# Elaboration of radiation Entrepreneurship Education Model in Applied- Science Education through Fuzzy and linear method

**(Case Study: University of Jahad Applied Sciences in Markazi province)**

**Mahtab Eshghiaraghi[1], Mitra Azarloo[2], Asghar Noorollahzadeh[3], Seyed Hessamodin Pourabbasi[4]**

[1] The professor of Applied Scientific University Jihad University and Payame Nour University (PNU) of Markazi Province, mahtab. Araghi66@gmail.com

[2] Instructor of English language institutions in Arak city, researcher, the member of Researchers Club Of Arak Azad University, mitra_azarlo@yahoo.com

[3] CEO of Omid Entreprenurship Fund, a. noorolahzadeh@gmail.com.

[3] Advisor to the Executive/ Managing Director of Omid Entrepreneurship Fund, University Professor, Chairman of Keshavarzi Bank Leasing, Shp.hasam@gmail.com.

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**Abstract**

One of the community needs that provides a range of opportunities for the youth is to create a suitable situation for skills training and preparations in the transfer of new technologies, which has been announced as a mission of Applied- Science University. Applied science education programs can work in the form of radiation in order to promote students' skills training and create employment opportunities in the country. This survey research is practical from the perspective of the goal and the role of the radiation entrepreneurship education model in scientific and applied education is identified through interviewing experts and previous valid research, and then all the linguistic and qualitative variables are converted to quantitative numbers through fuzzy sets and eventually final ranking of the models is carried out through The center-level method. In the fuzzy analysis of the statistic population consisted of experts having been experienced in the field of applied science and education, regression was applied to investigate the impacts of all independent variables on scientific and applied training. In the regression analysis, the statistic population was consisted of 80 employees and professors and sample size was selected using Cochran formula including 66 employees and students of Applied Sciences University of Arak selected by simple random sampling method. The results showed that research and development are considered as the most important factor affecting scientific and applied education in radiation entrepreneurship education model. Whereas unlike employment, other factors such as the provision of professors and teachers, students, financial resources and faculty have direct effect on scientific and applied education. There is a significant relationship between scientific and applied education and variables of radiation entrepreneurship education.

**Key words:** Applied and Science, entrepreneurship education, radiation, research and development, learners, professors and teaching, financial resources

## 1. Introduction

In the last few years, due to limited job opportunities, the low growth of employment opportunities and essential capabilities to deploy university graduates and lack of jobs related to graduates' majors, The University of Applied Science has got more and more attention among various universities. University of Applied Science with various branches all over the Provinces of Iran helps to increase skill level of employed personnel in various sectors of economic field and graduates of higher education and professional skills that are lacking in administrative. Its aim is to promote the potential of business ideas and start-up entrepreneurs, the set-up of an innovation culture based on experience and the development of entrepreneurial competencies. Entrepreneurship is recognized nowadays – both by scholars and practitioners – as one of the most important engines of economic growth. Its contributions cover different field as: fostering innovation, enhancing productivity, job creation, and effective alternative to wage employment, all of these driving to increasing national and personal incomes. That is why policies to foster entrepreneurship are widely promoted in all countries, and numerous studies are pursued in order to identify the factors influencing entrepreneurship (Volkmann, et al., 2010). Currently, the mission of the university as an institution has changed. Education of entrepreneurship is the one of the important areas of study in Applied Science universities all around the world. Developments on information and technology have reached a high level, creating new challenges and problems for universities. Additionally, universities have to change their teaching models and methods to reach contemporary levels. It is possible for universities to revise their missions and visions. These missions should include objectives of education and a suitable strategy that considers the private sector and its expectations from universities (Basci and Alkanb, 2015). Most of the previous literature suggests that Applied Science University's students perceive the education and concept-development support (educational and cognitive) from their universities as highly influential on their entrepreneurial

intentions. In practice, the entrepreneurship training is more important to encourage the potential entrepreneurs at universities , to provide information in accordance with the relevant fields and to raise awareness about the entrepreneurship in younger ages (*Elif Haykır Hobikoğlu and Bahar Şanlı, 2015)*. It turns out, these students do not seek state employments, but they employ many people as employers.

