University-related Factors influencing Technological Entrepreneurial Intentions of Science, Technology, Engineering and Mathematics (STEM) Students: A Comparative Study of Private and Public Universities

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Abstract

This study aims to establish university-related factors that influence the formation of technological entrepreneurial intentions (TEIs) among STEM students in Zambia. The article extends the Ajzen Theory of Planned Behavior (TPB) model by including environmental factors that were tested using a comparative study of public and private students, with quantitative data obtained from a sample of 400 STEM students and analyzed using structural equation Modelling (SEM). This paper contributes to emerging literature on TEIs by incorporating environmental variables into the TPB model to explain the formation of STEM students' TEIs. This study provides insights into the significance of pressure from friends, family and other networks and positive perception of technological entrepreneurial activities on the formation of TEIs in students. To the best of our knowledge, this is the first study to utilize the extended TPB on STEM Students in Zambia. This research also contributes to the existing literature on technopreneurship by comparing the formation of TEIs of STEM students in private and public universities. The findings suggest that attitudes towards entrepreneurship (ATE), subjective norms (SN) and perceived behavioral control (PBC) have a direct impact on TEIs for private university students and ATE and PBC for public university students. University support (US) influences TEIs through (SN) for both private and public university students. Additionally, the university environment affects TEIs through three antecedents (ATE, SN and PBC) for private university students, while teaching methods (TM) show no association with TEIs.

Keywords: Technopreneurship, Technological Intentions, University Support, University Environment, Teaching Methods

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I. Introduction

Given their critical role, technological entrepreneurship intentions (TEIs) play a role in enhancing growth through the elimination of economic inefficiencies, the introduction of innovations in the markets and employment creation. Studies on technological intentions have gained significant attention among policymakers and educators (Koe et. al., 2018). In the era of technological digitalization, technological entrepreneurship is regarded as the basis for competitiveness, sustainable economic growth and the promotion of social interests (Linan et. al., 2015).

Technopreneurship as a field of study has continued to receive significant attention in developing countries because of positive student perceptions of technological growth and its effects on EIs (Nathani and Divedo, 2019). This calls for the need to increase the intensity of students' EIs, which may result in a change in mindset so that they can focus on self-employment rather than formal employment (Maheshwari et. al., 2022). The literature has identified universities as ideal places for establishing how technological entrepreneurs are developed and enhanced among students (Mosey, 2016), which has led to an increase in the number of studies exploring the influence of environmental factors such as university support, university environment and teaching methods on the formation of students' EIs.

Prior studies have indicated that students entrepreneurial intentions are positively influenced by university support (Liu, Gargievski, Qi and Pass, 2022; Yi 2021; Qazi, Qureshi, Raza, Khan and Qureshi, 2020), university environment (Tommy and Pardede, 2020; Lopez and Alverez, 2019; Canever, Barrel and Ribeiro, 2017) and methods employed in teaching entrepreneurship education (Karim et. al., 2016; Hattab, 2014). Despite the recognized importance of these factors individually, a comprehensive understanding of how they synergistically contribute to or hinder the development of entrepreneurial aspirations among STEM students remains elusive. In the rapidly evolving landscape of entrepreneurship education, there exists a pressing need to comprehensively investigate the interplay between university support mechanisms, the overarching university environment, and diverse teaching methods to discern their collective influence on shaping entrepreneurial intentions among students (Aliedan, Elshaer, Alyahya and Sobaih, 2022).

