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The Characteristics of Successful Founders: Focus on Chemistry Students in Germany and Poland

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Abstract

Universities with chemistry departments are expected to produce so-called “chempreneurs” – entrepreneurs from the field of chemistry who contribute to the sustainable transformation of the industry through innovative ideas. However, chemistry students in Germany are 54% less likely to start their own businesses than the average student. Against this backdrop, a comparative study was conducted among chemistry students in Germany and Poland. The aim was to identify demographic factors that distinguish potential entrepreneurs from their fellow students. A sample of 498 German and 313 Polish students was divided into three groups (low, medium, high) based on their intention to start a business. The results of variance analyses (ANOVA) show significant differences in all constructs examined in favor of the group with a high intention to start a business. A supplementary descriptive evaluation of typical demographic characteristics (including age, gender, and migration background) underscores structural differences and provides impetus for universities and political actors to specifically promote entrepreneurial thinking in the STEM field.

Keywords: chempreneurs, chemistry students, start-us, entrepreneurship education

1. Introduction

After you have introduced 'the problem and have developed the background material, explain your approach to solving the problem. In empirical studies, this usually involves stating your hypotheses or specific questions and describing how these were derived from theory or are logically connected to previous data and argumentation. Clearly develop the rationale for each. Also, if you have some hypotheses or questions that are central to your purpose and others that are secondary or exploratory, state this prioritization. Explain how the research design permits the inferences needed to examine the hypothesis or provide estimates in answer to the question.

'Chemical entrepreneurship' refers to the commercial application of innovations in chemistry to the market or to potential buyers (Oyeku, Oduyoye, Elemo, Akindoju, & Unuigbe, 2015). Innovations, defined as new processes, products or procedures, reflect a combination of ideas, inventions and their dissemination (Wolf, Dorucka, Przekop, & Haubold, 2022). In the context of global challenges such as health, crop production, energy conversion, water resources and climate change, the potential applications of chemical innovations are crucial (Confalone, 2014). In Germany, the chemical industry contributes 6.7% to gross domestic product and ranks third in the world behind the US and China (Federal Ministry for Economic Affairs and Energy, 2017; Statista, 2023). To maintain the chemical industry's leading position, it is crucial to bridge the gap between science and entrepreneurship (Sachse & Martinez, 2016).

The translation of academic research into marketable products often occurs through patents, licensing or the creation of companies (Oyeku, Oduyoye, Elemo, Akindoju, & Unuigbe, 2015). However, not all scientists and researchers aim for commercial success (Parker, Raghu, & Brooks, 2018). It is therefore important to identify potential founders among students and to explore their attitudes and behaviours. Chemistry education often focuses on scientific aspects and neglects their social relevance and translation into marketable products

(Nwakaego & Kabiru, 2015). To promote the entrepreneurial readiness of chemistry students, it is important to analyze the factors that influence their career decisions.

This study analyses the differences between chemistry students in Germany and Poland who want to start a business, those who do not, and a third group with neutral attitudes. The analysis is based on attributes such as perceived university support, foundation knowledge, subjective norms, perceived behavioural control, career opportunities and identified motivations and barriers (Mueller & Schnurbus, 2023; Majeed & Ghumman, 2021). Building on this theoretical basis, the question arises as to whether potential founders among chemistry students are characterized by a specific profile of characteristics.

Hypotheses: There is a set of properties defining chemistry students that have an intrinsic motivation to start a company.

The aim is to develop a comprehensive understanding of the characteristics that differentiate successful founders from non-founders, thereby providing valuable insights for promoting entrepreneurship in the chemical industry.

2. Theoretical Framework

The chemical industry is a key driver of innovation and economic value in areas such as energy, water, agriculture, and healthcare (Abigail, Jeslin, Vijayarangan, & Rakhi, 2022; Confalone, 2014). However, despite its high relevance and innovation potential, chemistry students are statistically less likely to found a business than students from other disciplines (Walther et al., 2023a). This gap between innovation capacity and entrepreneurial realization highlights the need for a deeper understanding of the entrepreneurial intentions of chemistry students.

