RESEARCH ARTICLE:

Challenges Associated with Research Management and Administration in Universities

Ayansola Olatunji Ayandibu[1]

Received: 30 August 2022 | **Revised:** 30 April 2023 | **Published:** 15 June 2023

Reviewing Editor: Dr. Grace Temiloluwa Agbede, Durban University of Technology

Abstract

Higher education institutions (HEI) face several obstacles because of the digital revolution that must be solved for them to play a more and bigger part in innovation ecosystems and economies. Therefore, HEIs and policymakers are always in need of a research administrative structure that is mainly favorable and creates an atmosphere where researchers can generate high-quality research outputs. This study aims to outline the problems that university research management and administration face when trying to promote research, innovation, and commercialization. There will be a study of the existing literature to propose a theory (The Triple Helix Model) that is relevant to this study. The study followed a scoping review of literature that is relevant to the subject matter. Practical answers to the questions will then be used in this framework. According to the research cited in this article, HEIs must set up strategic structures and activities to advise policymakers on how to frame robust support systems for research, innovation, and commercialization.

Keywords: *higher education institutions (HEIs); innovation; entrepreneurship; support systems; research commercialisation*

Introduction

The main obstacles to technology transfer and commercialization of university research in India, according to Ravi and Janodia (2022), are (1) a lack of adequate resources and infrastructure; (2) a lack of creativity and critical thinking in curricula; (3) a lack of publicity because of a lack of knowledge about patenting, publishing, and of research; (4) a lack of IP research hubs or similar offices merely to comply with statutory requirements; and (5) a lack of research. These findings are supported by Budi and Aldianto (2020), who argues that although technology cannot be deployed on a wide scale straight immediately, it must still go through various phases, which often result in modern technology failing to access the market. To avoid the technological and financial traps that are likely to arise throughout the process of research commercialization, universities must thus build extremely functional research management and administration skills (Kalantaridis and Küttim, 2023). The most important elements influencing knowledge commercialization at universities, according to Biranvand and Seif (2020), are the legal, economic, human, cultural, structural, political, and communicational-informational variables. Furthermore, their study showed that the biggest obstacles to research management and administration included inadequate faculty awareness, poor control of university funds, universities' vulnerability to wealth generation, a lack of university entrepreneurship missions, a lack of current and effective university-based think tanks, and databases, and ineffective connections between students and seasoned entrepreneurs.

This study aims to outline the problems that university research management and administration face when trying to promote research, innovation, and commercialization. In recent years, universities, research centers, and businesses in many countries have started to make and sell products based on their research (Hosseinian *et al*., 2015). When universities add entrepreneurial goals to their teaching and research missions, it shows how much they contribute to the social and economic growth of their communities. Because of this, a lot of professors and government officials from many countries have been studying academic entrepreneurship and knowledge commercialization in the past few years (Farsi Jahangir *et al*., 2014). Commercialization is the process of making

[1]University of Zululand, ayansola.ayandibu@gmail.com | https://orcid.org/0000-0001-5870-2388

new ideas into successful consumer products. In other words, commercialization starts when a company is set up to use scientific and technological advances to meet market needs through product design, development, manufacturing, marketing, and more work to make the product better (Mehta, 2008). The commercialization process begins with the creation of an idea, moves on to the development of products and services, and ends with the sale of those products and services to end users (Pourfateh *et al*., 2017). By changing how people think about universities, they are now able to help achieve new goals, such as participation in society and economic growth, in addition to their traditional roles of teaching and research (Nicola *et al*., 2006).

Along with teaching and research, universities are getting more and more requests to transfer and sell their research (Rasmussen *et al*., 2006; Mathisen and Rasmussen, 2019). One of the main goals of science and technology policymakers is to find out how universities can affect the process of making new products and getting good commercial results to create value chains (Meigounpoory and Ahmadi, 2012). In today's competitive world, the commercialization of university research is seen as an important step in the process of technological innovation. It also plays a big role in the growth of the knowledge economy (Meigounpoory and Ahmadi, 2012). Several academics have looked into the internal and external factors that help knowledge commercialization and have come to the same conclusions. The most important internal factors are good researchers, good relationships between universities, businesses, and society, material and spiritual support for knowledge commercialization in universities, the use of specialized consultants in the field of knowledge commercialization, and the quality of research (Ashrieh *et al*., 2016). The most important outside factors were found to be government services, economic stimulus, rules and regulations, parks, and science and technology development centers (Masudian et al., 2013). Knowledge is a country's main competitive advantage in the world economy, so it is important for a country to get more of it (Nadirkhanlou *et al*, 2012). The commercialization of information made by universities, which often leads to the development of scientific discoveries there, is a major topic of public debate today (Erfan and Nadi, 2016). Many people think that selling academic information is a good way to improve regional skills and economic performance and to help the economy grow (Baycan, 2013). Along with teaching and research, universities are getting more and more requests to transfer and sell their research (Rasmussen *et al*., 2006). Since universities are the main source of knowledge, it seems important for them to take part in national and regional economic growth (Nadirkhanlou *et al*., 2012).

