Journal of Business Management and Economic Research
2020, 4 (6): 473-489 DOI: 10.29226/TR1001.2021.242
Journal Homepage: https://www.jobmer.org

Moderating Effect of Business Incubator on Entrepreneurial Pedagogy and Students' Innovative Capability in Kenya Institutions of Higher Learning

Mercy Murrey*
Department of Entrepreneurship and Project management,
School of Business and Economics Moi University, Kenya
murreymercy@yahoo.com
*Correspondence author

Bernard Kibeti Nassiuma
Department of Entrepreneurship and Project management,
School of Business and Economics Moi University, Kenya

Joash Ogada
Department of Entrepreneurship and Project management,
School of Business and Economics Moi University, Kenya

Abstract

The approach by which institutions nurture innovation and creativity is the central research focus of entrepreneurship. The existence of business incubators can have adverse impacts on research and innovation among students in institutions of higher learning. This explains why universities geared towards the promotion of innovativeness of students, have established business incubators which have helped to foster innovation. This article aimed at investigating the role business incubators play in fostering the relationship between entrepreneurial pedagogy and student's innovativeness. The general objective was to determine the moderating effect of incubator uses on the relationship between problem-based learning, competence-based learning, direct Learning and case study learning and student innovative capability in institutions of higher education in Kenya. Factor analysis was used to explore the data for patterns, extract and reduce the many items to a more manageable number and group items with similar characteristics. The article used Barron and Kenny moderation test approach. Results showed that business incubators moderated the relationship between problem based, competence based and case study learning and the student's innovative capabilities.

Key Words: *Business Incubator, Entrepreneurial Pedagogy, Factor Analysis*

Suggested Citation:
Murrey, M., Nassiuma, B. K. & Ogada, J. (2020). Moderating Effect of Business Incubator on Entrepreneurial Pedagogy and Students' Innovative Capability in Kenya Institutions of Higher Learning. Journal of Business Management and Economic Research (JOBMER), Vol: 4, Issue: 6,

1. Introduction

The existence of business incubators can have adverse impacts on research and innovation among students in institutions of higher education. This explains why universities geared towards the promotion of innovativeness of students, have established business-based incubators which have helped to foster innovation (Lasrado, Sivo, Ford, O'Neal, &Garibay, 2016). Whether they are offering tricked-out labs or incredible funding opportunities, the incubators have offered a great opportunity for students who are smart enough to participate in the innovative process of coming up with new products and services.

Globally, the need for the integration of business incubators in colleges and universities in encouraging student creativity and innovativeness has been a topic of ongoing discussion globally. To remain relevant and enable students to pursue surer pathways to success, universities are introducing campus spaces where students can connect to fellow entrepreneurs and interested financiers. The business incubator has geared the institutions of higher education, to rethink their place in preparing the next generation entrepreneurs and in creating an entrepreneurial environment. Birx (2019)

Some Universities in Kenya have also made attempts to set up business incubations centres. For example, Kenyatta University has set up the Chandaria Business Innovation and Incubation Centre in the year 2017. This centre is said to be the first of its type in East Africa. The objective of the centre is to promote the projects of at least 50 students a year. The centre also fosters regular interaction between the students and a team of experts and mentors from Kenyatta University and some leading industrialists in East Africa, who chart out commercialization of the products. The Jomo Kenyatta University of Agriculture and Technology in partnership with Kuza Biashara Ltd. are also in the process of setting up a business mentoring programme known as Innovation and Entrepreneurship centre. The mission of the centre is to translate student innovations into viable business outputs. The Technology, Innovation and Entrepreneurship (TIE) initiative launched has a mission to build the capacity of young and innovative entrepreneurs through training, mentorship, networking as well as extending seed capital for business start-ups.

There is however a need to examine how these incubators by most of this universities globally, regionally and in Kenya influence the innovativeness of the students and particularly entrepreneurship students (Allan, 2016). This is mainly because the impact of these incubators has not been measured, especially at the local level and hence their contribution cannot be determined effectively (Ismail, &Mahmood, 2013). It is therefore against this background that the study will seek to assess entrepreneurial pedagogy, incubator use and student innovative capability in institutions of higher education in Kenya.

2. Literature Review

According to Lindholm & Politis, (2013) the incubator gives students the chance to learn through experience with opportunities to work through a business concept in the student business lab, get involved with start-ups, and take part in competitions and conferences for entrepreneurs. College campuses are ripe with innovation, as students grow through education and experimentation in school (Kolympiris, Christos and Klein, Peter 2016). To help foster this innovation, many colleges and universities have opened up business incubators, helping students and others in their community to help make their innovative dreams a reality (Lasrado, Sivo, Ford, O'Neal &Garibay, 2016). Whether they're offering tricked-out labs or incredible funding opportunities, these incubators offer a great opportunity for students who are smart and lucky enough to participate.

Dedicated students can even choose to live in a residential community called entrepreneurs hall, which gives them access to co-ops, mentoring, courses, and always-on access to the incubator (Jamil, Ismail, &Mahmood, 2015). Undergrads looking for a strong start in creating a business can minor in entrepreneurship, while MBA students can take entrepreneurship as a major. With initiatives in social and digital entrepreneurship, an intensive program for promising start-ups and another incubator that furthers an incredible array on business incubation opportunities have emerged, (Agbim, Oriarewo, &Owocho, 2013). Boasting resources for life sciences, biotech, medical devices, photonics, clean energy, and engineering, can also help to incubate businesses in just about any physical technology.

Culkin, (2013) noted that this incubator is all about supporting technology transfer, sharing learning experiences with students, providing professional support, and facilitating partnerships and collaborations with other campuses. Innovation depot offers a facility and program for technology business development, focusing on biotechnology, life science and technology service businesses. With a next-generation facility offering both office space and laboratory space full of amenities, it's a great place to locate a technology start-up. This business incubator takes innovation to the water, functioning as an economic engine for environmental and agricultural industries (Somsuk, &Laosirihongthong, 2014).

Start-up incubators can support students in developing entrepreneurial skills and provide tailored support, for early-stage, high-growth businesses and ideas (Barbero, Casillas, Wright, & Garcia, 2014). At their best, they can also create a virtuous cycle of job creation, university-industry collaboration, revenues for local businesses and for governments and show tangible benefits of academic impact.

Salem, (2014) concluded that incubators have been shown to increase the chance of a business succeeding. Improved success rates for entrepreneurs are only one of the many benefits from successful incubator programmes. Communities and universities can also see the impact from incubating and accelerating start-ups. Incubators help entrepreneurial students to build start-up services, including incubators accelerators, seed funds and entrepreneurship training (Wang, Hung, & Wang, 2013).