Furthermore, few studies have explored the concept of technological entrepreneurship, how technology enterprises are created, as well as what motivates and hinders individuals to engage in that behavior, especially among university graduates (Shane and Venkataraman, 2003). A systematic review conducted by Maheshwari et. al. (2022) proposed the need for the inclusion of environmental factors in the theory of planned behavior (TPB) model and examined them on students in other parts of the world, such as Africa, since most of the studies on EIs have been conducted in Asia. Additionally, several prior studies have called for more research to investigate the development of technological entrepreneurial intentions among STEM students (Wright et. al., 2017; Alves et. al., 2019; Wright et. al., 2019). Therefore, this research aims to bridge this gap by exploring the intricate relationships among university support structures, the overall entrepreneurial climate within the university and the effectiveness of various teaching methods in cultivating and enhancing entrepreneurial intentions among STEM students. Through a nuanced examination of these dimensions, this study seeks to provide actionable insights for educators, policymakers and institutions to refine entrepreneurial education strategies and foster an environment conducive to nurturing the next generation of innovative and enterprising individuals."

II. Literature Review

Technopreneurship

Technopreneurship, or technological entrepreneurship, is a unique form of entrepreneurship that results from the combination of three aspects: Entrepreneurship, innovation and technology (Nacu and Avasilcai, 2014). A seminal author on technology entrepreneurship, Tony Bailetti defined technology entrepreneurship as the “Deployment of resources to create a project managed by specialised individuals with different expertise directly linked to scientific and technological knowledge to create and sustain value for the business”. Bailetti (2012) as well as Nathani and Dwivedi (2017) observed that technology entrepreneurship can occur in three distinct forms: Technology entrepreneurship (news business ventures or products resulting from research), digital technology entrepreneurship (a bath of new business ventures or products through ICT technologies) and digital entrepreneurship (new internet products/services). This study defines technology entrepreneurship as the combination of technological know-how with entrepreneurial skills and talent to create new products, processes and ventures (Yordanova, 2021). A recent study

by Nazarov et. al. (2017) suggested that human beings, expertise, experience and government support are key factors that influence the development of technology entrepreneurship.

Entreprenurial Intentions

In exploring the formation of students' entrepreneurial intentions, several studies have employed three models, namely, Luthje and Franke's model and Shapero and Ajzen's TPB model (Gieure, Benavides-Espinosa and Roig-Dobón 2019; Karimi, Biemans, Mahdei, Lans, Chizari and Mulder, 2017; Nabi et.al., 2010). This study is anchored in Ajzen's TPB, an extension of the Theory of Reasoned Action (Saraih et. al., 2017) due to its increased utilization in entrepreneurial intention studies, its popularity and its strength in explaining behavioral intentions (Ajzen, 2011).

The TPB model suggests that developing a positive perception influences entrepreneurial intentions, which in turn results in behavior (Vracheva, Abu-Rahma and Jacques, 2018). Positive perceptions of individual capacity and the ability to engage in business activities accepted by community members increase entrepreneurial intention. In this study, we extended the TPB model by incorporating three constructs as independent variables (teaching methods, university support and university environment). The extended TPB model presents an opportunity to establish the indirect effects of independent variables on the development of students' entrepreneurial intentions in public and private universities.

TPB utilizes three accurate constructs to predict human behavior and actions. These are attitudes towards entrepreneurship (ATE), subjective norms (SN) and perceived behavioral control (PBC) (Maheshwari et.al., 2022). An ATE is a representation of how an individual views the entrepreneurial outcome, which may be negative or positive. SN refers to one's perception of how the immediate environment (e.g., peers, family and networks) responds to the idea of venture creation. PBC relates to an individual's perception of available factors, which may promote or hinder entrepreneurial behaviors. These constructs have been applied in several EI studies and have proved significant in the formation of students (Srivastava and Misra, 2017; Agolla, Monametsia and Phera, 2019; Naushad, 2018). Furthermore, other studies have also supported the argument that TPB constructs play a significant role in students' entrepreneurial intentions (Said, Uthamaputhran, Zulkiffi, Hong and Wai, 2021; Nguyen, 2020; Ajum, Ramzani and Nazer, 2019; Karimi et. al., 2017; Gieure et al., 2019).

Entrepreneurship Intentions

Recently, several studies have used TPB to explain how students' entrepreneurial intention has developed (Aloulou, 2016). Individuals decide to create a new business venture after conducting a serious analysis of the environment and developing attitudes as well as beliefs to act through proper planning. Intentions influence a person to engage in certain planned behaviors perceived to be rewarding, unique and timely (Nuseir, Basheer and Aljumah, 2020). A self-employed career is heavily dependent on one's developed intentions or is sometimes referred to as human behavior.

