Navigating Spin-Off Decisions: The Role of Key Factors Support in Thai Universities

Chanisa Maneerattanarungrot*
Mullika Sungsanit**
Apisara Wichean***
Bongse Varavuddhi Muenyuddhi****
Wiwat Nuansing*****
Lars Andersson******
Ekburus Boonsoy***

Abstract

The study investigates academic spin-off ventures in Thai universities, with a particular focus on the perception of university intellectual property support, funding support, attitudes towards intellectual property knowledge, and the perceived influence of funding resources on spin-off decisions. A positive correlation exists between favorable intellectual property knowledge and spin-off engagement, suggesting the need for educational programs to enhance awareness. Perceived funding resources significantly impact spin-off decisions, emphasizing the importance of accessible financial support. Collaboration between universities and stakeholders is vital to providing diverse funding opportunities, including government grants and venture capital. While institutional support lacks statistical significance, personal beliefs heavily influence spin-off decisions. These insights are crucial for fostering a thriving spin-off ecosystem in Thai universities, with implications for economic and societal development. Recommendations include investing in faculty and researcher education on intellectual property and ensuring diverse funding sources are available to effectively support academic spin-off ventures.

Keywords: Academic Spin-Off Ventures; Intellectual Property Support; Funding Resources; Technology Transfer Offices; Technology Commercialization

Received: March 26, 2024 | **Revised:** July 8, 2024 | **Accepted:** August 8, 2024

* Assistant Professor, School of Management Technology, Institute of Social Technology, Suranaree University of Technology, (Correspondence).
** Lecturer, School of Management Technology, Institute of Social Technology, Suranaree University of Technology.
*** Researcher, Center of excellence for Entrepreneurship, Suranaree University of Technology.
**** Lecturer, Institute of Digital Arts and Science, Suranaree University of Technology.
***** Lecturer, School of Physics, Institute of Science, Suranaree University of Technology.
****** Lecturer, Technopolis, Innovation and IP Management, Suranaree University of Technology.

Introduction

The establishment and growth of university spin-off ventures have become increasingly significant in driving innovation and economic development within Thailand and across the global landscape. These spin-off ventures, born from the fertile grounds of academic institutions, have the potential to bridge the gap between research and practical applications, fostering technological advancements, job creation, and economic prosperity (Katila et al., 2008; Hayter, 2015). Nonetheless, despite their transformative potential, the creation and successful operation of university spin-off ventures are often fraught with formidable challenges, two of the most conspicuous being the scarcity of financial resources and the intricate web of intellectual property considerations (Mowery & Sampat, 2004; Markman et al., 2008).

Launching a new venture demands significant capital for research and development, product commercialization, and scaling operations. Securing funding for university spin-offs can often be a daunting task due to their perceived high-risk nature (Mowery & Sampat, 2004). This scarcity of financial resources can hinder the growth and sustainability of these ventures.

In addition to financial constraints, university spin-off ventures must navigate the complex world of intellectual property. Academic institutions produce significant intellectual property through research efforts (Mowery & Sampat, 2004), and transferring this to spin-off ventures involves navigating complex legal and contractual arrangements (Markman et al., 2008). Issues such as ownership, licensing, and protecting intellectual property present substantial challenges that require careful management for the successful operation of these ventures.

Despite the growing recognition of the potential impact of university spin-off ventures in Thailand, there remains a limited understanding of the specific factors that influence their success or failure within the Thai context. In particular, the nuanced interplay between financial resources, intellectual property considerations, and the broader institutional environment within Thai universities remains underexplored.

This research seeks to answer the following overarching questions: What are the key factors, including financial resources and intellectual property considerations, that significantly influence the success or failure of university spin-off ventures in Thailand?

By delving into the intricate world of Thai university spin-off ventures, this research scrutinizes the critical role of financial resources and intellectual property in their formation and development. As the cornerstone of innovation, these ventures hold the promise to drive economic growth, facilitate technology transfer, and promote academic entrepreneurship. Nevertheless, the journey from research laboratory to commercial viability is fraught with uncertainties, barriers, and the ever-present risk of failure.

Through empirical research, data analysis, and case studies, this study aims to shed light on the challenges that aspiring entrepreneurs, academic institutions, and policymakers face in nurturing and sustaining these spin-off ventures. By addressing the barriers imposed by funding limitations and intellectual property issues, this research aims to provide valuable insights and recommendations to bolster the creation of university spin-off ventures in Thailand. Ultimately, the findings of this research can contribute to the broader conversation on fostering innovation, economic development, and academic entrepreneurship, not only within Thailand but also in a global context.

Literature Review

Academic spin-off

The development and growth of academic spin-off ventures have gained increasing attention in the literature due to their potential to drive innovation and economic development (Mathisen & Rasmussen, 2019). Academic spin-off ventures, born from academic institutions, serve as a bridge between research and practical applications, fostering technological advancements, job creation, and economic prosperity.

Academic spin-offs are typically defined as new companies created to exploit knowledge, technology, or research results developed within academic institutions (Pirnay et al., 2003). These ventures play a crucial role in the knowledge economy by translating academic research into commercial products and services, thereby enhancing the economic impact of universities (Shane, 2004). They contribute to regional economic development by creating high-skilled jobs and attracting investment (Fini et al., 2017). Moreover, spin-offs often maintain close ties with their parent institutions, facilitating knowledge exchange and potentially enhancing the quality and relevance of academic research (Rasmussen & Wright, 2015).

The process of creating and developing academic spin-offs is multifaceted and often challenging. It involves the transfer of knowledge from an academic setting to a commercial environment, requiring a delicate balance between scientific pursuits and business objectives (Vohora et al., 2004). This process often necessitates the acquisition of new skills and resources, as well as the navigation of potential conflicts of interest between academic and commercial activities (Siegel et al., 2003).

Furthermore, the impact of academic spin-offs extends back to their parent institutions. Spin-off activities can have a peripheral halo effect, positively influencing universities' research income and reputation (Pitsakis et al., 2015). This potential benefit underscores the symbiotic relationship between academic institutions and their spin-off ventures.

In conclusion, academic spin-offs represent a vital mechanism for translating academic knowledge into economic and societal benefits. They embody the entrepreneurial potential of universities and play a crucial role in bridging the gap between academic research and practical applications. Understanding the nature, development, and impact of these ventures is critical for fostering innovation, promoting economic growth, and improving the societal impact of academic institutions.

Factors affecting academic spin-off decision

A complex interplay of factors encompassing institutional, individual, and environmental dimensions influences the decision to pursue academic spin-off ventures. This section reviews the key factors identified in previous research that lead to academic spin-off decisions.