3. Methodology:

Data Cleaning and Preparation: It was prudent to make sure that the data used in this article was coded, clean, accurate and reliable. This was done by checking for missing data (Hair et al., (2010); Tabachnick & Fidell, 2007). The data was coded into a statistical software STATA. Qualitatively the variables were coded as, 5-Strongly Agree, 4-Agree, 3- Disagree, 2 Strongly Disagree, 1 Not Decided. Accuracy was maintained during data coding, therefore, incorrectly filled questionnaires were discarded in the process. To make sure the data was reliable, the study performed reliability test suggested by Lee Cronbach in 1951.

Sampling Adequacy using Kaiser-Meyer-Olkin (KMO): Before conducting factor analysis, data were standardized by creating z-scores for every variable. Data standardization is done in order to have a common data format. It deals with data transformation by subtracting the mean of every variable and divides it by its standard deviation. After that, Kaiser 1974 proposed that it is necessary to determine whether the sampling used in any survey is adequate for factor analysis. The constructs used to measure entrepreneurial pedagogy, use of business incubators and students' innovative capability are unobserved and therefore factor analysis is conducted to reduce large set of variables into few composite variables. To do this, principal component analysis (PCA), a statistical method that extract factors from the data is estimated. It finds a set of small unobserved variables accounting for as much variance as possible among lager set of

variables (Mann, 1995). Principal component analysis according to Wold, S., Esbensen, K., and Geladi, P. (1987) is a multivariate technique that analyzes a data table in which observations are described by several inter-correlated quantitative dependent variables.

According to Rose *et al.,* (2004), a moderator is a third variable that adjusts the strength of a causal relationship. Baron and Kenny (1986) defined it as a "variable that affects the direction or strength of the relationship between study variables. The study used hierarchical multiple regression to test for moderation effects (Baron & Kenny, 1986). First, entrepreneurial pedagogy i.e. problem-based learning, competency-based learning, direct learning and case study-based learning aspects were regressed against student innovative capability. Secondly, moderating variable was introduced and regressed together with all other variables. Therefore, interaction term between predictor and moderating variables was obtained by multiplying the two variables that produced an interaction effect done at different stages for each individual interaction as specified in the hierarchical regression model below.Testing for moderating effect of business incubator, the following model was used

$Y = \beta_0 + \beta_1 X_i + \beta_2 Z + \beta_3 X_i Z + \varepsilon$ ……..……..……..……...1

In correlational analysis, a moderating variable (Z) according to Baron and Kenny (1986) is a third variable which could affect the amount of correlation and or change the direction of the dependent (Y) and the independent variable (X). The effect of a moderator can be shown via the interaction of X and Z (Kang et al., 2015), Pivato and Misani (2008) and WU and KO (2013).

Graphically, the following figure 1 illustrates the relationship between the independent variable, the moderator and the dependent variable.

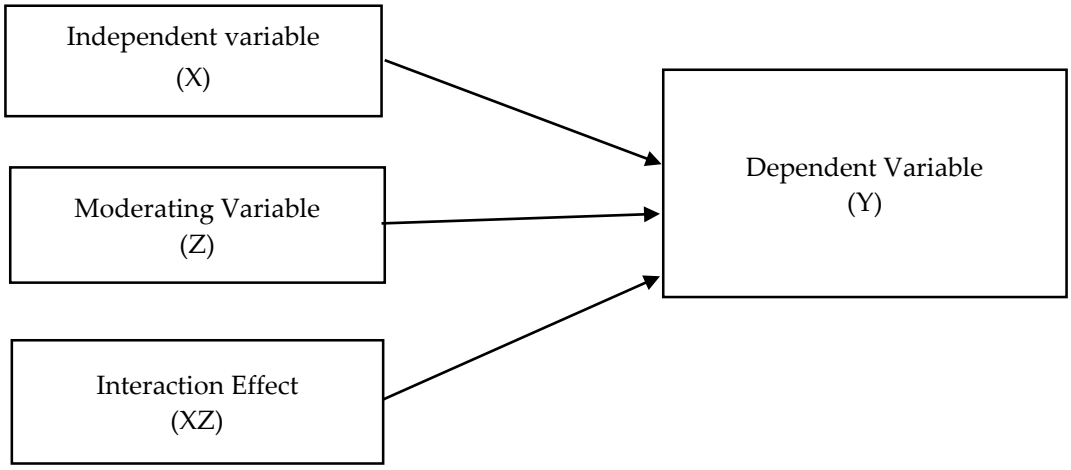

Figure 1: Testing Interaction Effect
Source Baron and Kenny (1986)

To estimate the simple and interaction effect, first X and Z enter the into the model as predictors of Y. Next, the interaction term XZ enters the model, If the interaction effect is significant, then the moderating effect exist (Baron & Kenny, 1986). Note that in multiplying X and Z, a problem of multicollinearity may exist, and to correct this, centering or standardizing data is done (Frazier et al., 2004).

4. Results and Discussion

The Table 1 shows the results from KMO results. To get KMO, PCA is first estimated for identifying various components and then *estatkmo* command using STATA software will estimate the KMO.

According to Kaiser, H. (1974), KMO values ranges between 0 and 1. Values close to zero show that there are large partial correlations in comparison to sum of correlation. In other words, there is a widespread correlation and it implies that there are problems for factor analysis.

Table 1. Sampling Adequacy Using KMO

Variables	KMO Sampling Adequacy
Students Innovative Capabilities	0.8983
Problem Based Learning	0.8994
Competence Based Learning	0.8836
Direct Learning	0.8870
Case Study Learning	0.9114
Business Incubators	0.8706

Source: Survey Data, 2020

The KMO values between 0.8 and above indicates the sampling is adequate for factor analysis whereas values less than 0.6 are not adequate and something remedial should be taken. This study found that all variables were above 0.8 and were acceptable for factor analysis. The results presented shows that the overall coefficient for KMO sampling adequacy for problem-based learning is 0.8994, competence learning is 0.8836, direct learning is 0.8870 and case study learning had 0.9114 KMO. Further the moderator (business incubator) and the dependent variable (students' innovative capabilities) had KMO of 0.8706 and 0.8983 respectively. Each of the construct used had KMO sampling adequacy above threshold of 0.8 (see appendix 1). Since all the variables made the threshold of having KMO values over 0.70, the study proceeded to do factor analysis using principal component analysis.

Factor Analysis: Factor analysis is a statistical analysis reduction technique that explains correlation between multiple outcomes due to one or multiple underlying explanations or factors. It attempts to discover the unexplained factor that influence the covariance among multiple observations (Matsunaga ,2010). These factors represent underlying concepts that cannot be adequately measured by single variable. The significance of this is that it is normally used in surveys research in which responses to each question represents an outcome since several or multiple questions are often related. Eigenvalues are used to measure the total variance accounted by each factor. It was suggested by Kaiser criterion (Kaiser, 1974) that those factors with eigen values equal or greater than one should be retained.