Entrepreneurship research has widely adopted the Theory of Planned Behaviour (TPB) (Ajzen, 1991), which emphasizes three central determinants of intentional behavior: attitudes, subjective norms, and perceived behavioral control. Studies confirm that entrepreneurial knowledge, self-efficacy, and perceived university support significantly affect students' intentions (Wilson et al., 2007; Souitaris et al., 2007; Walther et al., 2024a). At the same time, external barriers such as limited financial resources, legal uncertainty, or lack of networks remain persistent obstacles (Obschonka et al., 2015; Walther et al., 2024f). The TPB model adapted for this research is shown in Figure 1 below.

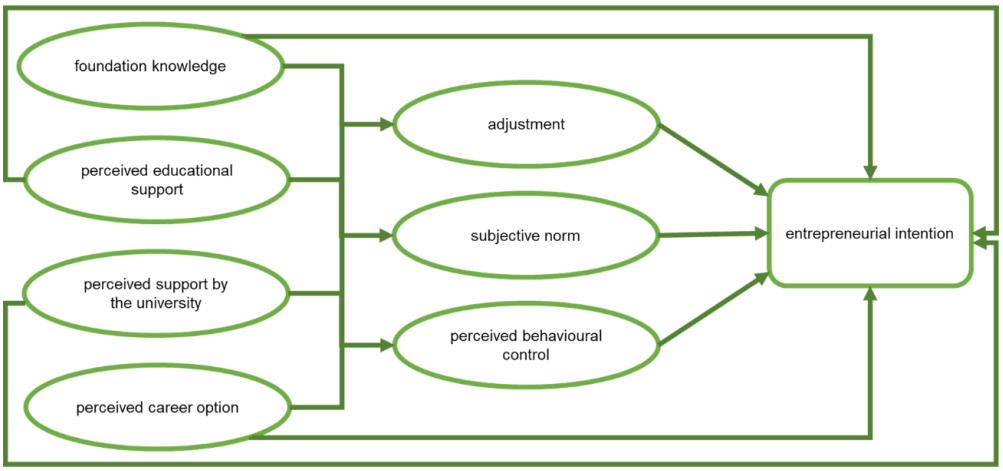

Figure 1. adapted TPB model

In addition to psychological constructs, the university environment plays a decisive role. Several studies confirm that the presence of entrepreneurship-related infrastructure – such as business plan competitions, start-up centers, and entrepreneurship education – positively affects students' willingness to start a business (Fayolle & Gailly, 2015; Souitaris et al., 2007). This is particularly relevant for STEM disciplines, where such programs are often less established (Packham et al., 2010). Yet, the perceived availability and usefulness of these offers varies widely between institutions and countries (Saeed et al., 2015).

Moreover, demographic variables such as gender, migration background, social capital and academic degree have repeatedly been shown to influence entrepreneurial aspirations (Dyer, 1995; Wilson et al., 2007; Walther et

al., 2024b). For instance, female and migrant students often report more barriers and fewer role models than their male or native counterparts (Obschonka et al., 2015; Walther et al., 2024c). Cultural and institutional differences also appear relevant when comparing countries: Data from the Global Entrepreneurship Monitor indicate significant variation in entrepreneurial attitudes across nations, shaped by education systems, policy landscapes, and social expectations (Sternberg et al., 2022).

However, most existing studies have several limitations:

They often focus on general student populations rather than discipline-specific subgroups like chemistry students.

Many do not apply a structured comparison across countries or use small, unbalanced samples.

Importantly, previous research lacks differentiated subgroup analyses (e.g., low/middle/high intention) that allow for profile-based characterizations of potential entrepreneurs within a discipline.

Research Gap and Contribution

To date, no study has systematically compared chemistry students with different levels of entrepreneurial intention across countries, nor developed a multifactorial attribute profile that distinguishes potential founders from non-founders in this field. This represents a critical gap, especially considering the structural challenges and innovation needs of the chemical industry.

This study addresses this gap by:

Drawing on a large, comparative sample of chemistry students in Germany and Poland.