Institutional Factors: Academic spin-off decisions consistently identify institutional support as a critical factor. This includes: a) Intellectual Property (IP) Support: The presence and effectiveness of Technology Transfer Offices (TTOs) play a crucial role in spin-off creation (Algieri et al., 2011). TTOs assist in identifying, protecting, and commercializing intellectual property, thereby facilitating the spin-off process (Siegel et al., 2007). b) Funding Support: University-provided financial resources, including seed funding and access to

external funding sources, significantly influence spin-off decisions (Shane, 2004; Rasmussen & Borch, 2010).

Individual Factors: The characteristics and attitudes of potential academic entrepreneurs are pivotal in spin-off decisions. a) Entrepreneurial Orientation: Academics with higher entrepreneurial tendencies are more likely to engage in spin-off activities (Clarysse et al., 2011). b) Attitude Toward IP: While less studied, the individual's understanding and perception of IP can influence their decision to commercialize research through spin-offs (Thursby & Thursby, 2002).

Resource Factors: The availability and perception of resources significantly impact spin-off decisions. a) Financial Resources: Access to funding, both perceived and actual, is a key determinant of spin-off creation (Mustar et al., 2006). b) Human capital: The availability of skilled personnel and mentors can influence the decision to create a spin-off (O'Shea et al., 2005).

Environmental Factors: External conditions also play a role in spin-off decisions. a) Market Demand: The perceived market potential for the technology or innovation can encourage spin-off creation (Perkmann et al., 2013). b) Industry Partnerships: Strong university-industry relationships can facilitate spin-off formation (Link & Scott, 2005).

To summarize these factors and identify potential gaps in the literature, we present the following table 1:

Table 1: Key Factors Influencing Academic Spin-off Decisions

Factor Category	Specific Factor	Key Studies	Included in Current Study
Institutional	IP Support	Siegel et al. (2007), Algieri et al. (2011)	Yes
	Funding Support	Shane (2004), Rasmussen & Borch (2010)	Yes
Individual	Entrepreneurial Orientation	Clarysse et al. (2011)	No
	Attitude Toward IP	Thursby & Thursby (2002)	Yes
Resources	Financial Resources	Mustar et al. (2006)	Yes
	Human Capital	O'Shea et al. (2005)	No
Environmental	Market Demand	Perkmann et al. (2013)	No
	Industry Partnerships	Link & Scott (2005)	No

Table 1 highlights several important gaps in the existing literature on academic spin-off decisions. Firstly, despite extensive research on institutional support, our study focuses on how individuals perceive this support. Our study addresses this gap by examining perceived university intellectual property support (PUIP) and perceived university funding support (PUF). Secondly, the specific role of attitudes toward intellectual property knowledge (AIP) in spin-off decisions is underexplored. Our focus on this factor represents a unique contribution to the field. Thirdly, many studies focus on objective measures of resource availability. In contrast, our study examines perceived funding resources (PFR), offering new insights into how perceptions of available resources influence spin-off decisions.

Furthermore, although the literature acknowledges environmental factors like market demand and industry partnerships, our study does not directly address them, indicating a potential area for future research. Importantly, the interplay between these factors, particularly

in non-Western contexts like Thailand, remains understudied. By addressing these gaps, our study aims to provide a more comprehensive and nuanced understanding of the factors influencing academic spin-off decisions, particularly in the context of Thai universities. This approach allows us to contribute to the broader academic discourse on spin-off ventures while also offering valuable insights specific to the Thai higher education landscape.

Perceived university intellectual property support (PUIP)

Perceived University Intellectual property support refers to the degree to which university community members, including faculty, researchers, and students, believe that the institution offers assistance, resources, and guidance concerning the safeguarding, administration, and commercialization of intellectual property. This support encompasses services like aiding in patent filings, facilitating technology licensing, fostering industry partnerships, and providing educational programs on intellectual property matters. Technology Transfer Offices (TTOs) are specialized units within universities responsible for overseeing and promoting the transfer of innovations and intellectual property generated within the university to the commercial sector (Duval-Couetil et al., 2014). These offices are crucial in identifying, protecting, and bringing academic innovations and discoveries into the real world. TTOs collaborate with inventors, industry partners, and other stakeholders to ensure the successful transition of intellectual property into practical applications. Their role in creating spin-off ventures is indispensable for commercializing university research (Montiel-Campos, 2018). University administrators should consider the pivotal role TTOs play in the commercialization process to enhance their effectiveness in supporting spin-off creation.

Furthermore, TTOs' organizational philosophy, which integrates their mission and vision and influences their support for spin-off ventures, can significantly impact spin-off creation. Categorizing the different organizational philosophies within TTOs can provide insights into their effectiveness in promoting spin-off creation (Meysman et al., 2019). According to Algieri et al. (2011), substantial financial resources and a full-time, highly skilled TTO workforce are critical factors in boosting spin-off creation. Notably, the age of the TTO does not affect its ability to foster additional spin-offs. Additionally, O'Shea et al. (2005) discovered a positive and statistically significant correlation between the number of technology transfer office employees and the rate of spin-off creation. As a result, university support, especially from TTOs, can significantly influence the creation of spin-off ventures. Based on these findings, we propose the following:

H1: The perceived university intellectual property support has a significant impact on academic spin-off decisions.

Perceived university funding support (PUF)

Perceived university funding support is the subjective assessment of the financial resources, opportunities, and incentives made available to university-affiliated researchers, students, and faculty to commercialize their research or innovative ideas. It encompasses the perceived accessibility and adequacy of funding mechanisms such as grants, seed capital, investment, and incubation support. It also considers the perceived ease of navigating administrative procedures and securing financial resources within the university environment. Gras et al. (2007)'s research indicates that university financial support influences spin-off activity and performance. The finding suggests that university financial support may be critical for developing new spin-offs in European universities, perhaps due to the need for more investment sources such as external venture capital and business angels. Link and Scott (2005)

examine the determinants of university spin-off formation and find that financial support from the university is a significant factor. This support can come in the form of seed funding, grants, or access to research facilities and resources. Shane (2004) emphasizes the importance of academic entrepreneurship and argues that universities should actively support spin-off creation through funding mechanisms and supportive policies. Therefore, we proposed that:

H2: The perceived university funding support has a significant impact on academic spin-off decisions.

Attitude toward intellectual property knowledge (AIP)

"Attitude toward intellectual property knowledge" can be defined as an individual's or organization's disposition, beliefs, and perceptions concerning the significance and utilization of intellectual property assets, along with the strategies for safeguarding and capitalizing on them. This attitude encompasses a range of factors, including one's comprehension of intellectual property rights, willingness to invest in protecting these rights, and the ability to harness intellectual property as a strategic asset. It reflects how stakeholders value and integrate intellectual property knowledge into their innovations and business strategies.

Thursby and Thursby's 2002 research investigated the drivers of growth in university licensing and found that intellectual property knowledge plays a pivotal role. They emphasized the importance of technology transfer offices in effectively managing and commercializing intellectual property originating from universities. Shane, in 2004, specifically focused on academic entrepreneurship and establishing university spin-offs, highlighting the critical role of intellectual property in generating wealth. He suggested that universities should actively encourage and support their faculty members in commercializing their research through spin-off ventures, which foster a positive attitude toward intellectual property knowledge.