Model Specification on testing the moderating Effect of Business Incubator Use: In linear causal relationship where an independent variable X (predictor variable) is presumed to cause a variable Y (the dependent variable or outcome variable), a variable Z (the moderator) measures the causal relationship between X and Y by using the regression coefficient. Moderation implies that the causal effect may be weakened, amplified or reversed (Judd & Kenny, 2010). In general, moderating effect can be indicated by the interaction of X and Z in explaining Y. the equation 1 is a multiple regression equation which is estimated to test for the moderator effect.

$$Y = \alpha + aX + bZ + cXZ + \varepsilon \quad \ldots\ldots 1$$

The coefficient c measures the effect of a moderator. The path a measure the simple effect of X and sometimes referred to as the main effect of X when Z equals to zero (Frazier, Tix and Barron 2004), Hayes (2013) and Cohen et al., (2003). The effect of X on Y is a+cM indicates that the effect of X and Y depends on the value of Z (Frazier, Tix and Barron 2004). In this article, the objective was to investigate the moderation effect of use of business incubators on the relationship between each of the predictor variables (problem-based learning, competence-based learning, direct learning and case study learning) and the outcome variable (students' innovativeness. This

moderation in this study was analyzed using R because it has a special type of packages; *moderate.lm* package that analyzes the moderating effect and it further R software provides a graphical representation of the same using *rockchalk* package

The study obtained eigenvalues for each variable. Considering factor 1, Students' innovative capability had eigenvalue 4.190, problem-based learning had eigenvalue of 4.899, competence-based learning had eigenvalue of 3.934, direct learning and case study learning had 4.365 and 4.809 eigenvalues respectively. Business incubator which is the moderator had eigenvalue of 3.747. Looking into the factor 2, eigenvalues for all the variables were less than the 1 and according to Kaiser criterion, this factor was not retained and therefore only factor 1 was considered in determining the loadings on each of the constructs.

Table 2. Factor Analysis

Variable	**Eigenvalues**		**Likelihood Ratio Test**	
	Factor 1	**Factor 2**	**Chi2**	**Prob>Chi2**
Students' Innovative Capabilities	4.190	0.452	1416.56	0.000
Problem Based Learning	4.899	0.699	1971.14	0.000
Competence Based Learning	3.934	0.789	1374.52	0.000
Direct Learning	4.365	0.511	1527.34	0.000
Case Study Learning	4.809	0.494	1720.59	0.000
Business Incubators	3.747	0.363	703.93	0.000
LR Test: Independence versus Saturated.				

Source: Survey Data, 2020

Factor Loading: The study extracted factors using factor analysis techniques, this was done after confirmation from KMO in which the study found that KMO values for each variable was above 0.70. (Kaiser, 1974; Field, 2005). Factor loadings are weights and correlation between each variable in the study and the factor. The recommended loading for an item according to Hair *et al.,* (2014) is a factor loading of 0.50. Factor dimensionality is relevant when the factor loading is higher. A negative value indicates an inverse impact on the factor. The loadings for factor 1 were positive to each of the variables in question. Uniqueness is the variance that is unique to the variables and not shared with other variables for instances it is clear from the results in table 2 below that higher the loadings the lower the uniqueness and vice versa. In simple terms low loading means the construct in question is unique to other constructs in explaining the main variable (for example Problem based learning, Competence based learning and Direct learning).

Factor Loadings on Students' Innovative Capability: Principal component analysis (PCA) is widely used in data processing and dimensionality reduction (Zou, H., Hastie, T., & Tibshirani, R. 2006). The principal component analysis goal is to extract the important information from the data, to represent it as a set of new orthogonal variables called principal components, and to display the pattern of similarity of the observations and of the variables. PCA can be generalized as correspondence analysis in order to handle qualitative variables and as multiple factor analysis in order to handle heterogeneous sets of variables. Mathematically, PCA depends upon the eigen-decomposition of positive semi-definite matrices and upon the singular value.

Factor analysis are used to explore the data for patterns and reduce the many variables to a more manageable number and group variables with similar characteristics (Abson, D. J., Dougill, A. J., & Stringer, L. C. 2012). The resulting PCA based vulnerability maps indicate the regional spatial variability of four statistically independent, unique components of socio-ecological vulnerability, providing more information than the single index produced using a normalization approach.

The study extracted factors for the dependent variable (Student Innovative Capability). To do this, first the study estimated the reliability of constructs using Cronbach alpha. Students'

innovative capability had a reliability coefficient of 0.8555>0.7 (Lee Cronbach,1951). The KMO value of 0.8983>0.7 signified that the sample was adequate for factor analysis (Kaiser,1974). The Likelihood ratio was a significant estimation of independent versus saturated items at Chi2(91) 1416.56 and prob>Chi2 0.000. since the factor 1 had eigenvalue of 4.190>1 indicates that the loading on the items defining students' innovative capability was based on factor 1. The loadings should be greater than 0.5 to be retained (Yong & Pearce, 2013).

According to Henson and Robert (2006), Park *et al.,* (2002), Preacher and MacCallum (2003), the orthogonality versus oblique data has been the hotly debated issues concerning the data rotation technique. If the constructs in the study features unrelated factors orthogonality should be verified for example if the factors are indeed unrelated, it should be revealed via exploratory factor analysis by employing an oblique rotation method. The uniqueness that the variance of the specified factors is not affected because rotation only changes the coordinates of the common factor space. The aim of rotation is to make factor loading easier to interpret (Preacher & MacCallum, 2003). Therefore, this study used varimax orthogonal rotation with Kaiser normalization.