Applying a structured classification of entrepreneurial intention (low, medium, high).

Integrating both psychological constructs (TPB) and demographic/institutional factors into the analysis.

Offering empirical insights into how distinct profiles of “chempreneurs” can be identified and supported more effectively.

3. Method

This study is part of a comparative study of chemistry students in Germany and Poland, which analyses innovation-oriented technology transfer from the students' perspective. Due to time and cost constraints, a cross-sectional design was chosen. The chosen method was a survey with a survey period (August 2022 - January 2023) to collect prospective and current data via an online questionnaire. In addition, additional questions were added to the questionnaire in this study. The questionnaire was translated into English, French, Spanish and Polish by specialist staff and then checked for loss of meaning. The target group for the survey consisted of students of chemistry and related disciplines (biochemistry, analytics, process engineering, industrial biology and food chemistry) who were contacted by email, in person at lectures or via online social media networks such as Instagram.

The questionnaire used corresponds to the questionnaire of the first study on the entrepreneurial behaviour of chemistry students in Germany and Poland (Walther, Haubold, Zieleniewicz, & Dobrucka, 2024). This questionnaire consists of questions from different studies, which are divided into demographic factors, the probability of starting a business or career intentions and the assumed influencing factors based on the Theory of Planned Behaviour (TPB). The questions were asked in the following order: demographic questions, external influencing factors, probability of starting a business and personal influencing factors. After the demographic questions on gender, migration, nationality and age, participants were excluded based on their student status to obtain the desired data. Study-related characteristics such as place of study, field of study, intended degree, total length of study, type of employment and presence of founders in the environment were then recorded and questions were asked to identify the latent constructs. For this purpose, questions from different studies were used and adapted on a 6-point Likert scale to force the choice: absolute ignorance (1) to extensive knowledge (6) for questions on basic knowledge, and I don't know (0) and strongly disagree (1) to strongly agree (6) with the other questions. A summary of the number of questions in each category and their source can be found in Table 1.

Table 1. Overview of applied study questions with sources, number and additions

Question Category	Number of questions	Answer option "I don't know"	Question source	Addition of own questions
Foundation knowledge (FK)	3	no	(Cook, Heath, & Thompson, 2000)	no
Perceived educational support (PES) & Perceived Support of the university (PSU)	10	yes	(Roy, Akhtar, & Das, 2017)	yes
subjective norm (SN)	2	no	(Saeed, Yousafzai, Yani−De−Soriano, & Muffatto, 2015)	no
Founding intention	2	no	(Saeed, Yousafzai, Yani−De−Soriano, & Muffatto, 2015)	no
Perceived Career options (WCO)	6	yes	(Cook, Heath, & Thompson, 2000)	no
Perceived Behavioural control (PBC)	9	yes	Zapkau, Schwens, Steinmetz, & Kabst, 2015)	no
Self-assessment for the foundation (SF)	3	yes	(Krueger, Reilly, & Carsrud, 2000)	no
Motives for Starting a Business	17	yes	(Pruett, Shinnar, Toney, Llopis, & Fox, 2009), (Solesvik, 2013)	yes
Barriers to Starting a Business	19	yes	(Pruett, Shinnar, Toney, Llopis, & Fox, 2009), (Solesvik, 2013)	yes

The likelihood of starting a business was measured by two different types of questions: First, the likelihood of starting a business after graduation, which ranged from very unlikely (1) to very likely (6), and second, career intentions with the options of public service, employment and starting a business. Regarding entrepreneurial intentions, entrepreneurial intention was used as a dividing factor for group formation. Students were categorized as 'low', 'medium' and 'high' based on their responses in categories 1-2, 3-4 and 5-6 for both Germany and Poland.

A total of 4,367 individuals and 120 professors or student representatives were contacted. In February 2023, we received complete questionnaires from 1,287 participants, giving a response rate of 29.4%, which is acceptable compared to other web-based studies (Cook, Heath, & Thompson, 2000). Before performing our statistical analyses, we excluded 320 participants due to incomplete data. We also excluded participants who reported that they were not currently studying (n = 135), or who were in another field (e.g. teaching or electrical engineering) or studying in another country (n = 21). The final sample thus consisted of 811 students, 498 from Germany and 313 from Poland. The average time needed to complete the questionnaire was 9.25 minutes. A summary of the final sample and its distribution is given in Table 2.