Furthermore, Siegel et al. (2007) delved into the surge of entrepreneurial activities within universities and their implications. They argued that universities play a pivotal role in nurturing entrepreneurship and that intellectual property knowledge is a fundamental resource for the successful creation of spin-off ventures. Therefore, we proposed that:

H3: Attitude Toward Intellectual Property Knowledge significantly impacts academic spin-off decisions.

Perceived funding resources (PFR)

Perceived funding resources pertain to an entrepreneur's subjective assessment of the financial and capital assets available for initiating and sustaining a spin-off venture. This encompasses the entrepreneur's beliefs regarding the accessibility, sufficiency, and reliability of funding sources, including venture capital, angel investors, government grants, bank loans, and personal savings. The entrepreneur primarily influences these perceived funding resources through their evaluation of internal and external factors that affect their ability to secure financial support.

Evans and Leighton (1989) proposed that financial constraints constitute a significant obstacle to entrepreneurship. Gentry and Hubbard (2004) found that individuals with access to financial capital are more likely to embark on entrepreneurial endeavors. Blanchflower and Oswald (1998) hypothesized that to foster entrepreneurship, the government should augment the availability of financial capital for potential entrepreneurs with limited resources. Some empirical studies suggest that in developing countries, a lack of access to finance and

complications within the financial system pose substantial constraints for aspiring entrepreneurs (Kristiansen & Indarti, 2004).

We can categorize funding sources supporting spin-off creation into two groups: those supporting academic research and those supporting market and business development. Rasmussen et al. (2014) emphasized the critical role of funding for academic research in establishing university spin-offs. The amount invested in research has a significant impact on the activities of university spin-offs. Bodolica and Spraggon (2021) also assert that the potential for high-quality research leading to commercial value is limited without access to funds. Odei and Stejskal's (2018) research demonstrates a close relationship between research and development funding and the establishment of new spin-off firms by UK universities. Concurrently, Mosey et al. (2017) posit that financial resources are essential for crafting business plans and conducting market research, both crucial for the formation of new spin-off firms. Therefore, we proposed that:

H4: Perceived funding resources significantly impact academic spin-off decisions.

Theoretical Model

The authors' theoretical model, as depicted in Figure 1, establishes robust hypothetical connections. This model has four independent variables: attitude toward intellectual property knowledge (AIP), perceived funding resources (PFR), perceived university intellectual property support (PUIP), and perceived university funding support (PUF). The dependent variable is academic spin-off decision (ASD).

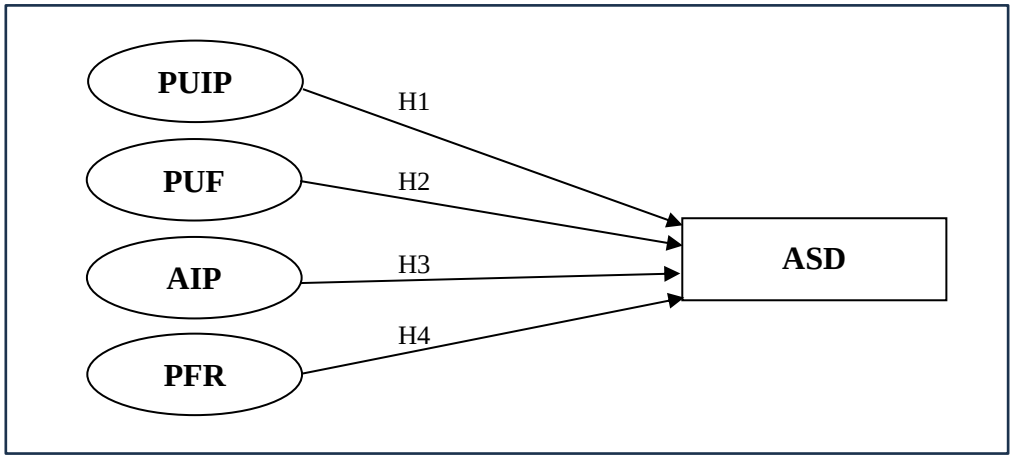


Figure 1: Theoretical Model and Research Hypotheses

Research Methodology

Participants

This research focused on researchers and students engaged in technology and innovation-related enterprises, specifically spin-off companies affiliated with 34 Thai universities in Group 1 global and frontier research and Group 2 technology and innovation, as defined by the Ministry of Higher Education, Science, Research, and Innovation (2021). To determine an appropriate sample size for our study, we followed the "5 cases per observed

variable" rule. This guideline, widely accepted in structural equation modeling (SEM), recommends a minimum sample size of five times the number of observed variables for robust analysis (Bentler & Chou, 1987; Hair et al., 2010). Our theoretical model includes four independent variables (perceived university intellectual property support, perceived university funding support, attitude toward intellectual property knowledge, and perceived funding resources) and one dependent variable (academic spin-off decision). Multiple observed indicators measure each variable, bringing the total to 15 observed variables. Therefore, we aimed to include at least 75 participants in our study. To account for potential incomplete responses, we added a buffer of approximately 10–20%, as suggested by Anderson and Gerbing (1984). For our sampling approach, we adopted a non-probabilistic method, specifically utilizing purposive sampling based on predetermined criteria. These criteria consisted of: 1) Affiliation with a Thai university as either a researcher or a student. 2) Participation in technology and innovation-related businesses, with a focus on spin-off companies. Between April and September 2022, we distributed 150 survey questionnaires to researchers and students affiliated with spin-off companies within Thai universities using the Survey Monkey platform. Ultimately, we received 128 completed questionnaires, resulting in a response rate of 85.3% of a participant pool comprising 128 researchers and students associated with spin-off companies within Thai universities.

Questionnaire Development

In this research article, we developed a self-assessment questionnaire comprising three distinct sections, each meticulously crafted following an extensive literature review. We designed the initial section of the questionnaire to gather demographic information about the respondents. We looked at different ideas in the second part. These included five-item tests for perceived university intellectual property support (PUIP) (based on Radinger-Peer & Sedlacek, 2017; Gibb, 2012), four-item tests for perceived university funding support (PUF) (based on Radinger-Peer & Sedlacek, 2017; Gibb, 2012), two-item tests for attitude toward intellectual property knowledge (AIP) (based on student attitudes toward intellectual property from the National Union of Students, 2012), and three-item tests for perceived funding resources (PFR) (from Tan, 2018; Svotwa et al., 2022). Lastly, the third section of the questionnaire assessed academic spin-off decision (ASD) (adapted from Yordanova et al., 2020) with one item. Respondents rated all items in sections 2 and 3 on a five-point Likert scale, with one indicating "strongly disagree" and five indicating "strongly agree."