Table 3. Factor Loading on Students' Innovative Capability

Variable	**Factor 1**	
Student Innovative Capability	**Loadings**	**Uniqueness**
1.I have the capacity to produce unique ideas	0.435	0.687
2. I am constantly seeking for unusual novel solutions to solve problems	0.548	0.615
3. Actively searching for better products and services	0.573	0.612
4. I have come up with new products that has benefited my business	0.550	0.582
5. Developed new ideas and concepts overtime	0.558	0.624
6. I have actively identified new services and products that has enhanced my capability	0.504	0.678
7. I have come up with new products that has benefited the business	0.580	0.558
8. Constantly seeking for new ways to do things	0.559	0.641
9. I prefer work that requires originality in thought	0.568	0.637
10. I can generate new ideas and be able to translate them into viable and profitable businesses	0.538	0.614
11. Ability to present new methods and ideas	0.594	0.571
12. I have the capacity to modify the features of an existing product or service	0.525	0.604
13. I have the capability to come up or discover original ideas	0.529	0.605
14. I have the ability to discover new products and services	0.580	0.564

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

Factor Loadings on Problem Based Learning: As discussed earlier, factor loadings are weights and correlation between each variable in the study and the factor. Eigenvalue for factor 1 for problem-based learning was 4.899 and the Chi2(171) of 1971.14 with prob > Chi2 = 0.000 (see table 1). This study considered factor 1, and according to results presented in table 3 factor analysis on Problem Based Learning, the following constructs were removed since they did not meet the threshold of having loadings greater than 0.50; We have responsibility for our learning(loading of 0.439), Problem tasks stimulate thinking, analysis and reasoning (0.486), Problems math with students' level of knowledge (0.461), Being present in tutorial groups is necessary to master the learning goal (0.482), I fulfil the task given to me during group work (0.421), Problems are easily solved

without much difficulty(0.487), We have encouraged to work in peer groups where we can conduct peer assessments(0.471) while the rest of the constructs were retained.

Table 4. Factor Loadings on Problem Based Learning

Variable	**Factor 1**	
Problem Based Learning	**Loadings**	**Uniqueness**
1.We have responsibility for our learning	0.439	0.669
2. Actively involved in the process of learning	0.589	0.557
3. Problem tasks stimulate thinking, analysis and reasoning	0.486	0.635
4. We have autonomy in the process of learning	0.532	0.583
5. We have an opportunity to interact with the faculty	0.540	0.597
6. Problems math with students' level of knowledge	0.461	0.670
7. Emphasize is placed on self-directed learning	0.593	0.556
8. Problem based design assures self-being in directed learning	0.560	0.597
9. Being present in tutorial groups is necessary to master the learning goal	0.482	0.701
10.We take initiative in diagnosing our learning needs	0.582	0.549
11. I fulfil the task given to me during group work	0.421	0.663
12. I participate in group work as much as possible	0.563	0.553
13. Problems are easily solved without much difficulty	0.487	0.643
14. We choose appropriate learning strategies	0.550	0.635
15. Multiple trials are encouraged in developing solutions for classroom problems	0.521	0.664
16. 1We are expected to conduct field research on a given topical issues	0.558	0.545
17. We can self-monitor the learning process	0.517	0.592
18. We decided on the resources for leaning	0.561	0.545
19. We have encouraged to work in peer groups where we can conduct peer assessments	0.471	0.610

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

Factor Loadings on Competence Based Learning: In this variable, fourteen items were proposed to measure competence-based leaning on students' innovative capabilities in institutions of higher learning in Kenya. The KMO for sampling adequacy on this variable was 0.8836 revealed that data was adequate for extraction of principal component analysis, eigenvalue for factor 1 was 3.934 > 1 (Yong & Pearce, 2013). The Likelihood ratio test which tests item independence against saturated items showed that the Chi2(91) value was 1374.52 and prob >Chi2 was found to be 0.000 (see table 1) implying the items were independent in explaining the variable in question (Competence Based Learning).

Table 5. Factor Loadings on Competence Based Learning

Variable	**Factor 1**	
Competence Based Learning	**Loading**	**Uniqueness**
1.Teaching is geared towards enhancing students' capabilities	0.455	0.690
2. Exams conducted is key to determining the competence of the learner	0.519	0.641
3. Skills matching is conducted to determine courses students should undertake	0.615	0.482
4. All entrepreneurship students take up skills matching classes to determine businesses they can run/manage	0.547	0.638
5. Various talent development programs/ projects are conducted at the university relating to entrepreneurship	0.543	0.594
6. Talent development as an activity is part of the university calendar	0.429	0.638
7. The assessment given enhance our entrepreneurial skills	0.625	0.539

Continuation of table 5

8. The teaching is based on class experiments so as to enhance our abilities	0.563	0.628
9. We take initiative to start tasks	0.523	0.644
10. We take responsibility for the choices we make	0.501	0.597
11. During group experiments I make valuable contributions	0.463	0.588
12. I contribute to shared group results by performing class duties	0.527	0.650
13. With my expertise I help others perform their tasks	0.521	0.593
14. We are encouraged as a group to do our best to achieve the best results possible	0.458	0.671

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

Four items were drop since the factor loaded on them were below threshold of 0.5 (Hair *et al.*, 2014) and the remaining ten were retained. These four items from table 4 were; Teaching is geared towards enhancing students' capabilities (factor loadings of 0.455<0.5), Talent development as an activity is part of the university calendar (loadings of 0.429<0.5), During group experiments I make valuable contributions (0.463<0.5) and We are encouraged as a group to do our best to achieve the best results possible (loadings of 0.458<0.5).

Factor Loadings on Direct Learning: Direct learning was measured by fifteen items. The Cronbach's measure for reliability on this variable was found to be 0.8577 which was above 0.7 (Lee Cronbach, 1951). The Kaiser-Meyer-Olkin coefficient for determining how adequate the sample for factor analysis was 0.8870 (see table 1). The study proceeded to extract factor using principal component analysis.

Table 6. Factor Loadings on Direct Learning

Variable	**Factor 1**	
Direct Learning	**Loadings**	**Uniqueness**
1.Teachers employ question and answer session when teaching	0.514	0.605
2. We are encouraged to ask questions when learning to ensure they grasp concepts	0.538	0.614
3. Presentations are compulsory when studying various units	0.605	0.529
4. Presentations are pre-defined in terms of number of presentations and mode of presentations	0.587	0.588
5. Teachers must appear in class for every lesson	0.554	0.550
6. We are required to attend all classes	0.507	0.584
7. Class discussions are encouraged in class to enhance our understanding	0.567	0.622
8. We are allowed to create own questions to test their ability	0.565	0.637
9. Discussions take up most of the course time	0.405	0.669
10. Class presentations have a positive impact on us	0.579	0.615
11. We are given an open arena of the questions and answers to enhance our ability	0.581	0.590
12. Discussions broaden our skills during class work	0.513	0.622
13. We are encouraged to brainstorm on questions and answers to enhance our skills	0.476	0.663
14. We are motivated to work based on the class assessment deadlines	0.400	0.647
15. We take responsibility for the class presentation given	0.518	0.616

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

The eigenvalue for factor 1 loaded on this variable was 4.363>1. The Likelihood ratio tests showed the Chi2(105) was 1527.34 and the prob>Chi2 was 0.000(see table 1). Considering factor 1, the following three items presented in table 5 did not meet the criteria above 0.5 (Kaizer (1974),Hutcheson and Sofroniou (1999) and Hair *et al*.(2006)) and were excluded; Discussions take up most of the course time (loading of 0.405<0.5 and having uniqueness of 0.669), We are encouraged to brainstorm on questions and answers to enhance our skills (loading of 0.476<0.5 and uniqueness of 0.663), We are motivated to work based on the class assessment deadlines(loading of 0.400<0.5 and uniqueness of 0.647). The remaining twelve items were retained.