Because scientific knowledge is so important to the innovation process, universities are moving away from teaching and research toward becoming knowledge commercialization engines (Khan, 2017). Before the end of the nineteenth century, universities and scientific institutions mostly focused on teaching. As social needs changed, however, they also started to focus on research. People call this change "The First Revolution" of universities. In the second half of the 20th century, universities started doing something new to help society and the economy grow (Parker *et al.,* 2023). This was called the Second Revolution. In addition to teaching and research, the third goal of entrepreneurship universities is to help the economy grow (Etzkowitz, 2001). Today, universities have a bigger role to play in research and how it is used. They need to make money, help the public, encourage learning and participation, and keep their independence. The results of the research are also used to push the limits of what is known. Technology and knowledge are also two of the most important things that contribute to the growth of wealth, talent, and knowledge in societies. They are also seen as powerful tools for national development. Academic entrepreneurship is the only way to do this. "Knowledge commercialization," or breaking into the business world, is one of the most important parts of entrepreneurship at the university (Hassangholipour *et al*., 2012).

Schulte (2004) states that an entrepreneurial university needs to do two things. First, it needs to teach aspiring entrepreneurs how to start businesses. Thirdly, it needs to encourage students and people in all fields to think like entrepreneurs. Second, one must start a business like an entrepreneur. Boehm and Hogan (2013) say that universities can help build a knowledge economy through a process called "knowledge commercialization." Economic growth is based on what people know. Through the company's subsidiaries, knowledge can be passed on to the market through education, research contracts, industrial consulting, and joint ventures. Ansari *et al*. (2016) found that the biggest problems with commercialization were bad ideas and policies, problems with getting money to invest, lack of trust, and bad communication. Getting the private sector involved was one of the least important problems. There are always a few things that make it hard to make the best use of intellectual property made at universities to improve the commercialization of knowledge (Parker, *et al*., Guthrie, 2023). It is inevitable to find them and get rid of them. The results of this study show that "bureaucracy and inflexibility of the university management system" and "weak communication and lack of communication networks among investors, industry

activists, and academics" are the biggest problems with commercializing knowledge at Tehran University. Decter *et al*. (2007) say that there are big problems with commercializing knowledge, such as a lack of trust between businesses and universities and the fact that institutions don't care about social and commercial needs. Greco *et al*. (2020).'s claim that horizontal collaborations will make it less likely that innovation and commercialization will be abandoned fits with this point of view. They say that the risk of mistrust and ineffective collaborations is higher in horizontal collaborations than in other types of collaborations.

Challenges Impacting Technology Transfer and Commercialization in Universities (Findings From Literature)

Pérez-Hernández *et al*. (2021) state that universities face three significant difficulties: the first is a lack of effective internal regulations for intellectual property management; the second is a lack of experts to staff Technology Transfer Offices at Higher Education Institutes (HEI) and Public Research Centers (PRC); and the third is inherent business difficulties. Specific impediments, according to Biranvand and Seif (2020), fall into the following categories:

Legal Barriers

- Inadequate legal protections for university innovators
- Researchers find that commercialization rules and restrictions are inefficient and unproductive.
- Lack of restrictions on academics using commercialization to their advantage
- A lack of ownership rights resulting from collaborative research with industry
- Ineffective measures used to raise the quality of academic research

Human Resource Barriers

- A weak commitment to commercialization
- Lack of knowledgeable and qualified personnel
- University weakness with strong human capital motivation
- Inadequate faculty members' knowledge

Economic Barriers

- The inadequate portion of the scholar's earnings from commercialization
- University fund management is subpar.
- Universities' poor performance in generating wealth
- Lack of commercialization and infrastructure for commercializing research findings
- Researchers' inability to get university funding to use production expertise

Structural and Policy Barriers

- Lack of a well-organized structure for the commercialization of academic research
- Lack of flexibility in the bureaucracy
- Lack of entrepreneurial ventures at universities
- Absence of a university research paper
- Absence of measures that effectively raise the quality of academic research

Communication and Information Barriers

- The university's lack of current and useful idea banks and databases
- Lack of mutual recognition between industry and university
- Lack of networking and communication between academics, industry activists, and investors
- Lack of community consultation services offered by universities

Cultural Barriers

- Research culture is weak.
- Cultural distinctions between the university and the business world
- entrepreneurial culture's shortcomings
- Collective sensitivity to the commercialization of knowledge produced by universities that is uncompromising

Research Management and Administration Capabilities Needed by Universities

Pérez-Hernández *et al*. (2021) state that a country or region's ability to innovate is inextricably linked to its ability to create, understand, and share information. The university had to adapt to this new environment by coming up with new ways to collect data and meet the needs of society and the market. This caused a change in its responsibilities and gave it a chance to be more involved in the social and economic scene. Chesbrough (2006) says that making new products and services requires a wide range of sources of innovation. This is why businesses need to work with customers, suppliers, academic institutions, and even competitors. Universities are better partners for new technology field research in areas where the commercial results aren't clear. But this collaboration is even more important in poor countries, where universities are the main source of information for new ideas (Stal *et al*., 2016). Universities are seen as sources of innovation in this case for two main reasons: first, the publication of research results in scientific journals and corporate contracts meant that innovation results used to be the responsibility of companies and universities would not have kept intellectual property rights; and second, the publication of research results in scientific journals and corporate contracts meant that innovation results used to be the responsibility of companies and universities would not have kept intellectual property rights. Universities, on the other hand, started to keep ownership of patentable and marketable discoveries that came out of their research. They did this through commercial licensing and by starting new companies (Lockett and Wright, 2005).