To ensure the questionnaire's validity, native Thai translators conducted a rigorous translation process into Thai. Additionally, three academic professionals specializing in academic spin-off creation thoroughly examined and selected appropriate and relevant questions. We employed the Index of Item Objective Congruence (IOC) as a statistical measure to evaluate the alignment between test items and specified criteria or objectives. Among the 15 items, 13 demonstrated IOC values between 0.60 and 1.00. This range, exceeding the 0.5 threshold, indicates that the questionnaire is appropriate according to the criteria established by Rovinelli and Hambleton (1977). We carefully revised the remaining two items, which had an IOC value of 0.33, based on feedback from the three academic professionals. This process ensured that the questionnaire was not only linguistically accurate but also conceptually valid for the Thai academic context. We evaluated the reliability of the measurement scales using Cronbach's alpha, a widely recognized measure of internal consistency (Cortina, 1993). Cronbach's alpha value of.878 indicated a satisfactory level of internal consistency (Nunnally, 1978).

Data analysis

We conducted a frequency analysis to investigate the demographic characteristics of the questionnaire items. We treated them as independent variables in order to explore the factors influencing perceived university intellectual property support (PUIP), perceived university funding support (PUF), attitude toward intellectual property knowledge (AIP), and perceived funding resource (PFR). At the same time, academic spin-off decision (ASD) was considered the dependent variable. We examined these relationships using structural equation modeling (SEM) and carried out data analysis using SPSS 26.0 and AMOS 24.0.

Research Findings

Demographic Characteristics

Table 2: Demographic Characteristics of the Participants

Variable	Frequency	Percentage (%)
Gender		
Male	62	48.44
Female	60	46.87
Non-disclosure	6	4.69
Age (year)		
< 25	53	41.41
26 – 35	53	41.41
36 – 45	13	10.15
46 – 55	9	7.03
Institute		
Fine art	31	24.22
Industry and Technology	18	14.06
Medicine/Dentistry	23	17.97
Engineering	1	0.78
Agricultural Technology	3	2.34
Business and Management	7	5.47
Information Technology/Digital Technology	8	6.25
Science	32	25.00
Education	2	1.56
Allied health sciences	1	0.78
Communication Arts	1	0.78
Renewable energy	1	0.78
Status		
Bachelor degree student	46	35.94
Master degree student	31	24.22
Doctoral degree student	10	7.81
Full-time researcher / post-doc	21	16.41
Teacher in university	20	15.62
University Group		
Group 1 Global & Frontier Research University	88	68.75
Group 2 Technology and Innovation University	40	31.25

Note: The total number of participant (n=128)

Table 2 summarizes the demographics of the survey participants. Roughly half of the respondents identified as male (48.44%), with the remainder identifying as female (46.87%) or choosing not to disclose their gender (4.69%). The largest age group among participants

included individuals under 25 and those aged 21–25, each accounting for 41.41% of the total. Regarding educational status, a notable proportion of respondents were pursuing bachelor's degrees (35.94%) within the Institute of Science (25.00%). Furthermore, most participants were affiliated with Group 1 Global & Frontier Research University, representing 68.75% of the sample.

Normality, Linearity, and Reliability Test

The assumption of normality is a fundamental prerequisite for many parametric statistical tests. In our pursuit of assessing the normality of our dataset, we conducted two essential tests: the Skewness and Kurtosis tests. Skewness is a measure of the symmetry of the data distribution, whereas kurtosis assesses the distribution's peakedness or flatness. In a normally distributed dataset, skewness should approximate zero, and kurtosis should be around 3, corresponding to a standard normal distribution. As shown in Table 3, the results affirm that our sample data aligns with the characteristics of a normal distribution (Hair et al., 2010).

Linearity is a critical assumption, particularly in the context of regression analysis and correlation studies. To assess the linearity between variables, we employed the Pearson correlation coefficient. This coefficient quantifies the strength of linear relationships between two continuous variables, ranging from -1, indicating a perfect negative linear relationship, to 0, implying no linear relationship, and 1, denoting a perfect positive linear relationship.

In our research, we computed Pearson correlation coefficients for pertinent pairs of variables to determine whether a significant linear association existed between them. Correlation coefficients with absolute values approaching 1 are indicative of robust linear relationships, while parameters approaching 0 suggest weaker or negligible linear relationships. As presented in Table 3, our findings demonstrate that our independent variables exhibit a discernible linear relationship with the dependent variable (Hair et al., 2010).

Table 4 presents the reliability analysis results. All variables showed an internal consistency reliability greater than 0.7 (Nunnally, 1978).

Validity analysis

In this study, we evaluated the validity using confirmatory factor analysis (CFA), explicitly assessing convergent validity. Convergent validity is acceptable when the factor loading is 0.5 or higher, the average variance extracted (AVE) is 0.5 or higher, and the construct reliability (CR) exceeds 0.7.

Our validity analysis results indicated that the independent variables' factor loadings, AVE and CR, did not meet the desired thresholds. As a result, we excluded items that did not meet these criteria and presented the final set of items that met the established criteria in the adjusted variable, as demonstrated in Table 4.

Table 3: Normality and Linearity Test Results.

Factors	Skewness	Kurtosis	PUIP	PUF	AIP	PFR	ASD
PUIP	-0.024	-0.826	1				
PUF	-0.379	-0.343	.568**	1			
AIP	-1.023	0.437	.197*	.185*	1		
PFR	-0.45	-0.197	.476**	.662**	.364**	1	
ASD	-0.445	-0.322	.300**	.359**	.444**	.582**	1