Santos and Liguori (2019) described entrepreneurial intentions as individual beliefs that influence the interest in and decision to start a new business venture or engage in entrepreneurial activities. Several factors affect entrepreneurial intentions, especially among students in universities that can be public or private and that offer different institutional environments. This makes the time and place where students are instrumental in creating entrepreneurs (Dornelas, 2005).

However, the development of intentions among students in private and public universities differs because of the different contingent variables found at each university. Studies have shown that students from private universities exhibit higher entrepreneurial intentions than their counterparts from public universities (Barral, Ribeiro and Canever, 2018; Silva and Teixeira, 2013; Perim, 2012). Therefore, this study assumes that the private university environment is more effective than the public environment in influencing students' entrepreneurial intentions.

Environmental Factors

Studies on the influence of environmental factors on entrepreneurial intentions have received much attention among scholars because of the significant role they play in the development of intentions (North, 2005). According to Lüthje and Franke (2003), the presence of environmental factors can influence, inspire or motivate an individual to recognize and exploit available business opportunities. However, in the context of developing countries such as Zambia, little has been done to explore the significance of environmental factors in the process of new venture creation (Bruton et. al., 2008). In this study, three environmental factors (university support, university environment and teaching methods) were explored to establish their direct and indirect effects on STEM students' EI. According to Fishbein and Ajzen (2010), environmental factors can have direct or indirect effects on entrepreneurial intentions through TPB constructs.

University Support

Trivedi (2016) described university support (US) as programs aimed at stimulating students' entrepreneurial behaviors, such as networking, counselling, coaching, mentoring, providing business advice and other business-related activities. These factors have been directly linked to students' entrepreneurial intentions in universities, especially in developed countries (Boh et. al., 2016). Institutions of higher learning are nuclear points of interaction in the development of students' entrepreneurial intentions (Saeed, Yousafzai and Muffatto, 2015). Students' entrepreneurial intentions are enhanced by creating entrepreneurial awareness through the educational programs offered in these institutions and entrepreneurship education. Apart from educational support, universities provide other forms of support, such as advising students on business activities (Saeed et. al., 2015), training students in business concept development and other business development support services (Mustafa et. al., 2016). Students' positive evolution of education support, concept development support and other business development support services increase their entrepreneurial intentions. Similar studies have reported a positive relationship between university support and

entrepreneurial intention (Mustafa et. al., 2016; Trived, 2016; Saeed et. al., 2015; Lüthje and Franke, 2003)

University Environment

The University environment (UE) provides learners with opportunities to acquire the skills required to develop a career destination in a community (Gieure, 2018). The university environment may include people with business ideas, established business ventures and resources to assist students and infrastructure to support start-ups. Students who perceive these factors positively have a higher chance of developing intentions to engage in entrepreneurial activities (Franke and Lüthje, 2004). Therefore, university environmental factors may promote or hinder the development of entrepreneurial intention. Prior studies have acknowledged that university environment has a positive influence on entrepreneurial intentions (Maheshwari, 2022; Martinez-Clement et.al., 2018; Gieure, 2018; Kabok et.al, 2017; Minola et.al., 2016; Shirokova et.al., 2016). A study conducted by Wright et.al. (2017) identified university elements, such as accelerators, incubators, access to grants and competition among STEM students as significant factors in the development of technological entrepreneurship intentions. Similarly, a recent study conducted by Baubonienė, Hahn, Puksas and Malinauskienė (2018) described the university as a perfect environment for the creation of a start-up or new business venture.