In developed countries, universities and businesses work together naturally because businesses look for information from outside sources to improve their human resources and research and development (RandD) infrastructure. Due to the number and effects of university spin-off companies, the process of technology transfer (TT) has come a long way and helped the economy, especially in the United States (US) (Di Gregorio and Shane, 2003). In the United States, the term “spin-off enterprises” was first used in the late 1970s to describe businesses that grew out of academic labs in California and Boston without being planned. The idea first came up in Europe in the 1980s, when they were trying to change their industries (Lockett and Wright, 2005). Few TTO workers at South African universities, on the other hand, are certified or have experience in industry or entrepreneurship. Most of them are lawyers or come from other fields that have nothing to do with transfer. Most of them think that their main job is to give legal advice to people who want to get a patent or license. They usually do this through training or, in some cases, IP scouting. When combined with limited resources, the fact that transfer offices don't specialize in much makes for a separate problem (Schraudner *et al*., 2016). In the same way, TT might be possible if creating knowledge helps organizations and businesses make money. TT is the movement of information from where it came from to where it needs to go. Compared to other strategies like research contracts or selling patents, the creation of university companies has become one of the most important ways that universities help society (Garcia *et al*., 2017).

There are two kinds of effects that university spin-off companies have: direct and indirect. Direct effects happen when the companies are close to where new technology is being made and help pay taxes and make it possible for the university to compete internationally. Indirect effects happen when the companies are close to where new technology is being made and help pay taxes, train entrepreneurs, improve the evaluation of research results, and bring money to the university. To make a local development environment, the government, universities, society, stakeholders, businesses, and economic, social, cultural, and political elements must all work together. This is needed for the process of making businesses based on technology. It is important to realize that a company's reputation and licensing policies have a big effect on these activities that add value (Di Gregorio and Shane, 2003). The capacity of universities to develop spin-off enterprises is determined by their legacy and the availability of optimal geographic circumstances. Another goal of universities is to help the economy grow through TT and cooperation between businesses and organizations (Etzkowitz and Leydesdorff, 2000). Entrepreneurial universities should be treated like businesses, with patents, research and development, partnerships, and, in the end, the creation of organizations to sell their research breakthroughs. Three things set entrepreneurial universities apart: 1) a management structure that allows the institution to adapt to a changing environment by combining traditional academic values and corporate values; 2) a collection of business and administrative entities created by the university to interact with the environment quickly; and 3) a diverse financial base that reduces reliance on a single source of funding (Etzkowitz, 2001; Stal *et al*., 2016).

Using Penrose's (1956) resource-based theory, the research looks at how well universities can start businesses. According to this idea, the results and skills of each institution based on experience are very important in building businesses, and these things will affect what happens in the future (Pazos *et al*., 2010). As a result of this kind of

institution's support of the formation of businesses in its labs and facilities, a new type of university worker and researcher emerges: the entrepreneur scientist. Also, because "transdisciplinary research and development" is a goal and because entrepreneurship training is a big part of the curriculum, "entrepreneurial champions", as Clark (2004) calls them are needed. So, he stressed how important it was to set up institutions to encourage entrepreneurship and the creation of businesses based on research done by research organizations (Santamaria and Brunet, 2007). Many studies have shown how important universities are as possible technologybased enterprises (TBE) incubators and how important it is for educational programs to link scientific knowledge to academic requirements such as Delmar and Davidsson (2000). Spin-off businesses are part of the university's TT strategy and have become one of the academic authorities' goals because they are based on academic knowledge and show how important the university is to the knowledge economy (Pazos *et al*., 2010).