## 2. Background of entrepreneurship education

The term "entrepreneurship education" – commonly used in the USA and Canada in the early 1980s and spread in Europe after that– refers to "the building of knowledge and skills either «about» or «for the purpose of» entrepreneurship generally, as part of recognized education programs at primary, secondary or tertiary-level educational institutions". By contrast, "entrepreneurship training is the building of knowledge and skills in preparation for starting a business" (Martinez, A. et al, 2010). However, entrepreneurship education can only demonstrate the process involved in being successful, but cannot create an entrepreneur (Saee, 1976). Bygrave and Hofer (1991) plastically expressed: "We cannot ensure that entrepreneurship training would create a Bill Gates [...], but give us a student/course attendant with an orientation towards business and we can improve the performance of such an individual". Parker (2009) explains clear why the relationship between entrepreneurship and formal education can be construed both positive and negative: on one hand, education might improve entrepreneurial way of thinking, specific entrepreneurial skills and necessary knowledge for running or starting a business; on the other hand, education might increase preference for wage employment instead of entrepreneurship or self-employment. Behind possible negative impact, it is impossible to deny that raising awareness through entrepreneurship education programmes definitively encourages entrepreneurship from the simple reason that you can't choose an entrepreneurial career if you never hear about how to start or run a business (DODESCU, BADULESCU, 2011).

## 3. Literature review

Entrepreneurial education refers also to programs less formal and of shorter duration than the entrepreneurial education, considered as more rigorous, more formal, more business and management oriented (DODESCU, BADULESCU, 2011). General agreement about entrepreneurship is the important factor for economic expansion all around the world. In addition to this, the university has a vital role both in supporting research and development and in teaching entrepreneurship to students. Elaine & Gray's (2013) Emphasis of university entrepreneurship education is like preparation for the business world for turning theoretical knowledge to information. Therefore university education can teach people how to run a business (Abereijo, 2015). In the literature, there are various approaches to teach entrepreneurship methods. According to Wright, Bitner, and Zeithaml (1994) traditional education at universities about entrepreneurship includes lectures and seminars as a passive method. This method suggests that all of the students are like an "empty box" to which a teacher can add theoretical knowledge. This method can be criticized that it is not focused on new phenomena on enterprising behavior and following only managerial concepts.

Another approach of entrepreneurship education at universities is related to a dynamic and active method, or learning by doing. This method suggests a goal oriented way to teach student all of the components of analyzing, evaluating, and constructing knowledge that students need. This approach also makes guidance to pedagogical knowledge for lecturers on how they can concern with the students and their teaching techniques. (Basci and Alkanb, 2015). Mwasalwiba, (2010) Believes that the education systems by using entrepreneurship education contributes learners experience different activities related to learning, and this kind of education prepares them in acquiring new skills.

**Importance of entrepreneurship education**

According to the National Content Standard for Entrepreneurship Education, Entrepreneurship is a key driver of our economy. Entrepreneurship education is a lifelong learning process, starting as early as elementary school and progressing through all levels of education, including adult education. The Standards and their supporting Performance Indicators is a framework for teachers to use in building appropriate objectives, learning activities, and assessments for their target audience. Using this framework, students will have: progressively more

challenging educational activities; experiences that will enable them to develop the insight needed to discover and create entrepreneurial opportunities; and the expertise to successfully start and manage their own businesses to take advantage of these opportunities (Philomena, 2014). Moreover, European countries emphasize entrepreneurship education at universities. German speaking countries in particular take place ahead on researching and teaching about enterprise. Therefore the concept of entrepreneurship is considered by the community. Recognition and explanation of business circumstances serves to change entrepreneurial thinking and mindset. (Volkmann, et al., 2010).