Factor Loadings on Case Study Learning: Thirteen out fifteen items were retained to measure case study learning. First, Cronbach reliability test was carried out on this variable and found that the items were reliable. The Cronbach alpha coefficient was 0.8742. Further, KMO value of 0.9114>0.70 (Kaiser 1974) confirming the sample was adequate to extract factor using factor analysis technique. Factors were extracted using loadings. Factor 1 was retained since the eigenvalue for this was above 1(eigenvalue of 4.809). Loadings considering this factor 1 indicated that two items were dropped. These items are; I can clearly understand and articulate the main concepts (with loadings of 0.424 and being unique by 72.5 percent) and Write-up of well-known local entrepreneurs' experiences are available for review to students(loadings of 0.492 and with uniqueness of 63.4 percent as shown in table 6.

Table 7. Factor Loadings on Case Study Learning

Variable	**Factor 1**	
Case Study Learning	**Loadings**	**Uniqueness**
1.I can clearly understand and articulate the main concepts	0.424	0.725
2. Write-up of well-known local entrepreneurs' experiences are available for review to students	0.492	0.634
3. I have the ability to think through a problem and argue it out and give possible solutions	0.554	0.629
4. Review of literature as a skill is taught to students during entrepreneurship	0.601	0.544
5. It gives an overview understanding of what happens in real life situations	0.582	0.565
6. I have the ability to understand the relationship between the concepts	0.612	0.535
7. Case study has improved my learning efficiency	0.589	0.588
8. I have the ability to apply knowledge gained from cases to solve other problems	0.667	0.478
9. Case study has helped me learn the entrepreneurship content in a more comprehensive way	0.542	0.607
10. I have the ability to articulate real life issues based on the cases done in a classroom setting	0.579	0.584
11. Gives more opportunities for participation	0.600	0.524
12. We are given more opportunities to apply learning to different cases	0.534	0.619
13. More structured environments enhance learning	0.595	0.559
14. Encourages application of analytical skills	0.567	0.540
15. More opportunities for reviews of literature	0.514	0.654

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

Factor Loadings on Business Incubator: The study continued to extract factor for the moderating variables (business incubator) after confirming that, first the constructs were reliable (Cronbach's alpha coefficient was 0.8389 > 0.70). Secondly, the sampling was adequate for factor extraction. This is because the KMO value was 0.8706 and was above 0.7 Kaiser criterion (1974). Thirdly, eigenvalue for factor was found to be 3.747>1(Yong & Pearce, 2013). There was a significant Likelihood ratio test of Chi2 value of 703.93 and prob>Chi2 was 0.000 (see table 1). The extraction of factors in this case was based on the factor 1. Four items were dropped since they had loading below 0.5. Uniqueness is the proportion of the common variance of the variable not associated with the factor and according to results shown in table 7 the four items had high percentage of being unique with the factor. The four items with their respective factor loadings and uniqueness excluded were; I am able to meet and work with other entrepreneurs (factor loadings 0.490, 65.7 percent uniqueness), The incubator has enabled me have access to peer mentoring (factor loadings 0.488, 60.7 percent uniqueness), I have the ability to enhance my etiquette and presentation skills (factor loadings 0.482, 64.5 percent uniqueness), The lab has provided me with a combination of many skills including, ability to plan, organize and manage resources(factor loading 0.492, 67.2 percent uniqueness). The rest nine items were retained.

Table 8. Factor Loadings on Business Incubator

Variable	**Factor 1**	
Business Incubators	**Loadings**	**Uniqueness**
1.The business incubator has enhanced my networking abilities	0.544	0.630
2. I'm able to network with entrepreneurs from diverse fields	0.597	0.608
3. I am able to meet and work with other entrepreneurs	0.490	0.657
4. I have acquired sufficient business training through the incubator	0.539	0.657
5. The incubator has opened me up to better ideas	0.540	0.621
6. Entrepreneurial lab focuses on key business aspects of training	0.565	0.610
7. I have acquired practical skills through the training given through the incubator	0.504	0.695
8. The incubator has enabled me have access to peer mentoring	0.488	0.607
9. I am able to build my entrepreneurial capabilities and skills	0.590	0.541
10. I have the ability to enhance my etiquette and presentation skills	0.482	0.645
11. The entrepreneurial lab has enhanced my communication skills	0.549	0.677
12. Entrepreneurship training policies gained through the incubator has enhanced my understanding	0.599	0.555
13. The lab has provided me with a combination of many skills including, ability to plan, organize and manage resources	0.492	0.672

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax Orthogonal Rotation with Kaiser Normalization.

Source: Survey Data, 2020

Model Estimation

Moderating Effect Business Incubator Use on the Relationship Between Problem Based Learning and Students Innovative Capabilities: The first moderation in this article was moderation effect of business incubator use on the relationship of problem- based learning and innovativeness of the students in institutions of higher learning in Kenya. The moderation results presented in table 8 indicates that the interaction between -problem-based learning (one of the predictors) and the use of incubator (moderator) was positive (0.24220) significantly (0.0189) at 5 percent level to enhance innovativeness of the students. Hence, it was concluded that use of incubators among students in institutions of higher learning in Kenya would propel their innovative capability. It implies that hypothesis that incubator uses does not moderate the relationship between problem-based learning and student innovative capability in institutions of higher learning in Kenya was rejected

and concluded that business incubators enhances students participation on in solving problems in other words it propels students learning engagements to innovate more through problem based approach. Equation 1 can be illustrated as

$$SI = 1.6034 + 0.5454PBL + 0.7929BI + 0.2422(PBL * BI)$$

Table 9. Moderating effect of Business Incubator Use on relationship between Problem Based Learning and Students Innovativeness

Coefficients:	Estimate	Std. Error	t value	P(>|t|)
Intercept	1.60344	0.32101	4.995	0.000***
PBL	0.54544	0.09207	5.924	0.000***
BI	0.79286	0.36309	2.184	0.0296*
Interaction (PBL*BI)	0.24220	0.10275	2.357	0.0189*
Residual standard error: 0.4603 on 396 degrees of freedom. Multiple R-squared: 0.4687, Adjusted R-squared0.4647. F-statistic: 116.4 on 3 and 396degrees of freedom, p-value: 0.00				
Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