Table 2. Demographic breakdown of the study participants

Factor	Germany	Poland
Age	24.2 (SD = 3.42)	22.9 (SD= 2.82)
Men	48.0 %	28.1 %
Women	50.6 %	70.0 %
Immigration background	23.3 %	20.4 %
Foreign citizenship	15.5 %	3.8 %
Public university	79.9 %	
Bachelor's program	52.6 %	71.6 %
Master's program	25.3 %	20.4 %
No income	36.7 %	59.7 %
Full-time employment	6.8 %	5.4 %
Founder among their acquaintances	41.0 %	38.4 %

Statistical analysis was performed using IBM SPSS Statistics version 28.0.1. Prior to ANOVA analysis, data were tested for normal distribution using Shapiro-Wilk tests. As the data were not normally distributed, the Mann-Whitney U test for independent samples, a non-parametric alternative to ANOVA, was used. The Mann-Whitney U test compares the ranks of the data. The result of an ANOVA analysis is the standardized z-value, which indicates how many standard deviations the test statistic is from the expected value, and the significance level (p-value), which is determined by the distribution function of the test. The significance level was set at 5%. The calculation of the probability of starting a business is based on the percentage of participants who selected starting a business as a career option. The results are presented in a table showing the factor, the country, the number of 'don't know' responses, the percentage of 'don't know' responses, the sample size (n), the mean, the median, the z-value (z) and the p-value (p).

4. Results

This section presents the results of the study on the entrepreneurial intentions of chemistry students in Germany and Poland. The differences identified within the groups and between the countries are of particular importance. By analyzing the data, it is possible to get a clearer picture of how different factors influence students' entrepreneurial intentions and attitudes.

To categorise the students according to their entrepreneurial intentions, they were divided into three groups: Founders, non-founders and those with a balanced attitude towards entrepreneurship. This grouping is based on the students' previous statements about their likelihood of starting a business and their generally expressed career intentions.

Table 3 provides an overview of the categorization of students in Germany and Poland into these three groups, with a detailed analysis of the distribution within and between countries. The table clearly shows how many students in each country were categorized as founders, non-founders and with balanced attitudes, providing an important basis for the subsequent discussion of the results.

Table 3. grouping of students

Country	Germany			Poland		
Entrepreneurial intention	low	middle	high	low	middle	high
n	339	127	32	153	120	40
Age	24.32	23.69	24.72	23.14	22.71	22.43
Sd	3.4	3.4	3.4	3	2.6	2.7
male	155	67	17	34	41	13
female	180	58	14	115	77	27
immigration	302	99	20	147	116	38
foreign nationality	37	28	12	6	4	2
Social capital [yes]	120	63	21	81	80	35
bachelor	172	71	19	93	94	37
master	89	30	7	43	19	2
PhD	78	26	6	17	7	1
no income	255	76	18	112	75	29
part time job	63	33	9	30	35	7
full time job	14	18	5	11	10	4
state university	272	97	28			
private university	62	27	3			
Chemistry study program	218	77	26			
business chemistry study program	51	21	2			
other chemistry study program	70	29	4			

In Germany, most students with low entrepreneurial intentions (n = 339) are significantly higher than in the two groups with medium (n = 127) and high (n = 32) entrepreneurial intentions. This suggests that a large proportion of German chemistry students are rather reluctant to engage in entrepreneurial activities. In Poland, on the other hand, the distribution is less pronounced, with 153 students in the low group, 120 in the medium group and 40 in the high group. Despite the lower total number in the high entrepreneurial intentions category, Polish students tend to be slightly more optimistic about their chances of starting a business. The average age of the students varies between the groups, with German students with high entrepreneurial intentions being on average older (24.72 years) than their Polish counterparts in the same group (22.43 years). This could indicate that older students may have more work experience or business knowledge, which could lead to a higher willingness to start a business.