**The most commonly cited objectives of entrepreneurship education and training programs are:**

-to acquire knowledge germane to entrepreneurship;

- To acquire skills in the use of techniques, in the analysis of business situations, and in the synthesis of action plans;
- To identify and stimulate entrepreneurial drive, talent and skills;
- To undo the risk-adverse bias of many analytical techniques;
- To develop empathy and support for all unique aspects of entrepreneurship;
- To devise attitudes towards change;

-To encourage new start-ups and other entrepreneurial ventures (Dodescu Badulesc, 2011).

**Radiation entrepreneurship education model**

The radiation model, based on diffusion dynamics, has been developed and the model appears to match experimental data well. The model gives exact analytical results and it has the additional desirable feature of being parameter-free, i.e. it has the characteristics of a universal theory (Masucci et al, 2013). According the radiation model, the entrepreneurship courses and classes will be held for all students and Entrepreneurship Center acts as coordinator for all things and distribution of financial resources. Faculty members and professors take responsibility of teaching and research and development work and collaborate with their universities. In this model, the concept of entrepreneurship in all faculties and majors is induced students. According to the model presented above,

as all academic fields are defined in terms of the nature and objectives and training the graduates that can be specialized in their field to work, , it is recommended that Institute of Applied Science is required to allocate a center of Entrepreneurship and skill independently.

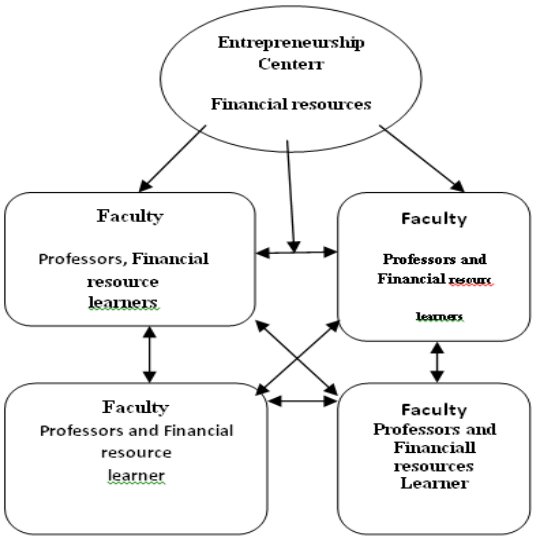


**Figure1;. Radiation entrepreneurship education model**

## Research Questions

1. How is Rating of effective radiation entrepreneurship education model in Applied Sciences training and job creation?

2. What is identifiable and effective radiation entrepreneurship education model in Applied Sciences training and job creation?

3. What are adequate evaluation and ranking model of radiation entrepreneurship education model in Applied Sciences training and job creation?

4. Is there a significant relationship between Applied Sciences training and job creation with financial resources, supplying professors and teaching, learners, R&D and faculty?

# 3-Methodology

In this study, initially, the effect of radiation model on applied scientific higher education and its role in employment through interview with experts and prior valid studies was identified. The statistic population is experts of Arak Applied Science University with high job experience in trainings. The sample volume was chosen through Cochran formula and sampling was randomly and they completed questionnaires. Delphi method was adopted thank to the consensus among the experts. The qualitative and linguistic variables convert into quantitative numbers. Finally, ranking from radiation model is implemented in applied scientific higher education. For analyzing, multiple regressions are applied.

## Findings

The Delphi method entails a group of experts who anonymously reply to questionnaires and subsequently receive feedback in the form of a statistical representation of the "group response," after which the process repeats itself. The goal is to reduce the range of responses and arrive at something closer to expert consensus. In order to describe the quantity, the standard deviations (mean, standard deviation, standard error of the mean, change range) were calculated.

