it is known that technology

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commercialization research has a position in quartile 1 with 53 journals. While the research with quartile 2 is 27 journals, quartile 3 is nine journals, and quartile 4 is five journals.

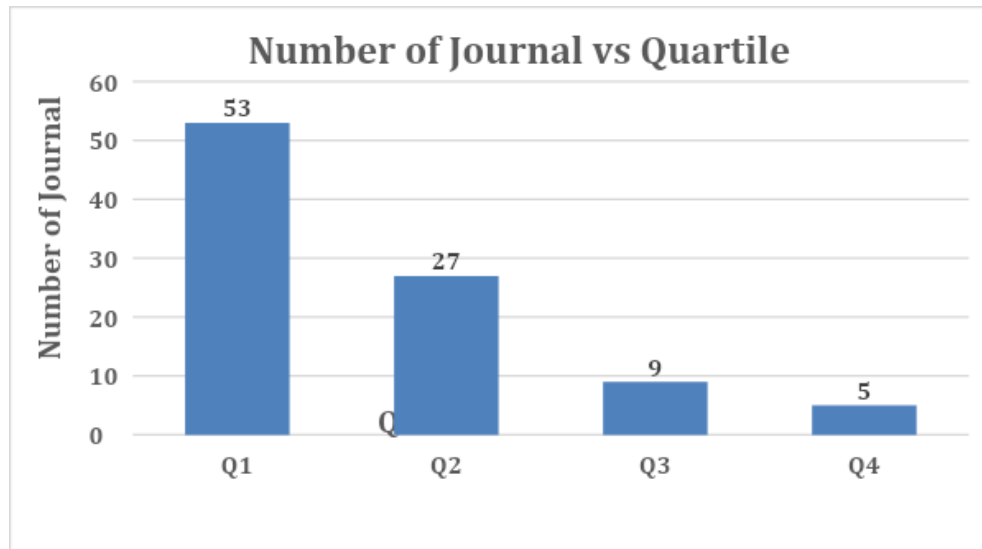


Figure 4. Research Quartile Type

This technology commercialization research also analyzes the countries where the research is conducted to see which countries have implemented a lot of technology commercialization and the development of technology commercialization there. The recapitulation of research results regarding the country where the research is conducted can be seen in Table 1.

Table 1. Number of Country

No	Country	Number of Country	No	Country	Number of Country	No	Country	Number of Country
1	USA	22	14	China	2	27	German	1
2	United Kingdom	10	15	Spain	2	28	Exeter	1
3	Italy	5	16	Turkey	2	29	Nigeria	1
4	India	4	17	Africa	2	30	Dubai	1
5	Korea	4	18	Indonesia	2	31	Finland	1
6	Netherlands	4	19	New Zealand	2	32	Poland	1
7	Japan	4	20	Egypt	1	33	Russia	1
8	Ireland	3	21	Saudi Arabia	1	34	Pakistan	1
9	Sweden	3	22	Czech	1			
10	Malaysia	3	23	Boston	1			
11	Singapore	3	24	Portugal	1			
12	Canada	3	25	Brazil	1			
13	Taiwan	2	26	Australia	1			

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Technology commercialization is an activity carried out by university researchers for commercializing their research to parties outside the university. Figure 5 can be seen that the results of the analysis of 91 journals, the results obtained by universities that carry out technology commercialization are as follows:

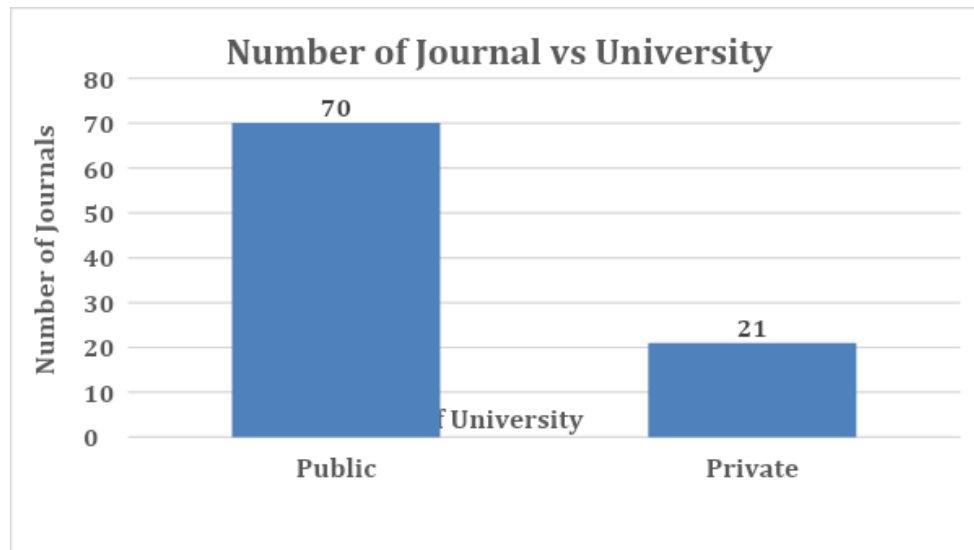


Figure 5. University of Research

**CONCLUSION AND FURTHER RESEARCH**

Based on the research, it was found that many journal publications on technology commercialization were carried out in 2019. The research method used was primarily qualitative methods, with literature review analysis. Then, this type of paper is mainly in the Q1 quartile with a total of 23 research; countries that apply technology commercialization a lot are the USA and the UK. The Technology Commercialization (TC) study has received attention for ten years. It is supported by the government's ongoing efforts to synergize research products from universities and industry so that they can be commercialized. Based on the findings of the 101 selected papers at TC, it can be concluded that the following leads to suggestions for further research.

First, most TC research involves academic spillover, university-industry collaboration, and technology transfer. These two questions are very often discussed in the world of higher education. The desire of universities to produce products capable of penetrating the industry is significant today. Second, identify four research topic clusters relevant for further study. For example, future research could focus on the commercialization of academic research products, technology transfer in technology commercialization, technology transfer industry, government and academia discussions on entrepreneurship, or the commercialization of university research products.

Academic contribution to this paper is knowing the topic of technology commercialization, the methods used, and the type of universities sampled for future research.

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**ACKNOWLEDGMENT**

The authors would like to thank the Industrial Engineering of Engineering Faculty of Universitas Andalas and Andalas University for providing a publication grant for FY 2022.

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