Notes: ** $p < 0.01$, * $p < 0.05$

Table 4: Mean, Standard Deviation, Reliability Analysis and CFA Analysis Results

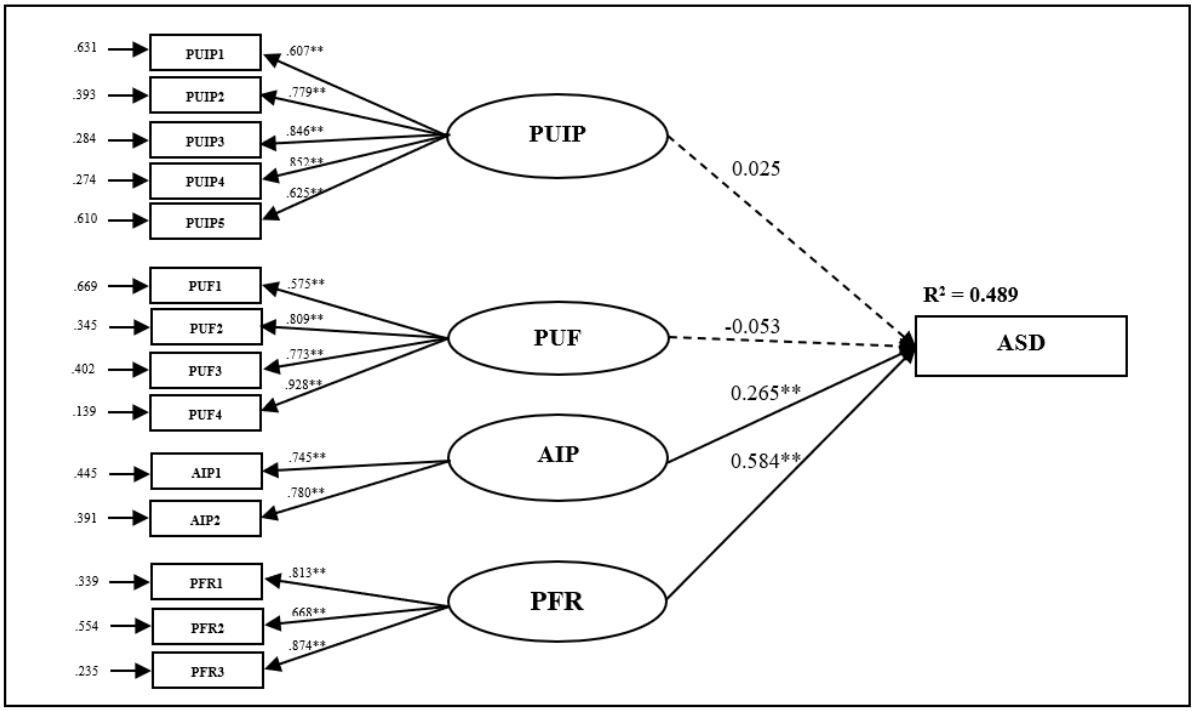
Construct	Mean	S.D.	Reliability	Factor loading	SE.	R^2	Model Fit
PUIP	**3.62**	**.768**	0.867				χ^2 = 6.863, df = 4, p = 0.1433, χ^2/df =1.716, CFI = 0.991, TLI =0.978, RMSEA = 0.075, SRMR = 0.021 AVE = 0.555, CR = 0.859
PUIP1	3.52	.922		0.607**	0.065	0.369	
PUIP2	3.45	.963		0.779**	0.050	0.607	
PUIP3	3.74	.933		0.846**	0.035	0.716	
PUIP4	3.84	.920		0.852**	0.040	0.726	
PUIP5	3.56	1.010		0.625**	0.060	0.390	
PUF	**3.30**	**.788**	0.848				χ^2 = 4.092, df = 3, p =0.2517, χ^2/df = 1.364, CFI = 0.996, TLI =0.992, RMSEA = 0.053, SRMR = 0.064 AVE = 0.631, CR = 0.870
PUF1	3.03	.850		0.575**	0.038	0.331	
PUF2	3.27	.962		0.809**	0.029	0.655	
PUF3	3.34	.941		0.773**	0.032	0.598	
PUF4	3.55	1.041		0.928**	0.021	0.861	
AIP	**4.40**	**.629**	0.737				AVE = 0.588, CR = 0.740
AIP1	4.35	.738		0.745**	0.047	0.555	
AIP2	4.45	.674		0.780**	0.047	0.609	
PFR	**3.41**	**.864**	0.834				χ^2 = 0, df = 0, p = 0, χ^2/df = 0, CFI = 1, TLI = 1, RMSEA = 0, SRMR = 0 AVE = 0.652, CR = 0.848
PFR1	3.41	1.000		0.813**	0.044	0.661	
PFR2	3.02	.891		0.668**	0.046	0.446	
PFR3	3.79	1.091		0.874**	0.038	0.765	

Note: ** $p < 0.01$

Model's goodness-of-fit

We evaluated the model's goodness-of-fit using widely recognized fit indices. The comparative fit index (CFI) value of 0.941 indicates a satisfactory fit, with values above 0.90 considered acceptable. The root-mean-square error of approximation (RMSEA) value of 0.077 indicates a reasonable fit, with values below 0.08 typically regarded as adequate. Additionally, the standardized root mean squared residual (SRMR) value of 0.075 further supports the model's fit, with values below 0.08 considered favorable. Collectively, these fit indices demonstrate that the proposed model exhibits a satisfactory level of fit to the data (Hair et al., 2010; Hu & Bentler, 1999).

For a more comprehensive structural equation model (SEM) analysis, consult Figure 2. The figure visually discerns the relationships between latent variables. Table 5 also shows a full breakdown of the standardized path coefficients (β), standard error (SE), t-values (critical ratios, CR), and coefficient of determination (R2), which helps us understand the relationships in this study better.



Notes: ** p < 0.01, solid line indicated significance to ASD, dashed line indicated non-significance to ASD, PUIP = Perceived University Intellectual Property Support, PUF = Perceived University Funding Support, AIP = Attitude Toward Intellectual Property Knowledge, PFR = Perceived Funding Resources, and ASD = Academic Spin-off Decision.

Figure 2: Results of research hypotheses based on the SEM

Table 5: Path Analysis

Path		Path coefficient	SE.	CR.	R^2
PUIP	→ ASD	0.025	0.088	0.254	0.489
PUF	→ ASD	-0.053	0.113	-0.469	
AIP	→ ASD	0.265**	0.086	3.081	
PFR	→ ASD	0.584**	0.107	5.458	

Note: ** p < 0.01

Results of research hypotheses

We conducted the structural equation model (SEM) analysis with a significance level of 0.01 for hypothesis acceptance and observed the following outcomes: First, perceived university intellectual property support showed no statistically significant effect on academic spin-off decisions (path coefficient: 0.025), thereby not supporting Hypothesis 1 (H1). Second, perceived university funding support also exhibited no significant impact on academic spin-off decisions (path coefficient: -0.053), leading to the non-support of Hypothesis 2 (H2). However, the same analysis found that attitudes toward intellectual property knowledge and perceived funding resources positively and significantly influence academic spin-off decisions (path coefficient: 0.265 and 0.584, respectively), thereby supporting Hypothesis 3 (H3) and Hypothesis 4 (H4). These findings underscore the critical role of individual attitudes and perceived resource availability in shaping academic spin-off decisions, even when institutional support falls short of statistical significance.

Discussions and Conclusion

This study investigated factors influencing academic spin-off ventures in Thai universities, focusing on perceived university intellectual property support (PUIP), perceived university funding support (PUF), attitude toward intellectual property knowledge (AIP), and perceived funding resources (PFR). Our findings contribute to understanding the dynamics driving university spin-off ventures and shed light on the role of financial resources and intellectual property in this context.

Our study revealed a significant positive effect of attitudes towards intellectual property knowledge on academic spin-off decisions. This suggests that individuals with a favorable perspective on intellectual property knowledge are more inclined to engage in academic spin-off ventures. Such ventures serve as instruments for attracting investments, generating wealth, and establishing a competitive edge (Glass & Saggi, 2002; Javorcik, 2004; Schneider, 2005; Singh, 2015). This underscores the importance of cultivating an environment within universities that encourages awareness and understanding of intellectual property rights.