Source: Survey Data, 2020

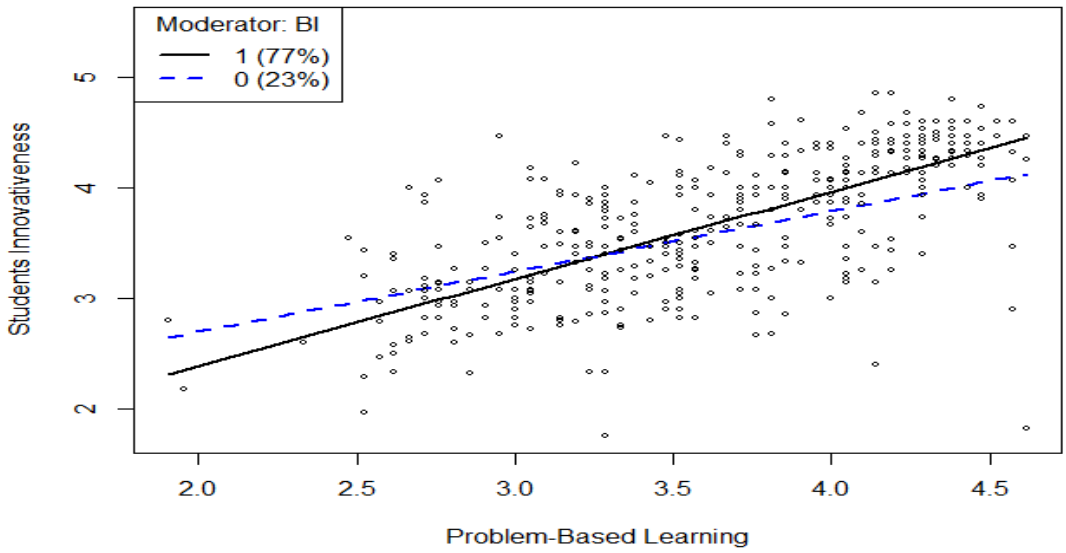

Figure 1: Moderating Effect of Business Incubator on Problem Based Learning and Students' Innovative Capabilities

Source: Survey Data, 2020

Moderating Effect Business Incubator Use on the Relationship Between Competence Based Learning and Students Innovative Capabilities: Competence is observed to be the extensive combination of knowledge, skills and attitudes which are necessary for effective performance. It was the aim of the article to determine the moderating effect of incubator uses on the relationship between competence-based learning and student innovative capability in institutions of higher education in Kenya. The hypothesis was tested and found that the interaction effect of incubator-use and the competence leaning was significant as shown in table 9 This means incubators are essential in students' development on creating innovations. It implies that teachings that enhances students' capabilities and conducting exams is key in determining the competence of the learners promotes or leads to students being innovative. The significance of the moderating effect indicates that business incubators enhances networking among students, incubators enables access to peer mentoring, and it opens to better the student's ideas and in return leads to

innovations among students of higher learning in Kenya. Results can be put in an equation form as

$$SI = 1.7406 + 0.4768CBL - 0.7341BI + 0.2180(CBL * BI)$$

Table 10. Moderating effect of Business Incubator Use on Relationship between Competence Based Learning and Students Innovative Capability

Coefficients:	Estimate	Std. Error	t value	P(>|t|)
Intercept	1.74058	0.28032	6.209	0.000***
CBL	0.47681	0.07558	6.309	0.000***
BI	-0.73408	0.31956	-2.297	0.0221*
Interaction (CBL*BI)	0.21804	0.08503	2.564	0.0107*

Residual standard error: 0.4526 on 396 degrees of freedom. Multiple R-squared: 0.4862,
Adjusted R-squared: 0.4823. F-statistic: 124.9 on 3 and 396degrees of freedom, p-value: 0.00

Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: Survey Data, 2020

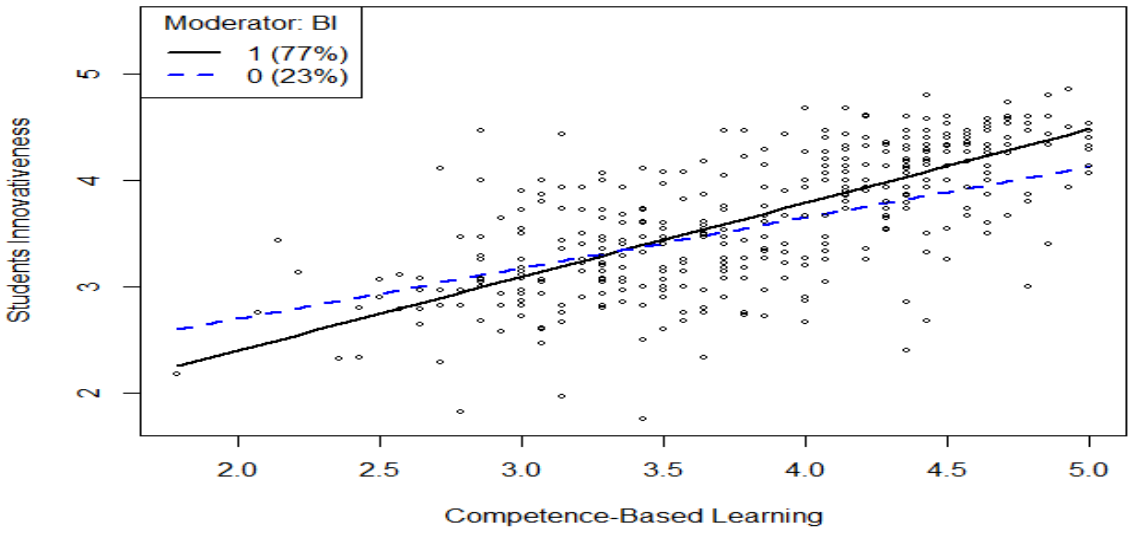

Figure 2: Graph showing Plots of the Moderating Effect of Business Incubator use on the relationship between Competence-Based Learning and Students' Innovativeness
Source: Survey Data, 2020.

Students professed a supportive learning environment for innovation competence only to some level of degree. On the other hand, learners rated their own innovation competence moderately higher. Despite positive perceptions of students' own innovation competence, the learning surrounding was only to a limited degree intended at developing innovation competence. The results propose that universities might require focusing more overtly and structurally on the teaching and assessment of innovation competence.

Moderating Effect Business Incubator Use on the Relationship Between Direct Learning and Students Innovative Capabilities: The results in table 10 indicates that incubator use did not moderate the relationship between direct leaning and students' innovative capabilities. It was hypothesized that Incubator use does not moderate the relationship between direct learning and students' innovativeness in institutions of higher learning in Kenya.