Teaching Methods

The teaching methods (TMs) applied to relationship-related programs have a strong influence on students' interest in venturing into entrepreneurship, developing a community of entrepreneurs and enhancing their motivation towards start-ups (Souitaris et.al., 2007). Universities should design and operationalize teaching methods that promote entrepreneurial behavior. Therefore, universities should apply a combination of practices on how to start a business venture, the use of computer games and simulation, critical thinking and reflective teaching strategies to promote entrepreneurship among students (Neck and Green, 2011). A comparative study conducted at Lithuanian and South Korean universities reported a positive relationship between the use of practicals as a teaching pedagogy and students' entrepreneurial intention (Baubonienė, Hahn, Puksas and Malinauskienė, 2018). Exposing students to business practices, such as business camps, competition and role-play significantly impacts their entrepreneurial intentions.

III. Theoretical Framework and Hypotheses

The hypotheses of research are formulated as follows:

H1. ATE has a positive influence on STEM students' technological entrepreneurial intentions.

H2. SN has a positive influence on STEM students' technological entrepreneurial intentions.

H3. PBC has a positive influence on STEM students' technological entrepreneurial intentions.

H4. University support has direct effects on STEM students: (a) ATE, (b) SN, (c) PBC and (d) technological entrepreneurial intentions.

H5. University environment has direct effects on STEM students (a) ATE, (b) SN, (c) PBC, and (d) technological entrepreneurial intentions.

H6. Teaching methods have direct effects on STEM students (a) ATE, (b) SN, (c) PBC, and (d) technological entrepreneurial intentions.

IV. Research Conceptual Framework

This study will be anchored on insights from the theory of planned behavior (TPB) to develop hypotheses based on the constructs presented in this conceptual framework.

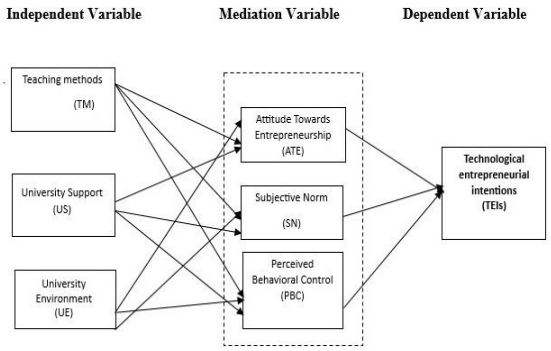

Figure 1. Conceptual Framework

Source: Baubonienė et.al., 2018; Ajzen, 2011; Mustafa et.al., 2016; Lüthje and Franke, 2003

V. Methodology

In this study, a sample size of 400 STEM students from two public and two private universities in Zambia were surveyed between July and September 2022. Convenience sampling was utilized, as in other entrepreneurial intention studies (Boubker, Arroud and Quajdouni, 2021; Lu, Song and Pan, 2021; Karimi, 2019; Liu, Lin, Zhao and Zhao, 2019; Karimi et.al., 2017; Liñán and Chen, 2009; Krueger et.al., 2000). A total of 400 questionnaires were distributed and all completed questionnaires were returned, representing a 100% response rate. As per Hair, Black, Babin and Anderson (2010), the survey responses were scrutinized to check for missing data and possible outliers. The survey instrument contained items adopted from Baubonienė et.al. (2018) and was measured using a 5- point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). TEI was measured using seven items: ATE 3, SN 4, PBC 5, US and UE, while TM had four items.

VI. Findings

Table 1 shows that there were more (95.5%) students aged between 16 and 25 years in public universities than in private universities (76%). In terms of gender, public universities had more males (66.5%) than private universities (51.5%). This indicates that universities in Zambia are male-dominated. Furthermore, private universities reported a higher number (40%) of

students engaged in entrepreneurial activities and less work experience (47.5%). The results suggest that most students in public universities are more interested in getting employed than their counterparts in private universities are.