Interestingly, our study found that PUIP and PUF had no statistically significant effect on academic spin-off decisions. This contrasts with some prior research but aligns with findings suggesting that technology transfer offices often focus more on protecting technology than fostering entrepreneurial activities (Clarysse et al., 2011). Despite the presence of TTOs, the perceived support from these offices may not be a primary driver in researchers' decisions to engage in spin-off ventures. This suggests that while institutional support for intellectual property is important, it may not be sufficient on its own to encourage spin-off creation.

Similarly, the lack of significant impact from PUF challenges the assumption that university-provided financial resources are a key driver of spin-off activities. This aligns with research by Ismail et al. (2010), which noted that university spin-off companies often require substantial capital for developing cutting-edge technologies into marketable products—capital that typically exceeds what universities can provide. These findings indicate that universities might need to either increase their support or improve how they communicate about available resources to potential academic entrepreneurs.

Our research also highlights that perceived funding resources significantly influence the decision to engage in academic spin-off ventures. This aligns with previous studies identifying financial resources as a critical component for spin-off ventures (Elpida et al., 2010; Aragón-Sánchez et al., 2017). Universities and stakeholders must collaborate to ensure funding opportunities are easily accessible and well-communicated to potential entrepreneurs. This finding is consistent with research emphasizing the high-cost nature of academic research commercialization and the positive correlation between funding and spin-off creation (Odei & Novak, 2022; Rasmussen et al., 2014).

In conclusion, our study makes several novel contributions to the academic spin-off literature. By focusing on perceptions rather than objective measures, offering context-specific insights from Thailand, presenting an integrated model of factors influencing spin-off decisions, emphasizing IP attitudes, and including students in our sample, we provide a more nuanced understanding of academic entrepreneurship. These contributions highlight the importance of context-sensitive approaches in fostering academic spin-offs, particularly in developing economies.

Our research underscores the need to consider individual perceptions, attitudes, and the broader academic pipeline when studying and promoting entrepreneurship in higher education settings. This holistic approach offers valuable insights for both researchers and policymakers seeking to enhance the academic spin-off ecosystem in diverse global contexts.

Recommendations

Based on our research findings and drawing from existing literature on academic entrepreneurship, we propose several recommendations for key stakeholders in the Thai university spin-off ecosystem.

For university administrators and technology transfer offices (TTOs), our findings suggest a need to enhance intellectual property (IP) education and improve the perception of funding availability. Universities should invest in comprehensive IP education programs, integrate IP modules into existing curricula, and offer specialized workshops for faculty and students (Bourelos et al., 2012). TTOs should reorient their services to foster an entrepreneurial environment beyond just protecting IP, as suggested by Siegel and Wright (2015). Implementing mentorship programs connecting experienced entrepreneurs with aspiring academic entrepreneurs can help bridge the gap between perceived and actual support (Hayter et al., 2017).

Policymakers play a crucial role in fostering academic entrepreneurship. We recommend developing policies that address the unique challenges of the Thai academic entrepreneurship ecosystem, particularly focusing on enhancing perceived funding resources and IP knowledge. Guerrero and Urbano's (2012) work on entrepreneurial universities in developing countries supports this context-specific approach. Setting up a national framework for academic entrepreneurship that combines university programs, government support, and collaboration with business can also help create spin-offs in a structured way, similar to what has worked in other emerging economies (Etzkowitz et al., 2015).

For academic entrepreneurs, including both faculty and students, we emphasize the importance of proactively seeking IP knowledge and building networks. Given the significance of IP attitudes in our findings, potential entrepreneurs should actively engage in IP education opportunities, a crucial approach for successful academic entrepreneurship, as highlighted by Lockett et al. (2005). Developing connections with industry partners and other entrepreneurs can enhance perceptions of resource availability and provide valuable support, as emphasized by Hayter (2016) in his study on early-stage spin-off success.

Potential investors can contribute significantly to the academic spin-off ecosystem by engaging early with universities and participating in university entrepreneurship programs. Munari et al. (2016) support the strategy of collaborating with universities to provide insights into market needs and investment criteria, which can shape more market-oriented research and spin-off ideas. Furthermore, contributing to mentorship programs and entrepreneurship courses can help bridge the gap between academic innovations and market requirements, as suggested by Pitsakis et al. (2015).

Implementing these recommendations requires a coordinated effort from all stakeholders. Universities should lead in creating an integrated support system that addresses both the tangible (funding, resources) and intangible (perceptions, attitudes) factors influencing spin-off decisions. By focusing on enhancing IP knowledge, improving perceptions of funding availability, and fostering a more entrepreneurial academic culture, Thai universities can significantly boost their spin-off ecosystems. Our research findings and international best

practices support these recommendations. However, we should tailor their implementation to the specific context of each institution and the broader Thai higher education landscape. Regular evaluation and adjustment of these strategies will be crucial to ensuring their effectiveness in fostering a thriving academic spin-off ecosystem in Thailand.

Limitations

The limitations of this study are essential to consider when evaluating its findings. This research focused exclusively on the universities in Group 1 and Group 2, which do not cover the entire landscape of Thai higher education institutions. This limited scope could lead to a potential bias in the study's conclusions, as it may not fully represent the diversity of academic spin-off ventures in Thailand. Additionally, the context-specific nature of the study means that its findings may not directly apply to other regions, and the self-reported data introduces the possibility of response bias. The cross-sectional design restricts the ability to track changes over time or establish causality, and the relatively small sample size and the omission of various influencing factors, such as personal entrepreneurial skills and market conditions, raise questions about its generalizability. The absence of qualitative data and the potential for temporal factors to influence academic spin-off decisions further emphasize the need for future research to build upon these findings.

Moreover, one should interpret the study's recommendations cautiously, even though it offers valuable insights into academic spin-off ventures. The recommendations, rooted in the specific research context, might only fully address a portion of the intricate issues at hand. When making decisions or policy changes related to academic spin-off ventures, it is essential to consider a broader range of factors. In conclusion, this study advances our understanding of the factors influencing academic spin-off decisions. However, its limitations highlight the need for more comprehensive research in this field to account for diverse contexts, variables, and a more representative sample of Thai universities.