The gender distribution shows that in Germany there are more women (n = 180) than men (n = 155) in the low intention group, while in the medium intention group the ratio between men (n = 67) and women (n = 58) is relatively balanced. In Poland, the data show a higher number of women in all groups, especially in the low intention group, which could indicate a possible gender-specific reluctance to start a business (Walther, Haubold, & Dobrucka, 2024c).

In both countries, most students in the groups with low and medium entrepreneurial intentions have a migrant background, which may indicate a particular challenge for students with a migrant background. The proportion of students with a foreign nationality is marginal in both Germany and Poland, suggesting that these students may have to overcome additional barriers to consider starting a business (Walther, Haubold, & Dobrucka, 2024a).

Regarding social capital, the data show that a higher number of students in the low and middle groups in

Germany have social capital (yes), indicating the importance of networks for entrepreneurial intentions. In Poland, the presence of social capital is also significant in the middle groups (n = 80), which may indicate that students who have access to supportive networks are more likely to consider entrepreneurial activities (Walther, Haubold, & Dobrucka, 2024g).

The following section analyses in detail the differences between the identified groups in terms of their entrepreneurial intentions. Particular attention is paid to the comparison groups 'founders', 'non-founders' and 'balanced attitudes'. These groups are based on the previous results and the grouping of chemistry students from Germany and Poland shown in Table 1.

The analysis will show how the different demographic factors, including gender, age, migration background and social capital, affect entrepreneurial intentions within and between the different groups. Table 4 shows the quantitative data on the distribution of students in the different groups, which serves as a basis for the subsequent discussion of the results.

Table 4. ANOVA comparison of entrepreneurial intention

Question / Factor	Country	Entrepreneurial intention	„I don't know "n	„I don't know "%	n	mean	median	GER						PL					
								low		middle		high		low		middle		high	
								z	p	z	p	z	p	z	p	z	p	z	p
FK	GER	low	0	0	339	2.3	2												
		middle	0	0	127	2.8	3	-4.77	<0.001										
		high	0	0	32	3.2	3	-3.70	0.003	-0.95	1.000								
	PL	low	0	0	153	2.1	2	1.98	0.720	5.74	<0.001	4.51	<0.001						
		middle	0	0	120	2.8	3	-4.24	<0.001	0.36	1.000	1.17	1.000	-5.28	<0.001				
		high	0	0	40	3.4	3	-5.48	<0.001	-2.29	0.332	-0.96	1.000	-6.21	<0.001	-2.52	0.176		
PES / PSU	GER	low	87	25.7	252	3.4	3												
		middle	27	21.3	100	3.8	4	-2.53	0.169										
		high	6	18.8	26	3.7	4	-0.78	1.000	0.60	1.000								
	PL	low	28	18.3	125	2.7	2	3.75	0.003	5.29	<0.001	2.63	0.129						
		middle	16	13.3	104	3.2	3	0.44	1.000	2.45	0.213	0.96	1.000	-2.64	0.125				
		high	3	7.5	37	3.7	4	-1.62	1.000	-0.04	1.000	-0.53	1.000	-3.60	0.005	-1.74	1.000		
SN	GER	low	0	0	339	1.3	1												
		middle	0	0	127	2.1	2	-9.38	<0.001										
		high	0	0	32	3.0	0	-7.39	<0.001	-1.98	0.718								
	PL	low	0	0	153	1.5	1	-2.44	0.223	6.15	<0.001	5.81	<0.001						
		middle	0	0	120	2.3	2	-9.13	<0.001	0.04	1.000	2.00	0.691	-6.01	<0.001				
		high	0	0	40	3.4	4	-8.80	<0.001	-2.74	0.093	-0.44	1.000	-6.95	<0.001	-2.75	0.090		