It is also important to note that spin-off businesses are often located close to where they started, which helps the economy of the area. Second, encouraging institutional reforms that make it easier for graduates of undergraduate and graduate programs to integrate, creating a knowledge market with highly qualified human capital, and improving how research results are evaluated. Also, once a spin-off company has grown to a certain point, it may choose to invest some of its money in a strategic plan or sell shares to the public. This means that both the founders and the institutions get money from the capital transfer. Fourth, their products and technologies have a high added value, and their research, development, and innovation activities help the economy grow. This means they play an important role in the innovation process, creating qualified jobs and boosting economic growth (Etzkowitz and Leydesdorff, 2000). The academic spin-off is the creation of new knowledge through academic research with the help of academic staff (Pirnay *et al*., 2003). On the other hand, Djokovic and Souitaris (2008) say that even though these businesses were started by the same people who were involved from the beginning, they did not always grow out of academic expertise. Because the academic experts who are taking part in the research may not be interested, a coworker, a graduate student, or even someone who has nothing to do with the institution may decide to take the risk. Some things that all spin-off businesses have in common are the study of discoveries, whether or not they are patented, and the use of information that researchers gather during their academic work. These businesses make money, are not part of universities, and were started by at least one member of the academic community (Stal *et al*., 2016). So, "university spin-off companies" will be defined in this study as business projects backed by members of the university community that focus on using new processes, products, or services with high added value that are based on knowledge and results from RandD and innovation at the university itself, leading to business growth.

Theoretical Framework Underpinning this Study

The Triple Helix Model is a framework that describes the relationship between three key stakeholders in the innovation process: academia, industry, and government (Madichie and Agu, 2023). This model is often used to understand the challenges associated with research management and administration in universities, as it highlights the interactions and dependencies between these three groups. Sarpong, AbdRazak, Alexander and Meissner (2017) mentioned that Triple Helix Model indicated that these three stakeholders play a distinct role:

i. Academia: This includes universities and research institutions, which are responsible for generating new knowledge through research and education. They are the primary source of intellectual capital and are often the drivers of innovation.
ii. Industry: This includes companies and businesses, which are responsible for translating academic research into products and services that can be sold in the market. They provide the funding and resources needed to develop and commercialize new technologies and are often the primary beneficiaries of academic research.
iii. Government: This includes national and local governments, which are responsible for creating policies and providing funding to support research and innovation. They play a crucial role in promoting collaboration between academia and industry, and in creating a regulatory environment that supports the development and commercialization of new technologies.

The Triple Helix Model underpins several challenges associated with research management and administration in universities (Madichie and Agu, 2023). Some of these challenges include:

i. Balancing academic freedom and commercialization: One of the key challenges faced by universities is how to balance academic freedom with the need to generate revenue through commercialization. This

can be a delicate balancing act, as universities must ensure that their research remains credible and objective, while also finding ways to monetize their intellectual property.

ii. Securing funding: Another challenge is securing funding for research and innovation. Universities often rely on government funding, which can be unpredictable and subject to political whims. Additionally, securing funding from industry partners can be challenging, as companies may be hesitant to invest in research that does not have an immediate commercial application.

iii. Managing intellectual property: Universities are often the owners of intellectual property generated by their researchers. Managing this intellectual property can be challenging, as it requires navigating complex legal and commercial issues. Additionally, universities must ensure that they are protecting the interests of their researchers while also maximizing the value of their intellectual property.

iv. Promoting collaboration: Collaboration between academia, industry, and government is essential for driving innovation. However, promoting collaboration can be challenging, as each of these stakeholders has different goals and priorities. Universities must find ways to incentivize collaboration while also protecting the interests of their researchers and ensuring that their academic standards are maintained.

The Triple Helix Model provides a useful framework for understanding the challenges associated with research management and administration in universities. By understanding the interactions and dependencies between academia, industry, and government, universities can develop strategies to promote innovation while also addressing these challenges.

Methodology

The purpose of this methodology section is to outline the steps taken to conduct a literature review for this study. The literature review was conducted to provide an overview of the existing research on a particular topic and to identify any gaps in the literature.

The main research question is "What are the challenges associated with research management and administration in Universities". The first step in conducting a literature review is to define the research question or topic. This involves identifying key concepts and terms that were used to search for relevant literature. The research question was clearly stated and focused to ensure that the review is comprehensive and relevant. The second step that was followed in conducting the literature review is to conduct a comprehensive search for relevant literature. This involves searching electronic databases, such as PubMed, Google Scholar, Web of Science, SCOPUS, etc using a combination of keywords and Boolean operators to identify relevant studies. In addition, manual searching of reference lists from identified studies is also done to find additional relevant studies. The third step in conducting a literature review article was to screen and select studies that meet the inclusion criteria. The inclusion criteria were established at the outset and were based on the research question. Studies that do not meet the inclusion criteria were excluded from the review. Screening and selection of studies were done in two stages. In the first stage, titles and abstracts were screened to identify potentially relevant studies. In the second stage, full-text articles were reviewed to determine if they meet the inclusion criteria. The articles that meet up with managing research administration in the Universities were included and those that did not specifically deal with the subject matter were excluded.

The fourth step was to extract data from the selected studies and synthesize the findings. Data extraction involves the systematic and objective identification, and explanation/summary of data from the selected studies synthesized. The data that was extracted included study outcomes and key findings. The synthesis of findings involves the analysis and interpretation of the data and the identification of patterns and themes. The fifth step was followed to assess the quality of the selected studies. Quality assessment involves evaluating the validity, reliability, and generalizability of the studies. The quality assessment criteria were established at the outset and were based on the research question. The final step was to write the review. The review was structured and included an introduction, literature review, methods, findings recommendations, and area of future research sections. The introduction provided background information on the topic and the research question. The methods section should describe the steps taken to conduct this literature review article. The finding sections summarised the findings. The recommendation section gave recommendations based on the findings, identify gaps in the literature, and provide suggestions for future research.