**Table1. structures 'descriptive statistic**

| Descriptive statistic | | radiation entrepreneurship education model | Supply professors | R&D | faculty | financial resource | learners | Scientist applied training | employment | Entrepreneurship center |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of respondent | Valid data | 63 | 62 | 62 | 65 | 65 | 65 | 66 | 66 | 63 |
| | Lost data | 3 | 4 | 4 | 1 | 1 | 1 | 0 | 0 | 3 |
| mean | | 17/82 | 21/48 | 63 | 15/72 | 6/6 | 6/5 | 10/05 | 7/96 | 5/56 |
| ***Mid limit of scale*** | | 18 | 18 | 18 | 54 | 12 | 6 | 6 | 9 | 6 |
| view | | 25/02 | 22/02 | 18 | 68/94 | 16 | 6 | 8 | 9/99 | 8 |
| ***Minimum of scale*** | | 6 | 6 | 6 | 18 | 4 | 2 | 2 | 3 | 2 |
| ***Maximum of scale*** | | 30 | 30 | 30 | 90 | 20 | 10 | 10 | 15 | 10 |
| ***Quarter*** | 25 | 15 | 18 | 54 | 14 | 5/4 | 6 | 7/8 | 7 | 5 |
| | 50 | 18 | 21/6 | 64/8 | 16 | 7 | 7 | 9/9 | 8 | 6 |
| | 75 | 21 | 24/06 | 68/4 | 18 | 8 | 8 | 12 | 9 | 7 |

**Table2. Pearson correlation coefficient**

| number | factors | correlation | significance | Percentage of truth |
|---|---|---|---|---|
| **1** | financial resources | 0/67 | 0/020 | 95% |
| **2** | supplying professors and teaching | 0/56 | 0/013 | 95% |
| **3** | R&D | 0/78 | 0/000 | 95% |

| | | | | |
|---|---|---|---|---|
| **4** | faculty | 0/41 | 0/05 | 95% |
| **5** | learner | 0/24 | 0/034 | 95% |
| **6** | employment | 0/30 | 0/066 | 95% |
| **7** | radiation entrepreneurship education model | 0/56 | 0/010 | 95% |

***Table 3: Multiple regression analysis of factors affecting*** **Applied Science education**

| ***The model variables (affecting factors)*** **Adjusted *R* Square= .96 R=.98** **Dependent variable : Applied Science education** | | | |
|---|---|---|---|
| **model** | **B** | **Beta** | **sig** |
| (constant) | 0/314 | | 0/000 |
| financial resources | 0/222 | 0/367 | 0/000 |
| supplying professors and teaching | 0/268 | 0/403 | 0/000 |
| R&D | 0/097 | 0/148 | 0/000 |
| faculty | 0/098 | 0/214 | 0/000 |
| learner | 0/102 | 0/193 | 0/000 |
| employment | 0/146 | 0/146 | 0/000 |

According table 1, 2,3, hypotheses are accepted and independent variables and Applied Science education are correlated positively. the university has a vital role both in supporting research and development and in teaching entrepreneurship through Applied Science education to students.

**Table4. Linguistic fuzzy numbers**

| **Equivalent Fuzzy number** | **Linguistic variable** |
|---|---|
| (0,0,2,4) | low |
| (3,4,6,7) | normal |
| (6,8,10,10) | much |

**Table 5. The results of the first phase questionnaire**

| **Factors affecting radiation entrepreneurship education models** | **low** | **normal** | **much** |
|---|---|---|---|
| **financial resources** | 0 | 2 | 5 |
| **supplying professors and teaching** | 0 | 2 | 5 |
| **R&D** | 0 | 4 | 5 |
| **faculty** | 0 | 3 | 4 |
| **learner** | 0 | 4 | 3 |
| **employment** | 0 | 2 | 5 |

**Table 6: Average of experts' views resulted in the first phase of questionnaire**

| Factors affecting radiation entrepreneurship education models | Fuzzy number | | | |
|---|---|---|---|---|
| financial resources | 5.1 | 6.9 | 8.9 | 9.1 |
| supplying professors and teaching | 5.1 | 6.9 | 8.9 | 9.1 |
| R&D | 4.7 | 6.3 | 8.3 | 8.7 |
| Faculty | 5.1 | 6.9 | 8.9 | 9.1 |
| Learner | 4.3 | 5.7 | 7.7 | 8.3 |
| employment | 5.1 | 6.9 | 8.9 | 9.1 |