Table 1: Demographic Profile of Respondents

Demographic Characteristic		Public university		Private University	
		Frequency	Percent	Frequency	Percent
Age	16-25 yrs	191	95.5	152	76
	26-35 yrs	8	4	48	24
	36-45 yrs	1	.5	0	0
Gender	Male	133	66.5	103	51.5
	Female	67	33.5	97	48.5
Self-employed	Yes	68	34	80	40
	No	132	66	120	60
Work experience	Yes	105	52.5	95	47.5
	No	95	47.5	105	52.5
Programmes	Computer Science	54	32	57	28.5
	IT	30	15	102	51
	Engineering	90	45	31	15.5
	Other Sciences	16	8	10	5

Source: Authors' compilation

Regarding future career plans, 42% of the students from public universities considered working as an employee a priority, while 20.5% of them from private universities considered this a priority. On starting technology-related enterprises, more (67.5%) students from public universities agreed with this statement and 56% from private universities. The findings revealed that more students from public universities have plans to start their technology-related enterprises after completing their undergraduate studies, and only 52.5% of them were interested in postgraduate studies compared to private universities, where most of them (76.5%) would like to pursue postgraduate studies, as indicated in figure 2.

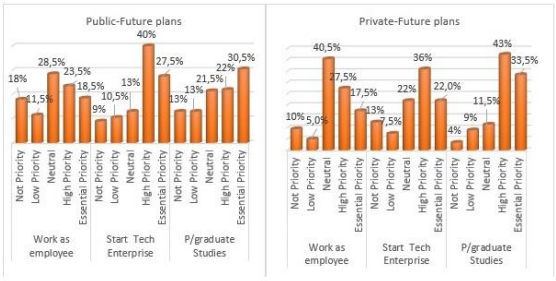

Figure 2. Public and Private Universities Students' Plans

Source: Authors' compilation

Factor Analysis

Table 2 presents the factor loadings for the 36 items used to measure the seven constructs used in this study. All loadings were above .5, an indication of the reliability of factors and the acceptability of the research model for structural equation modelling (SEM).

Table 2: Factor Loadings

Item	*Public University*			*Private University*		
	Factor Loadings	Cronb A	CR	Factor Loadings	Cranb A	CR
ATE		.800	.877		.698	.892
Tech Entrepreneur satisfaction	.839			.896		
More advantages	.813			.813		
Attractive career	.867			.862		
SN		.821	.880		.755	.851
Friends' approval	.799			.791		
Family approval	.851			.802		
Family values	.776			.677		
Friends value	.807			.794		
PBC		.908	.728		.771	.795
Can identify opportunities	.884			.683		
Can create new ways	.865			.665		
Can create a product to fulfil needs	.858			.765		
Can think creatively	.859			.632		
Could start own business	.799			.556		
EIs		.812	.880		.674	.840
I am ready to do anything	.773			.673		
I will make every effort	.790			.641		
Never seriously considered	.696			.752		
It's my professional goal	.643			.720		
Determined to create-12 months	.593			.637		
Determined to create-5 years	.753			.594		
Determined to create-10 years	.755			.567		
US		.828	.881		.831	.887
Great willingness to advise	.787			.648		
Well-developed infrastructure	.839			.671		
Competitions for students	.643			.842		
Conducting research & experiments	.752			.786		
Promote student businesses	.627			.787		
Innovation centres and laboratories	.794			.778		
UE		.826	.881		.844	.885
Encouraged to pursue their business	.754			.635		
Meet lots of people with good ideas	.699			.821		
Adequate entrepreneurship subjects	.849			.728		
Successful start-ups around	.604			.719		
Resources provided for students	.702			.753		
Compulsory entries. Subject	.579			.625		
Infrastructure to support start-ups	.810			.779		
TM		.798	.871		.820	.891
More clarity on business creation	.831			.848		
Analysis of actual business situations	.903			.864		
Computer games and simulations	.572			.744		
design-based thinking and reflective	.840			.818		

Source: Authors' compilation

Structural Equation Modelling

Table 3: Goodness of Fit Indices for the Proposed and Revised Models

Index	Public University Value	Private University Value
	Proposed Model	
RMSEA	.290	.324
CFI	.574	.602
TLI	-.279	-.195
Chi-Square	.000	.000
CD (R^2)	.255	.248
	Revised Model	
RMSEA	.000	.000
CFI	1.000	1.000
TLI	1.030	1.027
Chi-Square	.661	.587
CD (R^2)	.253	.471

The first step was to check the reliability and construct validity of the measurement model using a confirmatory factor analysis, as proposed by Hair et.al. (2010). The results do not report a model fit, as indicated in Table 3. Adjustments were made to the model using a conservative strategy to achieve model fit. Additionally, discriminant validity was achieved by having factor loadings for all seven constructs greater than .5.