Acknowledgments

This work was supported by the Suranaree University of Technology, Thailand Science Research and Innovation (TSRI), and the National Science, Research, and Innovation Fund (NSRF) (NRIIS number FF2-205-65-12-09)

References

Algieri, B., Aquino, A., & Succurro, M. (2011). Technology transfer offices and academic spin-off creation: The case of Italy. *The Journal of Technology Transfer, 38*(4), 382-400. https://doi.org/10.1007/s10961-011-9241-8

Anderson, J. C., & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika, 49*(2), 155-173. https://doi.org/10.1007/bf02294170

Aragón-Sánchez, A., Baixauli-Soler, J. S., & Carrasco-Hernández, A. (2017). A missing link: The behavioral mediators between resources and entrepreneurial intentions. *International Journal of Entrepreneurial Behavior & Research, 23*(5), 752-768. https://doi.org/10.1108/ijebr-06-2016-0172

Bentler, P. M., & Chou, C. P. (1987). Practical issues in structural modeling. *Sociological Methods & Research, 16*(1), 78-117. https://doi.org/10.1177/0049124187016001004

Blanchflower, D. G., & Oswald, A. J. (1998). What makes an entrepreneur?. *Journal of Labor Economics, 16*(1), 26-60. https://doi.org/10.1086/209881

Bodolica, V., & Spraggon, M. (2021). Incubating innovation in university settings: Building entrepreneurial mindsets in the future generation of innovative emerging market leaders. *Education + Training, 63*(4), 613-631. https://doi.org/10.1108/ET-06-2020-0145

Bourelos, E., Magnusson, M., & McKelvey, M. (2012). Investigating the complexity facing academic entrepreneurs in science and engineering: The complementarities of research performance, networks and support structures in commercialization. *Cambridge Journal of Economics, 36*(3), 751-780. https://doi.org/10.1093/cje/bes014

Clarysse, B., Tartari, V., & Salter, A. (2011). The impact of entrepreneurial capacity, experience, and organizational support on academic entrepreneurship. *Research Policy, 40*(8), 1084-1093. https://doi.org/10.1016/j.respol.2011.05.010

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*(1), 98-104. https://doi.org/10.1037/0021-9010.78.1.98

Duval-Couetil, N., Pilcher, J., Hart-Wells, E., Weilerstein, P., & Gotch, C.M. (2014). Undergraduate involvement in intellectual property protection at Universities: Views from technology transfer professionals. *International Journal of Engineering Education, 30*(1), 60-71.

Elpida, S., Galanakis, K., Bakouros, I., & Platias, S. (2010). The spin-off chain. *Journal of Technology Management & Innovation, 5*(3), 51-68. https://doi.org/10.4067/s0718-27242010000300004

Etzkowitz, H., Germain-Alamartine, E., Keel, J., Kumar, C., Smith, K. N., & Albats, E. (2019). Entrepreneurial university dynamics: Structured ambivalence, relative deprivation and institution-formation in the Stanford innovation system. *Technological Forecasting and Social Change, 141*, 159-171. https://doi.org/10.1016/j.techfore.2018.10.019

Evans, D. S., & Jovanovic, B. (1989). An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy, 97*(4), 808-827. https://doi.org/10.1086/261629

Fini, R., Fu, K., Mathisen, M. T., Rasmussen, E., & Wright, M. (2017). Institutional determinants of university spin-off quantity and quality: A longitudinal, multilevel, cross-country study. *Small Business Economics, 48*(2), 361-391. https://doi.org/10.1007/s11187-016-9779-9

Gentry, W. M., & Hubbard, R. G. (2004). Entrepreneurship and household saving. *Advances in Economic Analysis & Policy, 4*(1), 1-55. https://doi.org/10.2202/1538-0637.1053

Gibb, A. (2012). Exploring the synergistic potential in entrepreneurial university development: Towards the building of a strategic framework. *Annals of Innovation & Entrepreneurship, 3*(1), 16742. https://doi.org/10.3402/aie.v3i0.17211

Glass, A. J., & Saggi, K. (2002). Intellectual property rights and foreign direct investment. *Journal of International Economics, 56*(2), 387-410. https://doi.org/10.1016/s0022-1996(01)00117-9

Gras, J. M. G., Lapera, D. R. G., Solves, I. M., Jover, A. J. V., & Azuar, J. S. (2008). An empirical approach to the organisational determinants of spin-off creation in European universities. *International Entrepreneurship and Management Journal, 4*(2), 187-198. https://doi.org/10.1007/s11365-007-0061-0

Guerrero, M., & Urbano, D. (2012). The development of an entrepreneurial university. *The Journal of Technology Transfer, 37*(1), 43-74. https://doi.org/10.1007/s10961-010-9171-x

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson.

Hayter, C. S. (2015). Public or private entrepreneurship? Revisiting motivations and definitions of success among academic entrepreneurs. *The Journal of Technology Transfer, 40*(6), 1003-1015. https://doi.org/10.1007/s10961-015-9426-7

Hayter, C. S. (2016). A trajectory of early-stage spinoff success: The role of knowledge intermediaries within an entrepreneurial university ecosystem. *Small Business Economics, 47*(3), 633-656. https://doi.org/10.1007/s11187-016-9756-3

Hayter, C. S., Lubynsky, R., & Maroulis, S. (2017). Who is the academic entrepreneur? The role of graduate students in the development of university spinoffs. *The Journal of Technology Transfer, 42*(6), 1237-1254. https://doi.org/10.1007/s10961-016-9470-y

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1-55. http://dx.doi.org/10.1080/10705519909540118

Ismail, K., Mason, C., Cooper, S., Omar, W. A., & Majid, I. A. (2010). University spin-off formations: How decision-making process has been made?. *International Journal of Business and Social Science, 1*(2), 103-123.

Javorcik, B. S. (2004). The composition of foreign direct investment and protection of intellectual property rights: Evidence from transition economies. *European Economic Review, 48*(1), 39-62. https://doi.org/10.1016/s0014-2921(02)00257-x

Katila, R., Rosenberger, J. D., & Eisenhardt, K. M. (2008). Swimming with sharks: Technology ventures, defense mechanisms, and corporate relationships. *Administrative Science Quarterly, 53*(2), 295-332. https://doi.org/10.2189/asqu.53.2.295

Kristiansen, S., & Indarti, N. (2004). Entrepreneurial intention among Indonesian and Norwegian students. *Journal of Enterprising Culture, 12*(1), 55-78. https://doi.org/10.1142/s021849580400004x

Link, A. N., & Scott, J. T. (2005). Opening the ivory tower's door: An analysis of the determinants of the formation of U.S. university spin-off companies. *Research Policy, 34*(7), 1106-1112. https://doi.org/10.1016/j.respol.2005.05.015

Lockett, A., Siegel, D., Wright, M., & Ensley, M. D. (2005). The creation of spin-off firms at public research institutions: Managerial and policy implications. *Research Policy, 34*(7), 981-993. https://doi.org/10.1016/j.respol.2005.05.010

Markman, G. D., Siegel, D. S., & Wright, M. (2008). Research and technology commercialization. *Journal of Management Studies, 45*(8), 1401-1423. https://doi.org/10.1111/j.1467-6486.2008.00803.x

Mathisen, M. T., & Rasmussen, E. (2019). The development, growth, and performance of university spin-offs: A critical review. *The Journal of Technology Transfer, 44*(6), 1891-1938. https://doi.org/10.1007/s10961-018-09714-9

Meysman, J., De Cleyn, S. H., & Braet, J. (2019). Cash, community, and coordination: The triple-c categorization of technology transfer office organizational philosophy. *International Entrepreneurship and Management Journal, 15*(3), 815-835. https://doi.org/10.1007/s11365-018-0555-y