Question / Factor	Country	Entrepreneurial intention	„I don't know "n	„I don't know "%	n	mean	median	GER						PL					
								low		middle		high		low		middle		high	
								z	p	z	p	z	p	z	p	z	p	z	p
WCO	GER	low	12	3.5	327	3.3	3												
		middle	3	2.4	124	3.8	4	-5.78	<0.001										
		high	0	0.0	32	3.9	4	-3.85	0.002	-0.56	1.000								
	PL	low	3	2.0	150	3.7	4	-4.78	<0.001	1.13	1.000	1.27	1.000						
		middle	3	2.5	117	4.2	5	-8.94	<0.001	-2.74	0.093	-1.20	1.000	-3.97	0.001				
		high	1	2.5	39	4.6	5	-7.69	<0.001	-3.77	0.002	-2.42	0.234	-4.62	<0.001	-1.84	0.991		
PBC	GER	low	2	0.6	337	3.7	4												
		middle	0	0.0	127	3.8	4	-1.37	1.000										
		high	0	0.0	32	3.7	4	0.33	1.000	1.03	1.000								
	PL	low	4	2.6	149	3.7	4	0.25	1.000	1.39	1.000	-0.19	1.000						
		middle	2	1.7	118	3.7	4	1.13	1.000	2.06	0.594	0.30	1.000	0.78	1.000				
		high	0	0.0	40	3.7	4	-0.07	1.000	0.72	1.000	-0.31	1.000	-0.21	1.000	-0.73	1.000		
SF	GER	low	15	4.4	324	2.3	2												
		middle	1	0.8	126	3.0	3	-6.75	<0.001										
		high	2	6.3	30	4.0	4	7.31	<0.001	-3.28	0.016								
	PL	low	9	5.9	144	2.3	2	-0.31	1.000	5.57	<0.001	6.79	<0.001						
		middle	3	2.5	117	3.4	3	-9.74	<0.001	-2.64	0.124	1.57	1.000	8.22	<0.001				
		high	2	5.0	38	4.3	4	-10.02	<0.001	-5.37	<0.001	-1.37	1.000	-9.24	<0.001	-3.48	<0.001		

Question / Factor	Country	Entrepreneurial intention	„I don't know "n	„I don't know "%	n	mean	median	GER						PL					
								low		middle		high		low		middle		high	
								z	p	z	p	z	p	z	p	z	p	z	p
Motives	GER	low	12	3.5	327	3.4	4												
		middle	1	0.8	126	4.0	4	5.91	<0.001										
		high	0	0.0	32	4.1	5	3.99	<0.001	-0.62	1.000								
	PL	low	1	0.7	152	3.9	4	-5.55	<0.001	0.61	1.000	1.00	1.000						
		middle	1	0.8	119	4.4	5	-9.10	<0.001	-2.77	0.083	-1.16	1.000	-3.49	0.007				
		high	1	2.5	39	4.6	5	-7.74	<0.001	-3.75	0.003	-2.35	0.281	-4.24	<0.001	-1.79	1.000		
Barriers	GER	low	27	8.0	312	4.3	5												
		middle	2	1.6	125	4.1	4	2.49	0.190										
		high	1	3.1	31	3.4	3	4.42	<0.001	2.85	0.066								
	PL	low	10	6.5	143	4.7	5	-5.80	<0.001	-6.92	<0.001	-7.13	<0.001						
		middle	3	2.5	117	4.4	5	-1.32	1.000	-3.15	0.024	-4.82	<0.001	3.52	0.006				
		high	0	0.0	40	4.3	4	-0.01	1.000	-1.45	1.000	-3.48	0.008	3.23	0.018	0.77	1.000		

5. Discussion

The results of the study provide clear empirical evidence that chemistry students with a high intention to start a business systematically differ from those with a low intention—both in their psychological attitudes and in their perceived institutional framework conditions. This supports the central hypothesis: there is a characteristic profile of potential "chempreneurs" that manifests itself in increased self-efficacy, a positive attitude toward entrepreneurship, and a higher subjective norm.

Theoretically, this finding fits well within the framework of the Theory of Planned Behavior (Ajzen, 1991), which assumes that intentional behavioral decisions are significantly influenced by attitudes, subjective norms, and perceived behavioral control. Numerous studies (e.g., Krueger et al., 2000; Liñán & Chen, 2009) confirm the relevance of these constructs in the context of entrepreneurial intentions. The extension of the model to include entrepreneurial self-efficacy (Siegel) and perceived institutional support (Walter et al., 2013) proves particularly necessary for STEM subjects, as traditional start-up role models and structures are often lacking in these fields.