Source: Authors' compilation

The construct reliability for all the constructs was above the recommended value of .70 (Nunnally and Bernstein, 1994) as indicated in Table 2. The second step was to test our hypotheses. Table 4 presents the evidence supporting the seven hypotheses. A positive association was found between ATE and EIs for both the public (coef. .511; p= 0.000), and private (Coef. .382; p=.001) universities. SN is positively related to EIs among private university students (Coef. .694; p= .000), whereas for

public university students, it was not statistically significant (Coef. .039; p= .679). We found evidence to support Hypotheses H1, H2 and H3.

Table 4: Results of Structural Equation Modelling

Hypotheses tested			Public Universities Coef.	P>[z]	Private Universities Coef.	P>[z]
Att. Towards Entrepreneurship Intentions	-->	Entrepreneurial	.511	.000*	.382	.001*
Subjective Norms	-->	Entrepreneurial Intentions	.039	.679	.694	.000*
Perceived Behavioral control	-->	Entrepreneurial intentions	.464	.000*	.259	.005*
University Support	-->	Att. Towards Entrepreneurship	-.024	.552	-.056	.240
University Environment	-->	Att. Towards Entrepreneurship	.178	.000*	-.028	.556
Teaching Methods	-->	Att. Towards Entrepreneurship	.007	.907	.095	.165
University Support	-->	Subjective Norms	-.132	.008*	.320	.000*
University Environment	-->	Subjective Norms	.127	.016*	.127	.080
Teaching Methods	-->	Subjective Norms	.106	.179	-.115	.258
University Support	-->	Perceived Behavioral Control	-.028	.619	.040	.485
University Environment	-->	Perceived Behavioral Control	.175	.003*	-.098	.100
Teaching Methods	-->	Perceived Behavioral Control	.164	.067	.140	.093

**p<.05*

Source: Authors compilation

Mixed results were observed for the association between the independent variables and antecedents of EIs. University support was found to be associated with both ATE (coef. -.024; p=.552: Coef. -.056; p=.240) and PBC (Coef. -.028; p=.619: Coef. .040; p= .485) for both public and private university students, whereas a positive interaction was observed in both cases (Coef. -.132; p=.008: Coef. .320; p=.000). Thus, hypotheses H4a and H4c are accepted, while hypothesis H4b is not.

Furthermore, university environment was positively associated with ATE (Coef. .178; p=000), SN (Coef. .127; p=.016 and PBC (Coef. .175; p=.003) for public university students, providing evidence for hypotheses H5a, H5b, and H5c. For private universities, the interactions are not statistically significant (Table 4). Finally, no statistically significant relationships were observed between TM and ATE (Coef. .007; p=.907: Coef. .095; p= .165), SN (Coef. .106; p= .179: Coef.-.115; p= .258) and PBC (Coef. .164; p=.067: Coef. .140; p= .093) for both public and private university students. No evidence was found to support Hypotheses H6a, H6b, and H6c.

VII. Discussion

This study extends the TPB by including environmental constructs (university support, university environment and teaching methods) to establish whether they are directly or indirectly related to the EIs of STEM students in public and private universities in Zambia. The findings revealed two important aspects of TPB. First, the Ajzen (1991) TPB model is applicable to studies of students' entrepreneurial intentions. Second, TPB is not restricted to a specific economic situation (Iakovleva et.al., 2011). This confirms the universality of the TPB in that the theory can be utilized to explain the formation of students' EIs in a different context. This is contrary to the claims made by Bruton et.al. (2008) that the explanatory power of theories developed in efficiency-driven economies exhibits a low ability to explain the interactions between variables when applied to factor-driven economies such as Zambia.