Discussion

Research management and administration at universities are affected by some things, such as internal and external resources, intellectual ability, and technology transfer agencies. Internal resources, or those that a university has put money into, help it run. Universities are places of learning that create new ideas, services, teaching, and research. Getting these results usually requires universities to spend money on things like teacher salaries, bonuses for good work, research costs, lab costs, and equipment. Faculty members carry out critical functions that keep institutions functioning properly. They are needed for schools and colleges to work. Before, faculty members could only do research and teach. Now, they can also start businesses, and their usefulness in doing so has been emphasized. Their labor costs and performance bonuses are now seen as resources that need to be evaluated if they want to affect new businesses. Research universities have a big effect on how well colleges do (Heisey and Adelman, 2011). Universities have realized that research money is an important resource for new businesses because it helps them buy new technology and makes it more likely that a company will be started using that new technology.

This study looked at the costs of buying lab equipment and supplies as a university resource. It also looked at the costs of hiring people, giving them bonuses for doing well and spending money on research. In this study, both professor and student start-ups were thought to be able to share internal resources and the parts that make them up. External resources for faculty start-ups include money from outside sources that are used to help the school or bring in businesses from outside the school. These sources might include both government and industry research support. Government funding for research is an important way for universities to do research and come up with research results. Several studies have shown that when the government pays for research, universities do better. Foltz *et al*. (2000) found that when the government paid for research, the number of patents in the US went up. Still, there are different conclusions about how government research funding affects commercialization at universities, such as with start-ups. People have criticized the government for putting basic research ahead of business ventures like start-ups when it comes to funding.

There are many reasons why businesses and schools should work together. A business corporation's relationship with a university may help it finish a hard basic research project by giving it access to resources that the business corporation does not control (McMillan et al., 2000). Also, universities can help companies come up with strategies, and working with universities is especially helpful for training a company's first employees (Bozeman, 2000). Institutions must also give business research grants to encourage research that leads to something useful. Getting research money from the industry encourages the sharing of information and joint research with businesses. This is because these actions improve market knowledge and the chance of starting a business that can use future networks (Bienkowska *et al.,* 2016). How corporate research funding affects start-ups, however, was looked at in different ways by different studies. Collaboration with businesses has been shown to boost economically relevant research, but it has also been suggested that it may slow down start-ups because these businesses are usually backed by industry and often want to own the rights to ideas (Powers and McDougall, 2005).

Given these different points of view, it is important to find out how corporate money affects faculty start-ups. Intellectual eminence has been shown to affect faculty start-ups, especially those that involve projects (Di Gregorio and Shane, 2003). One study found that intellectual eminence encourages creative businesses to start up in universities and lets high-quality businesses get their start (Jansen *et al*., 2015). It has been said that professors with a higher intellectual standing are more likely to get money from companies and the government because there may be a lack of information about them (Di Gregorio and Shane, 2003). Lastly, the amazing success of student start-ups like Google and Facebook shows that student start-ups have affected faculty start-ups. Also, colleges that are more like start-ups are more likely to work together and help each other succeed (Morris *et al*., 2017). Recently, the importance of student start-ups has been brought up, and many education and support programs are being made for them. This is expected to make teacher start-ups grow even more. This study looked at how faculty start-ups are affected by student start-ups as well.

The university's start-up assistance program, entrepreneurship classes, internal resources, and technology transfer offices were all thought to help student businesses get off the ground. The start-ups of university students are helped by education that encourages them to be entrepreneurs, simulations that help them put their ideas into action, and incubation that helps them grow their ideas into full-fledged businesses (Jansen *et al*., 2015). Education about entrepreneurship has been shown to have a big effect on new businesses in many different fields (Urbano *et al*., 2017). For a company to help students start their businesses, they need to know that students want to do

so. For this, one needs to learn how to start a business at a university and get hands-on training and experience that is linked to the right resources in the real world. Education and experience with start-ups and real-world situations can help improve self-efficacy and raise expectations. A recent study on new businesses found a link between entrepreneurship skills and the chances of starting a business (Shepherd and DeTienne, 2005). Entrepreneurship education is a way of learning that includes everything from corporate strategy to content creation. The goal is to improve people's attitudes and skills when it comes to being an entrepreneur (Kuratko, 2005).