**Table7. The results of the second phase questionnaire**

| Factors affecting radiation entrepreneurship education models | low | normal | much |
|---|---|---|---|
| financial resources | 0 | 2 | 5 |
| supplying professors and teaching | 0 | 2 | 5 |
| R&D | 0 | 4 | 3 |
| faculty | 0 | 2 | 5 |
| learner | 0 | 3 | 4 |
| employment | 0 | 2 | 5 |

**Table 8: Average of experts' views resulted in the second phase of questionnaire**

| Factors affecting radiation entrepreneurship education models | Fuzzy number | | | |
|---|---|---|---|---|
| financial resources | 9.1 | 8.9 | 6.9 | 5.1 |
| supplying professors and teaching | 9.1 | 8.9 | 6.9 | 5.1 |
| R&D | 8.7 | 8.3 | 6.3 | 4.7 |
| faculty | 9.1 | 8.9 | 6.9 | 5.1 |
| learner | 8.3 | 7.7 | 5.7 | 4.3 |
| employment | 9.1 | 8.9 | 6.9 | 5.1 |

results of Tables 3 - 8 illustrates that the experts' view at this stage is equal or less than 0.5 and represents the consensus among experts is good , so the results of this phase are reliable because the average score for all criteria is more than average ,and all the criteria are acceptable in the study .

**Table9. Average of experts' view in conjunction with the factors affecting radiation entrepreneurship education models**

| | Factors affecting radiation entrepreneurship education models | Average of experts' view | | | |
|---|---|---|---|---|---|
| | | $a_1$ | $a_2$ | $a_3$ | $a_4$ |
| **Applied Science education** | financial resources | 0/4000 | 0/5000 | 0/6000 | 0/7000 |
| | supplying professors and teaching | 0/1286 | 0/2286 | 0/3286 | 0/4286 |
| | R&D | 0/3000 | 0/4000 | 0/5000 | 0/6000 |
| | faculty | 0/3000 | 0/4000 | 0/5000 | 0/6000 |
| | learner | 0/1571 | 0/2571 | 0/3571 | 0/4571 |
| | employment | 0/2143 | 0/3143 | 0/4143 | 0/5143 |

Table 9 illustrates applied science education evaluation to each factors of radiation entrepreneurial education model so that will be calculated by crossing two factors of applied science education and the role of radiation entrepreneurship education models with new approaches.

**Table10. The evaluation grade of radiation entrepreneurship education models**

| | Factors affecting radiation entrepreneurship education models | The evaluation grade of radiation entrepreneurship education model |
|---|---|---|
| **Applied Science education** | financial resources | 0/11640 |
| | supplying professors and teaching | 0/04970 |
| | R&D | 0/09510 |
| | faculty | 0/10530 |
| | learner | 0/04440 |
| | employment | 0/07700 |

And two trapezoidal fuzzy numbers and averaging are used as follows:

$$\tilde{a} = (a_1, a_2, a_3, a_4; w_a)$$
$$\tilde{b} = (b_1, b_2, b_3, b_4; w_b)$$
$$\tilde{a} \oplus \tilde{b} = (a_1 + b_1, a_2 + b_2, a_3 + b_3, a_4 + b_4; \min(w_a, w_b))$$
$$\tilde{a} \otimes \tilde{b} = (a_1 \times b_1, a_2 \times b_2, a_3 \times b_3, a_4 \times b_4; \min(w_a, w_b))$$

Center of radiation for two trapezoidal fuzzy numbers $\tilde{A} = (a, b, c, d; w)$ is as following:

$$R(\tilde{A}) = \left(\frac{\alpha\left(\frac{a+2b}{3}\right)+\beta\left(\frac{b+c}{2}\right)+\gamma\left(\frac{2c+d}{3}\right)}{\alpha+\beta+\gamma} \times \frac{\alpha\left(\frac{w}{2}\right)+\beta\left(\frac{w}{2}\right)+\gamma\left(\frac{w}{2}\right)}{\alpha+\beta+\gamma}\right)$$
$$\alpha = \frac{\sqrt{(c-3b+2d)^2+w^2}}{6}$$
$$\beta = \frac{\sqrt{(2c+d-a-2b)^2}}{3}$$
$$\gamma = \frac{\sqrt{(3c-2a-b)^2+w^2}}{6}$$