Ministry of Higher Education, Science, Research and Innovation. (2021). *Assessment guide defining groups of higher education institutions (revised edition)*. https://qa.mcu.ac.th/wp-content/uploads/2023/03/reinventingUniversity.pdf

Montiel-Campos, H. (2018). University spin-off creation in the Latin American region. *Journal of Entrepreneurship in Emerging Economies, 10*(3), 386-408. https://doi.org/10.1108/jeee-02-2018-0011

Mosey, S., Guerrero, M., & Greenman, A. (2017). Technology entrepreneurship research opportunities: Insights from across Europe. *The Journal of Technology Transfer, 42*(1), 1-9. https://doi.org/10.1007/s10961-015-9462-3

Mowery, D. C., & Sampat, B. N. (2004). The Bayh-Dole Act of 1980 and university–industry technology transfer: A model for other OECD governments?. *The Journal of Technology Transfer, 30*(1-2), 115-127. https://doi.org/10.1007/s10961-004-4361-z

Munari, F., Rasmussen, E., Toschi, L., & Villani, E. (2016). Determinants of the university technology transfer policy-mix: A cross-national analysis of gap-funding instruments. *The Journal of Technology Transfer, 41*(6), 1377-1405. https://doi.org/10.1007/s10961-015-9448-1

Mustar, P., Renault, M., Colombo, M. G., Piva, E., Fontes, M., Lockett, A., Wright, M., Clarysse, B., & Moray, N. (2006). Conceptualising the heterogeneity of research-based spin-offs: A multi-dimensional taxonomy. *Research Policy, 35*(2), 289-308. https://doi.org/10.1016/j.respol.2005.11.001

National Union of Students. (2012). *Student attitudes towards intellectual property.* http://ipaware.org/wp-content/uploads/2016/10/20121012-IP-report.pdf

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.

Odei, M. A., & Novak, P. (2022). Determinants of universities' spin-off creations. *Economic Research-Ekonomska Istraživanja, 36*(1), 1279–1298. https://doi.org/10.1080/1331677X.2022.2086148

Odei, S. A., & Stejskal, J. (2018). Factors influencing spin-off activities at universities: Empirical evidence from the United Kingdom. In XXI. *mezinárodní kolokvium o regionálních vědách. Sborník příspěvků* (pp. 146-152). https://doi.org/10.5817/cz.muni.p210-8970-2018-14

O'Shea, R. P., Allen, T. J., Chevalier, A., & Roche, F. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy, 34*(7), 994-1009. https://doi.org/10.1016/j.respol.2005.05.011

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy, 42*(2), 423-442. https://doi.org/10.1016/j.respol.2012.09.007

Pirnay, F., Surlemont, B., & Nlemvo, F. (2003). Toward a typology of university spin-offs. *Small Business Economics, 21*(4), 355-369. https://doi.org/10.1023/A:1026167105153

Pitsakis, K., Souitaris, V., & Nicolaou, N. (2015). The peripheral halo effect: Do academic spin-offs influence universities' research income?. *Journal of Management Studies, 52*(3), 321-353. https://doi.org/10.1111/joms.12119

Radinger-Peer, V., & Sedlacek, S. (2017). Barriers to the generation of university spin-offs: A case study of Vienna. *Geographies of growth* (pp. 441-442). https://doi.org/10.4337/9781785360602.00024

Rasmussen, E., & Borch, O. J. (2010). University capabilities in facilitating entrepreneurship: A longitudinal study of spin-off ventures at mid-range universities. *Research Policy, 39*(5), 602-612. https://doi.org/10.1016/j.respol.2010.02.002

Rasmussen, E., Mosey, S., & Wright, M. (2014). The influence of university departments on the evolution of entrepreneurial competencies in spin-off ventures. *Research Policy, 43*(1), 92-106. https://doi.org/10.1016/j.respol.2013.06.007

Rasmussen, E., & Wright, M. (2015). How can universities facilitate academic spin-offs? An entrepreneurial competency perspective. *The Journal of Technology Transfer, 40*(5), 782-799. https://doi.org/10.1007/s10961-014-9386-3

Rovinelli, R. J., & Hambleton, R. K. (1977). On the use of content specialists in the assessment of criterion-referenced test item validity. *Dutch Journal of Educational Research, 2*, 49-60.

Schneider, P. H. (2005). International trade, economic growth and intellectual property rights: A panel data study of developed and developing countries. *Journal of Development Economics, 78*(2), 529-547. https://doi.org/10.1016/j.jdeveco.2004.09.001

Shane, S. (2004). *Academic entrepreneurship: University spinoffs and wealth creation*. Edward Elgar Publishing.

Siegel, D. S., Waldman, D., & Link, A. (2003). Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: An exploratory study. *Research Policy, 32*(1), 27-48. https://doi.org/10.1016/S0048-7333(01)00196-2

Siegel, D. S., Wright, M., & Lockett, A. (2007). The rise of entrepreneurial activity at universities: Organizational and societal implications. *Industrial and Corporate Change, 16*(4), 489-504. https://doi.org/10.1093/icc/dtm015

Siegel, D. S., & Wright, M. (2015). Academic entrepreneurship: Time for a rethink?. *British Journal of Management, 26*(4), 582-595. https://doi.org/10.1111/1467-8551.12116

Singh, S. (2015). Innovation, intellectual property rights and competition policy. *Innovation and Development, 5*(1), 147-164. https://doi.org/10.1080/2157930x.2014.1003450

Svotwa, T. D., Jaiyeoba, O., Roberts-Lombard, M., & Makanyeza, C. (2022). Perceived access to finance, entrepreneurial self-efficacy, attitude toward entrepreneurship, entrepreneurial ability, and entrepreneurial intentions: A Botswana youth perspective. *SAGE Open, 12*(2), 215824402210964. https://doi.org/10.1177/21582440221096437

Tan, L. P. (2018). The relationship between perceived access to finance and social entrepreneurship intentions among university students in Vietnam. *The Journal of Asian Finance, Economics and Business, 5*(1), 63-72. https://doi.org/10.13106/jafeb.2018.vol5.no1.63

Thursby, J. G., & Thursby, M. C. (2002). Who is selling the Ivory Tower? Sources of growth in university licensing. *Management Science, 48*(1), 90-104. https://doi.org/10.1287/mnsc.48.1.90.14271

Vohora, A., Wright, M., & Lockett, A. (2004). Critical junctures in the development of university high-tech spinout companies. *Research Policy, 33*(1), 147-175. https://doi.org/10.1016/S0048-7333(03)00107-0

Yordanova, D., Filipe, J., & Coelho, M. d. F. B. (2020). Technopreneurial intentions among Bulgarian STEM students: The role of the university. *Sustainability, 12*(16), 6455. https://doi.org/10.3390/su12166455