Table 11. Moderating effect of Business Incubator Use on relationship between Direct Learning and Students Innovative Capability

Coefficients:	Estimate	Std. Error	t value	P(>|t|)
Intercept	1.30619	0.27621	4.729	0.000***
DL	0.60294	0.07548	7.989	0.000***
BI	-0.27517	0.30888	-0.891	0.374
Interaction (DL*BI)	0.09004	0.08331	1.081	0.280
Residual standard error: 0.4274 on 396 degrees of freedom. Multiple R-squared: 0.542, Adjusted R-squared: 0.53 85. F-statistic: 156.2 on 3 and 396degrees of freedom, p-value: 0.00				
Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

Source: Survey Data, 2020

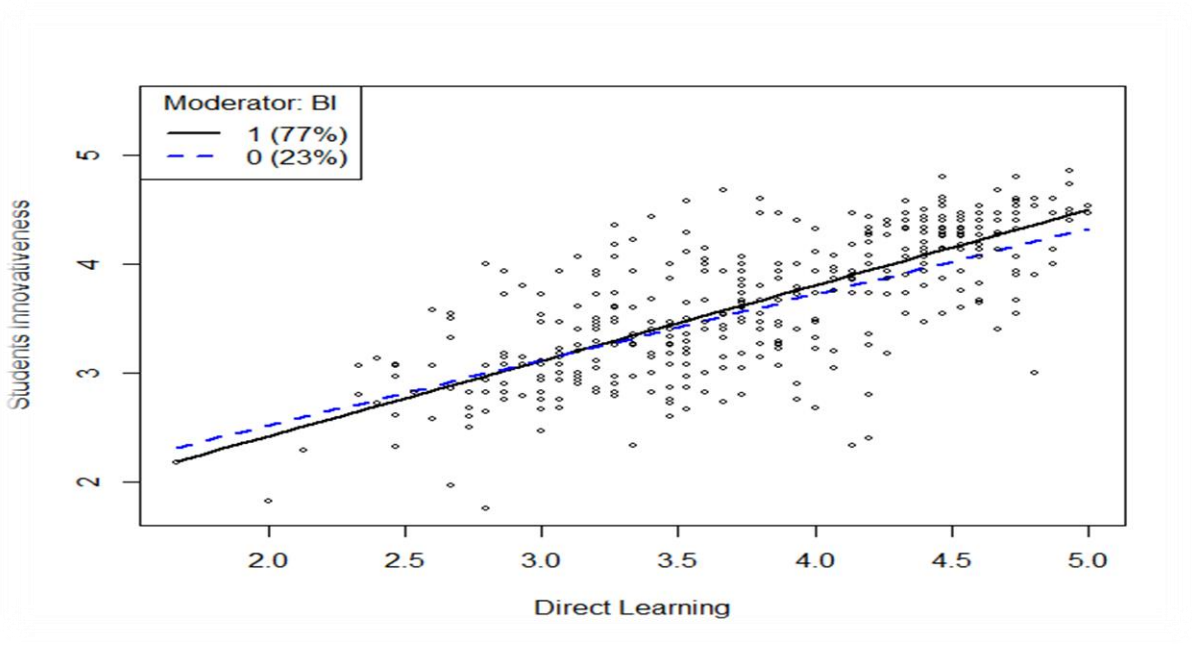

Figure 3: Graph showing Plots of the Moderating Effect of Business Incubator use on the relationship between Direct Learning and Students' Innovativeness
Source: Survey Data, 2020

Since the result was insignificant (p-value=0.280), the hypothesis failed to be rejected.

The relationship can be illustrated as

$$SI = 1.3062 + 0.6029DL - 0.2752BI + 0.0900(DL * BI)$$

The results of empirical research revealed that both self-directed learning ability and problem-solving ability had a positive effect on innovation behaviour and that problem-solving ability had a positive effect on innovation behaviour as a part of self-directed learning ability. Team-based learning in entrepreneurship education has been revealed to be valuable as a moderating effect on the relationship between problem-solving ability and self-directed learning ability and innovation behaviour, in the case of four factors of team-based learning, respectively. This research suggests the effectiveness and application of team-based learning method in entrepreneurship education.

Moderating Effect Business Incubator Use on the Relationship Between Case Study Learning and Students Innovative Capabilities: The following table 11 and figure 4 shows the relationship between the case study leaning and the studen's innovative capabilities of students of higher learning in Kenya. It is seen that the interaction is highly significant. This means that the hypothesis that business incubator use does not moderate the relationship between case study learning and

student innovative capability in institutions of higher learning in Kenya was rejected and concluded that use of case study leaning and incubators in institutions of higher learning in Kenya leads to a significant innovations by students. In equation form, the result can be as follows

$$SI = 1.8164 + 0.4551CSL + 0.9101BI + 0.2683(CSL * BI)$$

The findings also expose that business incubators continue to create innovative entrepreneurial firms; however, they may need to additionally increase the professionalism of their activities that show some limits regarding selection, business support, networking and graduation.

Table 12. Moderating effect of Business Incubator Use on relationship between Case Study Learning and Students Innovative Capability

Coefficients:	Estimate	Std. Error	t value	P(>|t|)
Intercept	1.81643	0.24198	7.507	0.000***
CSL	0.45509	0.06493	7.009	0.000***
BI	0.91005	0.27951	3.256	0.001**
Interaction (CSL*BI)	0.26833	0.07407	3.623	0.000***

Residual standard error: 0.4245 on 396 degrees of freedom. Multiple R-squared: 0.5482,
Adjusted R-squared: 0.5448. F-statistic: 160.1 on 3 and 396degrees of freedom, p-value: 0.00

Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Source: Survey Data, 2020

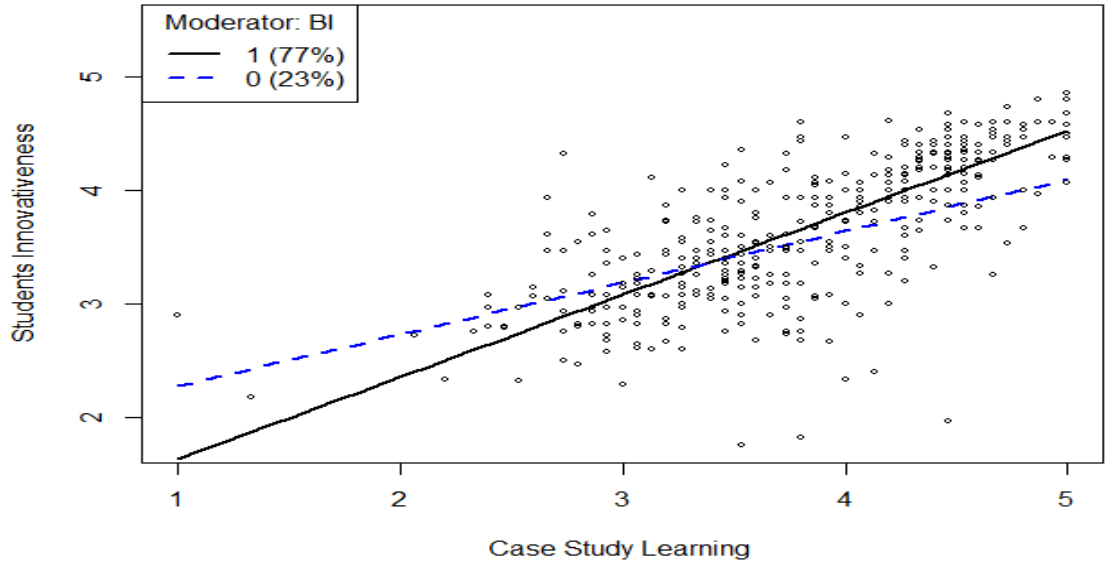

Figure 4: Graph showing Plots of the Moderating Effect of Business Incubator use on the relationship between Case Study Learning and Students' Innovativeness
Source: Survey Data 2020

5. Recommendation

Institutions of higher learning should have a more development training on the entrepreneurship that encourages participation on research activities by identifying problems and challenges faced by students. There should be a business programs that accelerates new startups by boosting their businesses.

References

Abson, D. J., Dougill, A. J., & Stringer, L. C. (2012). Using principal component analysis for information-rich socio-ecological vulnerability mapping in Southern Africa. *Applied Geography*, *35*(1-2), 515-524.

Agbim, K. C., Oriarewo, G. O., &Owocho, M. (2013). Factors influencing entrepreneurial intentions among graduates of Nigerian tertiary institutions. *International Journal of business and management invention*, *2*(4), 36-44.

Allan, J. (2016). Learning outcomes in higher education. Studies in Higher Education, 21 (1), 93-108)2. Amabile, T. (1988).A model of creativity in organizations. Research in organizational behavior 10 (1), 123-167.3.

Barbero, J. L., Casillas, J. C., Wright, M., & Garcia, A. R. (2014). Do different types of incubators produce different types of innovations?.*The Journal of Technology Transfer*, *39*(2), 151-168.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Birx, D. L. (2019). Rethinking Higher Education: Integration as a Framework for Change. *New Directions for Higher Education*, *2019*(185), 9-31.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *psychometrika*, *16*(3), 297-334.

Cronbach, L.J. (2015). Text materials in modern education: a comprehensive theory and platform for research. Chicago: University of Illinois Press

Culkin, N. (2013). Beyond being a student: An exploration of student and graduate start-ups (SGSUs) operating from business incubators. *Journal of Small Business and Enterprise Development*, *20*(3), 634-649.

Field, A. (2005). Factor analysis using SPSS. *Retrieved March*, *17*(2019), 63-71.

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counselling psychology research. *Journal of counseling psychology*, *51*(1), 115.

Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). Multivariate data analysis: A global perspective (Vol. 7).

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). Multivariate Data Analysis 7th Edition Pearson Prentice Hall.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate data analysis: Pearson new international edition. *Essex: Pearson Education Limited*.

Hayes, A. F. (2013). Mediation, moderation, and conditional process analysis. *Introduction to Mediation, Moderation, and Conditional Process Analysis:A regression-Based Approach edn. New York: Guilford Publications*, 1-20.

Hutcheson, G. D., & Sofroniou, N. (1999). *The multivariate social scientist: Introductory statistics using generalized linear models*. Sage.

Ismail, K., &Mahmood, N. (2013). A review of commercialization tools: Business incubators and technology parks. *International Journal of Economics and Financial Issues*, *5*(1S).

Jamil, F., Ismail, K., &Mahmood, N. (2015). A review of commercialization tools: Business incubators and technology parks. *International Journal of Economics and Financial Issues*, *5*(1S).

Jamil, F., Ismail, K., &Mahmood, N. (2015). Business incubators: A gateway to an entrepreneurial society. *Journal of Economics and Sustainable Development*, *6*(6), 153-160.

Judd, C. M., & Kenny, D. A. (2010). Data analysis in social psychology: Recent and recurring issues. *Handbook of social psychology*, *1*, 115-139.

Kaiser, H. 1974. An index of factor simplicity. Psychometrika 39: 31–36.

Kiecolt-Glaser, J. K., Preacher, K. J., MacCallum, R. C., Atkinson, C., Malarkey, W. B., & Glaser, R. (2003). Chronic stress and age-related increases in the proinflammatory cytokine IL-6. *Proceedings of the national Academy of Sciences*, *100*(15), 9090-9095.

Kolympiris, Christos and Klein, Peter G., The Effects of Academic Incubators on University Innovation (December 5, 2016). Baugh Center for Entrepreneurship and Free Enterprise, Research Working Paper 2016-04.

Lasrado, V., Sivo, S., Ford, C., O'Neal, T., &Garibay, I. (2016). Do graduated university incubator firms benefit from their relationship with business incubators?.*The Journal of Technology Transfer*, *41*(2), 205-219.

Lindholm Dahlstrand, Å.,& Politis, D. (2013). Women business ventures in Swedish business incubators. *International Journal of Gender and Entrepreneurship*, *5*(1), 78-96..

Matsunaga, M. (2010). How to Factor-Analyze Your Data Right: Do's, Don'ts, and How-To's. *International journal of psychological research*, *3*(1), 97-110.

Salem, M. I. (2014). The role of business incubators in the economic development of Saudi Arabia.*The International Business & Economics Research Journal (Online)*, *13*(4), 853.

Somsuk, N., &Laosirihongthong, T. (2014). A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-based view. *Technological forecasting and social change*, *85*, 198-210.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5). Boston, MA: Pear

Templin, J. L., & Henson, R. A. (2006). Measurement of psychological disorders using cognitive diagnosis models. *Psychological methods*, *11*(3), 287.

Wang, W. B., Hung, Y. C., & Wang, C. C. (2013).University-Industry Business Incubators in Taiwan.*Open Journal of Business and Management*, *1*(01), 1.

Wold, S., Esbensen, K., & Geladi, P. (1987). Principal component analysis. *Chemometrics and intelligent laboratory systems*, *2*(1-3), 37-52.

Yong, A. G., & Pearce, S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. *Tutorials in quantitative methods for psychology*, *9*(2), 79-94.

Zou, H., Hastie, T., & Tibshirani, R. (2006). Sparse principal component analysis. *Journal of computational and graphical statistics*, *15*(2), 265-286.