The creation of a business plan is an important part of teaching students about entrepreneurship because it lets them explain what they want to do and helps them learn the skills and knowledge they need. Programs that teach how to start and run a business help to encourage the growth of new businesses. Entrepreneurship education uses many different methods, but the researchers focused on start-ups, start-up clubs, and a type of group project called Capstone Design. When students know how the Capstone Design program works, they can build, test, and evaluate products that they might use at work or in other places. This program is meant to teach technical staff how to work on-site and to encourage innovation so that the market's needs can be met. Capstone Design is a type of project-based learning that uses project-based practice to help students reach their learning goals (Loyens *et al.,* 2008). Project-based learning combines abstract ideas with real-world situations to help students learn how to act in the real world. Successful educational practices include project-based learning, like Capstone Design, and encouraging entrepreneurship, which requires a wide range of skills and knowledge, from business planning to starting a business (Gibb, 1987). Capstone Design gives students a chance to work with industry, which is likely to help start-ups by giving them a chance to get interested and skilled in certain sectors and markets.

A start-up club is a place where students who want to start a business can talk about their ideas. This is a non-classroom activity that is very important for programs that teach people how to be entrepreneurs (Morris *et al*., 2013). Start-up club activities include mentoring, counselling, advice, and promoting new businesses. These activities make it easier to find new business opportunities, come up with new products, improve management skills, and encourage people to start their businesses. Capstone Design and start-up groups are two examples of programs that teach students about entrepreneurship and have a big impact on how they think about it and what they want to do with it. Student start-ups are also affected by what faculty start-ups do. Students at a university are more likely to join a corporation because it is an organization with shared values and culture. This will be the case if more faculty members launch their firms. Students may also learn about start-up strategies, investigate start-up ideas, and develop their business management abilities via faculty start-ups.

Conclusion

This article explained the most important problems that universities face when it comes to managing and running research. Technology transfer offices affect university start-ups because of what they do and how they do it. Technology transfer offices are very important to the commercialization of technology when faculty members and students own their ideas but don't know how to start a business because they don't know enough about commercialization and start-ups. Since they know about important institutional and regulatory events that affect the commercialization of technology, technology transfer offices may be able to help with initial investments right up until incorporation and reaching stable operating conditions. The article on challenges associated with research management and administration in universities is important because it sheds light on the complexities and difficulties faced by universities in managing and administering research. It will add to knowledge by providing insights into the various challenges and issues that researchers and university administrators face, such as funding, compliance, ethics, and academic excellence. This article can help to identify potential solutions to these challenges and promote discussions on how to address them, ultimately contributing to the improvement of research management and administration practices in universities.

Additionally, the article can inform policymakers and funding agencies about the challenges faced by universities and help them to make informed decisions about research funding and support. Overall, this article will be a valuable resource for students, early career researchers, university administrators, and policymakers seeking to better understand the complexities of research management and administration in universities. This article focused on the challenges associated with research management and administration in Universities. Further research may be conducted to investigate the impact of legal, human, economic, structural, and cultural factors on research management and administration in universities. The recommendations related to coordinating and collaborating

with faculty and student start-ups discussed in this article could also be researched further to create a roadmap for framing resilient support systems for research, innovation, and commercialization.

References

Ansari, M., Armaghan, N. and Ghasemi, J. 2016. Barriers and Solutions to Commercialization of Research Findings in Schools of Agriculture in Iran: A Qualitative Approach. *International Journal of Technology*, 1: 5-14.

Ashrieh, Z., Asghari, H. and Shafia, S. 2016. Meta-Analysis of the Link between Industry and University. *Journal of Industry and University*, 9(18): 65-80.

Baycan, T. 2013. *Knowledge Commercialization and Valorization in Regional Economic Development*. Cheltenham, U.K. and Northampton, Massachusetts: Edward Elgar Publishing.

Bienkowska, D., Klofsten, M. and Rasmussen, E. 2016. PhD Students in the Entrepreneurial University—Perceived Support for Academic Entrepreneurship. *European Journal of Education*, 15(1): 56–72.

Biranvand, A. and Seif, M. H. 2020. Effective Factors on Knowledge Commercialization in Payam-e-Noor University. *International Journal of Information Science and Management (IJISM)*, 19(1): 99-124.

Boehm, D. N. and Hogan, T. 2013. Science to Business Collaborations: A Science-to Business Marketing Perspective on Scientific Knowledge Commercialization. *Industrial Marketing Management*, 42(4): 564-579.

Bozeman, B. 2000. Technology Transfer and Public Policy: A Review of Research and Theory. *Research Policy*, 29(4-5): 627–655.

Budi, A. A. and Aldianto, L. 2020. Research and Development–Commercialization Bridge: A Refined Model. *The Asian Journal of Technology Management*, 13(1): 47-62.

Chesbrough, H. 2006. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Cambridge MA: Harvard Business School Press.

Clark, B. 2004. *Sustaining Change in Universities, Society for Research into Higher Education*. London: Open University Press.

Decter, M., Bennett, D. and Leseure, M. 2007. University to Business Technology Transfer-UK and USA Comparisons. *Technovation*, 27(3):145-155.

Delmar, F. and Davidsson, P. 2000. Where do they Come from? Prevalence and Characteristics of Nascent Entrepreneurs. *Entrepreneurship and Regional Development*, 12(1): 1-23.