ATE and PBC for both public and private universities STEM students were positively associated with EIs, while SN reported a positive influence on the EIs of private university students only. The results confirm the findings of previous studies that reported the direct influence of the three antecedents on EI (Gieure, 2019; Hussain and Imran, 2018; Farrukh et.al., 2018). An explanation for this is that students in both public and private universities consider technology entrepreneurship as an attractive, satisfying, and advantageous career option and that they can identify new opportunities, create new products and services that satisfy customers' needs, and successfully launch new ventures that influence their EIs.

In contrast, the relationship between students' EIs and SN was not statistically significant for public university students, as reported in prior studies (Barba-Sanchez et.al., 2022; Agolla, Monametsi and Phera, 2018; Arrighetti et al., 2016; Buli and Yesuf, 2015). This is because public universities are characterized by many professors engaged in scientific research, sourcing for scholarships and funding that are made available to students (Barral, Ribeiro and Canever, 2018). The influence of professors could be stronger than that of friends, family or other networks, hindering the process of developing TEIs. Students in public universities value advice from professors more than advice from peers, while in private universities with small numbers of professors, advice from peers significantly influences their TEIs.

The US was found to be directly related to SN for both public and private university students and indirectly related to TEI for private university students. This indicates that the US is indirectly related to students' EIs, as in similar studies (Veracheva, 2018; Trivedi, 2016; Rosique-Blasco et al., 2016). This can be attributed to the fact that private universities provide advice to students; access to well-developed infrastructure, finance, innovation centers and laboratories; good conditions for research; and competition for business ideas increases their social pressure expectations, which then influences their TEIs. However, there were no significant relationships between US, ATE and PBC for public and private university students. These results are contrary to the findings of previous studies that have reported a positive relationship between the antecedents of EIs (ATE and PBC) and EIs (Said et.al., 2021; Nguyen, 2020; Ajum, Ramzani and Nazer, 2019; Karimi et.al., 2019; Gieure et.al., 2019; Karimi et.al., 2014; Linan and Chen, 2009) and can be linked to a negative evaluation of US provided to students, which results in failure to stimulate the TPB elements. Fishbein and Ajzen described TPB elements as elements that are not intrinsic, but something that individuals develop during their daily encounters.

Public and private universities have different environmental setups that may influence students' EIs differently (Barral et.al., 2018). Mixed results have been reported in this study. UE has been reported to have a direct impact on ATE, SN and PBC for public university students and no relationships have been found for private universities. Regarding students' TEIs, an indirect relationship was observed through ATE and PBC for both private and private universities, and through SN for private universities. The results suggest that students in public universities have a positive evaluation of university environmental variables (encouragement to pursue their business ideas, interaction with idea champions and role models, exposure to entrepreneurship education, access to

resources and infrastructure that support venture creation), which results in a positive evaluation of technology entrepreneurship behavior. In addition, their perception of the available factors increased their confidence and ability to start technology-related enterprises. These findings support those of recent studies (Maheshwari, 2022; Martinez-Clement et.al., 2018; Gieure, 2018; Kabok et.al., 2017).

TM was not found to be related to ATE, SN, PBC or TEIs. Therefore, there is no indirect relationship between TM and TEIs in both public and private universities. This may be because the content of the programs developed and the methods of delivery being used are not effective in developing technology entrepreneurial intentions or the focus is on theories (Yordanova, 2021). When students are exposed to practical business sessions, computer games, simulations, workshops and other practical learning activities, they develop positive attitudes towards business venture creation. Several recent studies have stressed the significance of employing practical-based teaching methods to stimulate the development of TEIs among students (Samsone et.al., 2021; Onjewu et.al., 2021; Fiore et.al., 2019; Compose et.al., 2017).