The particularly large differences in the assessment of university support services points to a key institutional level: students with a high intention to start a business are significantly more likely to perceive their university as start-up friendly. These results are consistent with findings from higher education research, according to which the visibility and accessibility of entrepreneurship programs (e.g., start-up centers, business plan competitions, entrepreneurship courses) have a significant influence on start-up intentions (Fayolle & Gailly, 2015; Siegel & Wright, 2015).

Demographic differences also underscore the need for target group-specific support. The tendency for potential founders to be male and at an advanced stage of their studies is consistent with existing studies (Shinnar et al., 2012; Bergmann et al., 2016), which point to structural barriers for female and younger individuals interested in starting a business. Taking intersectional characteristics into account—such as migration background, study experiences, and subject-specific cultural influences—could further differentiate future studies.

Overall, the willingness to start a business among chemistry students is not a matter of chance but correlates systematically with psychological and institutional factors. Universities are therefore called upon to identify and activate this potential in a targeted manner – for example, through entrepreneurship elements anchored in the curriculum, low-threshold support services, and mentoring by start-up-oriented professionals from the chemical industry.

6. Summary

The analyses carried out impressively show that various factors are significantly correlated with the entrepreneurial intentions of chemistry students in Germany and Poland. Knowledge of the tasks involved in setting up a business and the ability to evaluate business ideas prove to be crucial for the development of entrepreneurial ambitions. This underlines the need to develop targeted education and support programs at universities to promote students' knowledge of entrepreneurship and strengthen their ability to identify viable business ideas.

In addition, universities in Germany and Poland play a central role in motivating and supporting students to pursue their entrepreneurial ambitions. The correlation between perceived support and entrepreneurial intention suggests that university programs and services should be optimized to promote an entrepreneurial mindset and strengthen the start-up culture among students.

The results also highlight the importance of social networks and the expectations of significant others. A supportive social environment contributes significantly to increasing the propensity of students to start a business. This suggests that programs should be developed that involve not only students but also their social networks to create appropriate support systems.

In addition, personal attitudes towards entrepreneurship, a sense of self-efficacy and a willingness to take risks are crucial for students' entrepreneurial intentions. Students who feel a high degree of control over their lives and have confidence in their abilities are willing to take entrepreneurial risks. These findings are valuable for the development of entrepreneurship programs in universities.

Furthermore, the perception of one's own abilities, the possibility of starting a business and the knowledge of practical details are crucial for entrepreneurial ambitions. Students who have a positive view of the feasibility of entrepreneurship are more likely to take steps towards starting a business. Universities should therefore implement targeted programs to improve practical skills and idea generation.

The study also shows that various motivational factors, such as the opportunity to realize one's own ideas, personal independence, the desire for financial freedom and the pursuit of a better quality of life, contribute significantly to entrepreneurial intentions. A supportive environment that encourages creative fulfilment and independence could further strengthen the start-up culture and entrepreneurship among students.

In conclusion, the results show that various barriers such as the search for innovative business ideas, risk aversion, lack of business knowledge and bureaucratic challenges have a significant impact on entrepreneurial ambitions. To address these barriers, universities should implement programs to help students overcome the fears and uncertainties of starting a business. Targeted mentoring programs, idea development workshops and practical experience in business management could be key measures to support and promote a start-up culture among students.

7. Limitations

Although the present results show clear trends, the study has several limitations. First, it is not a representative survey, but rather a sample that is significantly influenced by the cooperation locations in Idstein (Germany) and Poznan (Poland). This can lead to distortions regarding local university-specific offerings or subject cultures. Second, the groups being compared are of unequal size in terms of start-up intentions, which may limit the significance of individual comparisons. Third, no normal distribution was checked or assumed when performing the statistical procedures—future studies should aim for normally distributed data or, alternatively, use robust, non-parametric methods.

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