Di Gregorio, D. and Shane, S. 2003. Why do some Universities Generate more Start-ups than Others? *Research Policy*, 32(2): 209-227.

Djokovic, D. and Souitaris, V. 2008. Spinouts from Academic Institutions: A Literature Review with Suggestions for further Research. *Journal of Technology Transfer*, 33: 225-247.

Erfan, A. and Nadi, M. A. 2016. Components of Knowledge Commercialization in the Selected Universities of the World. *Czech-Polish Historical and Pedagogical Journal*, 8(2): 103–111.

Etzkowitz, H. 2001. The Second Academic Revolution and the Rise of Entrepreneurial Science. *IEEE Technology and Society*, 22(2): 18-29.

Etzkowitz, H. and Leydesdorff, L. 2000. The Dynamics of Innovation: From National Systems Mode 2 to a Triple Helix of University-Industry-Government Relations, *Research Policy*, 29(2): 109-123.

Farsi Jahangir, Y., Modarresi, M., Motavaseli, M. and Salamzadeh, A. 2014. Institutional Factors Affecting Academic Entrepreneurship: The Case of University of Tehran. *Economic Analysis*, 47(1-2): 139-159.

Foltz, J., Barham, B. and Kim, K. 2000. Universities and Agricultural Biotechnology Patent Production. *Agribusiness*, 16(1): 82-95.

García, F., Ramírez, G., Dra, C., González, O. and Torrejón, L. 2017. Coherencia Estratégica del Spin Off Universitarias y su Impacto en el Contexto Mexicano. *Retos de la Dirección*, 11(2): 38-55.

Gibb, A. A. 1987. Designing Effective Programmes for Encouraging and Supplying the Business Start-up Process: Lessons from UK Experience. *Journal of European Industrial Training*, 11(4): 24–32.

Hassangholipour, H., Roshandel, T. and Gholipour, A. 2012. Barriers to Knowledge Commercialization in Academic Entrepreneurship. *Entrepreneurship Development*, 4(14): 183-165.

Heisey, P. and Adelman, S. 2011. Research Expenditures, Technology Transfer Activity, and University Licensing Revenue. *The Journal of Technology and Transfer*, 36: 38–60.

Hillemane, B. S. M., Satyanarayana, K. and Chandrashekar, D. 2019. Technology Business Incubation for Start-up Generation: A Literature Review toward a Conceptual Framework. *International Journal of Entrepreneurial Behavior and Research*, 25(7): 1471-1493.

Hosseinian, H., Ghazi Noori, F. and Goodarzi, M. 2015. Identification of Factors Affecting the Technology Commercialization Strategy using the Advanced Method. *Technology Development Management Journal*, 3(1):63-97.

Jansen, S., van de Zande, T., Brinkkemper, S., Stam, E. and Varma, V. 2015. How Education, Stimulation, and Incubation Encourage Student Entrepreneurship: Observations from MIT, IIIT, and Utrecht university. *International Journal of Management Education*,13(2): 170–181.

Kalantaridis, C. and Küttim, M. 2023. Multi-Dimensional Time and University Technology Commercialisation as Opportunity Praxis: A Realist Synthesis of the Accumulated Literature. *Technovation*, 122: 1-12.

Khan, M. 2017. Are Universities Ready for Knowledge Commercialization?. *Technology Innovation Management Review*, 7(7): 63-68.

Kuratko, D. 2005. The Emergence of Entrepreneurship Education: Development, Trends, and Challenges. *Entrepreneurship Theory and Practice*, 29(5): 577–597.

Lockett, A. and Wright, M. 2005. Resources, Capabilities, Risk Capital and the Creation of University Spin-out Companies. *Research Policy*, 34(7): 1043-1057.

Lockett, A., Wright, M. and Franklin, S. 2003. Technology Transfer and Universities´ Spin-out Strategies. *Small Business Economics*, 20(2): 185-200.

Loyens, S. M., Agda, J. and Rikers, R. M. 2008. Self-Directed Learning in Problem-Based Learning and its Relationship with Self-Regulated Learning. *Educational Psychology Review*, 20: 411–427.

Madichie, N. O. and Agu, A. G. 2023. The Role of Universities in Scaling up Informal Entrepreneurship. *Industry and Higher Education*, 37(1): 94-109.

Masudian, P., Farhadpoor, M. R. and Ghashgayizadeh, N. 2013. Commercializing University Research Results: A Case Study by Behbahan Islamic Azad University. *Library Philosophy and Practice (e-Journal),* 870: 1-19.

Mathisen, M. T. and Rasmussen, E. 2019. The Development, Growth, and Performance of University Spin-offs: A Critical Review. *The Journal of Technology Transfer*, 44(6): 1891-1938.

McMillan, G. S., Narin, F. and Deeds, D. I. 2000. An Analysis of the Critical Role of Public Science in Innovation: The Case of Biotechnology. *Research Policy*, 29(1): 1–8.

Mehta, S. S. 2008. *Commercializing Successful Biomedical Technologies: Basic Principles for the Development of Drugs, Diagnostics and Devices*. New York: Cambridge University Press.