**Fuzzy analysis**

Adequate model in line with the evaluation and ranking factors of radiation entrepreneurship education models with new approaches should not only investigate Applied Science education, but, take role of factors of radiation entrepreneurship education models into consideration. On the other hand, since the evaluation process of radiation entrepreneurship education model is implemented by experts in Arak Applied Sciences, the issue of uncertainty and ambiguity should be noticed. Therefore, the use of fuzzy logic can be helpful in this regard. Finally, linguistic variables conversion to real numbers and choose the appropriate method of fuzzy in the model can be noticeable.

# 4-Conclusion

This research provides evidence of the openness of the university students to the studies within the course “entrepreneurship education”. Regarding the above discussions, the present study concludes that entrepreneurship and applied science education is considered as one of the basic needs of society. What is noticeable within teaching entrepreneurship courses is training in terms of learners and training place and it requires various educational programs. Applied science education affects financial resources, supplying professors and teaching, R&D,

faculty, learner and employment positively. Fuzzy regression analysis showed that all the factors affect radiation entrepreneurship education models positively.

## References


1 . Abereijo, I. O., (2015). Developing Entrepreneurial Competences in University Lecturers: Obafemi Awolowo University Experience. KJBM, 6(1), pp. 30-42.

2. ANCA DODESCU, ALINA BADULESCU, 2011, " Entrepreneurship Education and Training. Study-case: the AntrES programme on Women Entrepreneurship in Western Romania", Proceedings of the 5th WSEAS International Conference on Economy and Management Transformation (Volume II)

3. Bygrave, W. D. and Hofer, C. W., Theorising about entrepreneurship. Entrepreneurship Theory and Practice, 16(2)/1991, p. 16.

4. Coduras Martinez, A. et al., A Global Perspective on Entrepreneurship Education and Training, Entrepreneurship Monitor Special Report, 2010, p://www.gemconsortium.org/download/1282044htt 235598/GEM%20Special%20Report%20on%20Ed

5. Elaine, R. C. & Gray, D. O., (2013). Does Entrepreneurship Education Really Work? A Review and Methodological Critique of the Empirical Literature on the Effects of University-Based Entrepreneurship Education. Journal of Small Business Management, 51(3), pp. 329-51.

6. Elif Haykr Hobikolua, Bahar anl, 2015, " Comparative Analysis in the Frame of Business Establishment Criteria and Entrepreneurship Education from the Viewpoint of Economy Policies Supported By Innovative Entrepreneurship", Procedia - Social and Behavioral Sciences 195 ( 2015 ) 1156 – 1165.

7. Esref Basci, Reha Metin Alkan, 20015, " Entrepreneurship Education at Universities: Suggestion for A Model Using Financial Support", Procedia - Social and Behavioral Sciences 195 ( 2015 ) 856 – 861.

8. Mwasalwiba, E.S(2010).Entrepreneurship education: a review of its objectives ,teaching methods ,and impact indicators. Education + Training, 52 ,202.

9. Parker, Simon C., The Economics of Entrepreneurship, Cambridge University Press, Cambridge, 2009, pp. 117- 119.

10. Philomena, 2014, " the role of Entrepreneurship Education and economic development", Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 3159-0040 Vol. 1 Issue 5, December – 2014.

11. Saee, J., A Critical Evaluation of Australian Entrepreneurship Education and Training, in: Proceedings of the Internationalizing Entrepreneurship Education and Training Conference, Arnhem, 1996.

12. Volkmann, C. K., Tokarski, K. O. & Grünhagen, M., 2010. Entrepreneurship in a European Perspective Concepts for the Creation and Growth of New Ventures. 1st Ed. dü. Germany: Gabler Verlag Springer Fachmedien Wiesbaden.