VIII. Practical Implications

These findings have several implications for educators and policymakers. This study demonstrates the importance of extending the TPB by including environmental variables in exploring TEIs. By so doing, the study has made a significant contribution to the body of literature by testing the applicability of the Ajzen (1991) TPB model in different contexts (Karimi, 2017; Gupta, Javadian and Jalili, 2014) specifically in the Zambian context.

The findings of this study have reported that STEM students' assessment of social pressure from friends, family and other networks did not influence TEIs. This indicates that there is a need to change students' perceptions of social pressure at public universities in Zambia. For example, Karimi et.al. (2017) stressed the need for students to make social or normative considerations and pay attention to other people's opinions to stimulate their EIs development. Since public universities are characterized by a large number of professors, they should take a leading role in mentoring and influencing students to engage in entrepreneurial behaviors (Yordanova, 2021). Policymakers and educators should see that professors and other academicians provide business advice to students and ensure that they value technopreneurship as a career option, in addition to conducting scientific research.

University support-related factors were positively related to the TEIs of students in private universities. Providing well-organized and structured business support to STEM students that meets their technopreneurship expectations and needs increases their chances of establishing technology-related enterprises. According to Mustafa et.al. (2016), providing university support to students increases their entrepreneurship knowledge, skills and confidence in engaging in entrepreneurial activities. Therefore, policymakers and educators should ensure that policies and programs are developed and implemented in public universities that will strengthen the education support offered to students, concept development and other business development support services to promote the formation of TEIs among STEM students. The implementation of such policies will increase innovation and the creation of technology-related enterprises (Low and Isserman, 2015).

Given that UE plays a significant role in the formation of TEIs of STEM students in both private and public universities in Zambia, more attention from policymakers and educators is needed to enhance university environmental variables. Although the university environment does not influence the EI of students in public and private universities differently, the entire environment alone is not adequate (Barral et.al., 2017) Hence, there is a need to develop programs to support the university environment, such as the formation of entrepreneurship clubs for students, inviting investors to partner with students' projects and organizing technology fairs for STEM students.

TM as an environmental variable was not positively related to the TEIs of STEM students in either the public or private sector. This implies that the teaching methods utilized in both public and private universities in Zambia are not effective in influencing EI, mostly theoretically. Employing project-based and action-based teaching methods has proven effective in influencing the formation of students' EIs (Secundo et.al., 2020). Policymakers and educators should revise the curricula to ensure that the content focuses on entrepreneurship development and is suitable as a practical approach to teaching STEM students. Sansone et.al. (2021) argued that the use of practical TMs has a strong influence on behavior.

IX. Conclusion and Recommendations

Studies on technopreneurship have received much attention among scholars and policymakers because of the significant role technopreneurship plays in socio-economic development (Hoque, Awang and Siddiqui, 2017). More studies on technopreneurship are required to gain an in-depth understanding of the process of TEIs among STEM students and increase the formation of technology-related enterprises. The results of this study indicate a positive interaction between Ajzen's (1991) TPB variables (ATE, SN, and PBC) and TEIs for private university students, while ATE and PBC reported a positive association with TEIs for public university students. Furthermore, the US and UE had a positive influence on the TEIs of STEM students in private universities, while the TEIs of students in public universities were only influenced by UE. TM did not influence the TEIs of STEM students in either public or private universities in Zambia.

Similar to other studies, this study had several limitations. First, the sample size was not representative of the STEM student population in Zambia. This makes the findings more generalizable. Future research should consider increasing the number of public and private university STEM students participating in the study to generalize the findings. Second, they used a single source and method to collect primary data prone to errors and bias. Therefore, caution should be exercised when interpreting these results.

Future research should employ a mixed method (surveys and interviews) to triangulate the results. Policymakers and educators should conduct interviews. Finally, in this study, the TPB model was extended and validated by incorporating environmental factors only.

Future studies should use an integrated model that includes personality and moderating variables that may influence TEIs.

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