Meigounpoory, M. R. and Ahmadi, B. 2012. Identification of the Factors that Affect in Choosing the University Research Commercialization Strategies. *International Journal of Recent Research and Applied Studies,* 12(1): 140-147.

Morris, M. H., Shirokova, G. and Tsukanova, T. 2017. Student Entrepreneurship and the University Ecosystem: A Multi-Country Empirical Exploration. *European Journal of International Management*, 11(1): 65–85.

Morris, M. H., Webb, J. W., Fu, J. and Singhal, S. 2013. A Competency-Based Perspective on Entrepreneurship Education: Conceptual and Empirical Insights. *Journal of Small Business Management*, 51(3): 352–369.

Nadirkhanlou, S., Pourezzat, A. A. and Gholipour, A. Zehtabi, M. 2012. Requirements of Knowledge Commercialization in Universities and Academic Entrepreneurship. In: Howlett, R., Gabrys, B., Musial-Gabrys K. and Roach, J. eds. *Innovation through Knowledge Transfer 2012. Smart Innovation, Systems and Technologies*. Berlin, Heidelberg: Springer, 179-194.

Nicola, B., Rosa, G. and Maurizio, S. 2006. Institutional Changes and the Commercialization of Academic Knowledge: A Study of Italian Universities Patenting Activities between 1965 to 2002. *Research Policy*, 35(4): 120-131.

Parker, L., Martin-Sardesai, A. and Guthrie, J. 2023. The Commercialized Australian Public University: An Accountingized Transition. *Financial Accountability and Management*, 39(1): 125-150.

Pazos, D. R., López, S. F., González, L. O. and Sandiás, A. R. 2010. Factores determinantes de la creación de spin-offs universitarias. *Revista Europea de Dirección Y Economía de la Empresa*, *19*(1): 47-68.

Penrose, E. T. 1956. Foreign Investment and the Growth of the Firm. *Economic Journal*, 66(262): 220–235.

Pérez-Hernández, P., Calderón, G. and Noriega, E. 2021. Generation of University Spin Off Companies: Challenges from Mexico. *Journal of Technology Management and Innovation*, 16(1): 14-22.

Pirnay, F., Surlemont, B. and Nlemvo, F. 2003. Toward a Typology of University Spin-offs. *Small Business Economics*, 21(4): 355-369.

Pourfateh, N., Naderi, N. and Rostami, F. 2017. Study of the Factors Affecting Commercialization of Agricultural Innovation in Kermanshah Science and Technology Park, Iran. *International Journal of Agricultural Management and Development*, 7(1): 121- 132.

Powers, J. and McDougal, L. 2005. University Start-up Formation and Technology Licensing with Firms that Go Public: A Resource-Based View of Academic Entrepreneurship. *Journal of Business Venturing*, 20(3): 291- 311.

Rasmussen, E., Qystein, M. and Gulbrandsen, M. 2006. Initiatives to Promote Commercialization of University Knowledge. *Technovation*, 26(4): 518-533.

Ravi, R. and Janodia, M. D. 2022. Factors Affecting Technology Transfer and Commercialization of University Research in India: A Cross-Sectional Study. *Journal of the Knowledge Economy*, 13: 787-803.

Santamaria, C. and Brunet, I. 2007. Creación de Empresas y Spin-off Universitarias en México. *Ride Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, 5(9): 16-41.

Sarpong, D., AbdRazak, A., Alexander, E. and Meissner, D. 2017. Organizing Practices of University, Industry and Government that Facilitate (or impede) the Transition to a Hybrid Triple Helix Model of Innovation. *Technological Forecasting and Social Change*, 123: 142-152.

Schraudner, M., Sinell, A. and Shutz, F. 2016. Analysis of Knowledge and Technology Transfer between Science, Industry, and the Public in African Innovation Systems: Results from Botswana, South Africa, and Namibia. Available: https://www.researchgate.net/publication/346487647_Analysis_of_Knowledge_and_Technology_Transfer_between_Science_Industry_and_the_Public_in_AfricanGerman_Kollaborations_Results_for_South_Africa_Namibia_and_Botswana (Accessed 8 June 2023).

Schulte, P. 2004. The Entrepreneurial University: A Strategy for Institutional Development. *Higher Education in Europe*, 29(2): 187-191.

Shepherd, D. A. and DeTienne, D. R. 2005. Prior Knowledge, Potential Financial Reward, and Opportunity Identification. *Entrepreneurship Theory and Practice*, 29(1): 91–112.

Stal, E., Tales, A. and Fujino, A. 2016. The Role of University Incubators in Stimulating Academic Entrepreneurship. *Revista de Administração e Inovação*, 13(2): 89-98.

Urbano, D., Aparicio, S., Guerrero, M., Noguera, M. and Torrent-Sellens, J. 2017. Institutional Determinants of Student Employer Entrepreneurs at Catalan Universities. *Technological Forecasting Social Change*, 123: 271–282.