

The Young Engineers' Entrepreneurial Triggering

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Abstract

The objective of this approach is to study the determinants of the entrepreneurial triggering for engineers who obtained their diplomas from the National School of Engineering of Sfax during the academic year 2012/2013. Three months are needed to collect our data from a questionnaire established and administered to all graduates through their emails. 665 graduates are aimed to study. However, only 84 who have not started a career in a liberal profession have responded to the questionnaire.

In accordance with the literature presented, it is argued that entrepreneurial triggering is driven by entrepreneurial intent and external factors such as positive and negative displacements and inhibitors. A simple linear regression model accompanied with the ordinary least squares method is used to analyze the data. The findings show that there is a strong relationship between intent on the one hand and the onset of the entrepreneurial triggering on the other. It is also proved that external factors are likely to impact triggering occasionally at both the positive and the negative sides.

Keywords: Young engineers; Intention; External factors triggering

Introduction

There is no doubt that entrepreneurship is an essential component of the economic growth and employment creation [1-4]. However, entrepreneurship is often believed to be more successful for graduates because of the knowledge acquired during their studies [5]. Maalej [6] argues that higher education determines the professional status of the individuals. He thinks that the diploma is necessary for those who choose to be integrated into the market-oriented labor as it is the best signal for the potential employer. It is also required to the graduates who choose to create their own businesses and who are amply formed to face the difficulties of entrepreneurship. Fayolle [7] maintains that the factors motivating the young graduates, particularly engineers, to choose entrepreneurship are best known by the need for autonomy, professional experience, knowledge acquired in management and the dissatisfaction with working conditions. Other factors are as follows: the belonging to a large company, the desire to seek a great deal of professional experience, security and stability of employment and finally the belonging to the female sex. The latter factor, which seems to concern wage employment, inhibit the young graduates to be engaged in entrepreneurship. The young graduates are doomed to choose to be salaried employees. Fayolle and DeGeorge [8] emphasize on the concepts of intention and displacements in order to highlight the process of entrepreneurial triggering among young French engineers. In this article, the factors which determine the entrepreneurial triggering for young engineers from Tunisian universities are studied. After a theoretical incursion, a methodological approach based on a questionnaire is considered in order to test the hypotheses and then to analyze and interpret the findings.

Literature Review

The current environment places new challenges in front of the engineering teaching situation. Today, the engineering schools are required to develop the entrepreneurial trend for their students in order to stimulate their intentions to create their own businesses. The entrepreneurial education is responsible for developing the entrepreneurial intention in engineering students. It is mainly aimed to increase the efficiency of the engineering teaching by orienting its process towards the creation of enterprises. Shirokova et al. [9]

argue that the entrepreneurial intentions lie at the foundation of the entrepreneurial process. Küttim et al. [10] believes that the intention of starting a personal business is a signal of the future entrepreneur. Recently, Karabulut [11], confirm the idea that it is up to the individuals to choose their own careers. He adds that those who intend to be entrepreneurs generally plan to take entrepreneurial risks and collect the resources needed to set up their own businesses. It is noted that intention initiates the entrepreneurial actions. In the same line of thought, Maalej [12] states that every entrepreneurial act is preceded by the intention of business undertaking. Consequently, business creation is considered as a simple act emanating from a process under construction. Maalej supports the importance of attitude toward the behavior and the importance of the social norms for entrepreneurial intention. Conversely, financial constraints, business creation training, and each element pertaining to the perceived behavioral control have no significant effect on intention.

Intention may not turn into an act nor is it considered as a precondition for action. In this respect, the question that poses itself is whether the individual is born as an entrepreneur or is trained to be so. Boulton and Turner [13] and Mellor et al. [14] support the hypothesis that entrepreneurship is by no means innate but acquired. The importance of an entrepreneurial training leads the individual to the entrepreneurial venture [15,16]. Léger-Jarniou [17] argues that engineers may change their careers in one way or another. Hence, it is up to an engineer to choose to be a manager-entrepreneur by developing an entrepreneurial culture. It is through pursuing an interactive and appropriate pedagogy based on a precise strategy. Jusoh et al. [18] question the factors that may turn an individual into an entrepreneur. In all cases, the triggering operators, particularly intention, are needed

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to become an entrepreneur. However, it is necessary to demonstrate how an action is performed once intention is there. Bruyat [19] argues that the act of business creation can be considered as an open dynamic system. The potential entrepreneurs, who act as strategic creators, conduct a process enabling them to carry out their projects in an influential chosen environment which may constrain them to a great extent. Similarly, Danjou [20] explains that the link between intention and action is widely open. However, he maintains that the models which have been suggested so far are incomplete to the point that the entrepreneurial act is unexplainable. Indeed, the entrepreneurial behavior is so complex which makes it difficult to predict merely from the intention. In his conceptual model GEM¹, Elifneh [21] thinks that the environment is an incentive for the entrepreneurial triggering. Here, as it is noted with Bruyat [22], the transition from the intention stage into the actively developmental one of the enterprise creation project is not an irreversible process. The potential entrepreneurs can renounce their projects without being considered as a failure. This transition may be due to internal or external factors. They can emanate from the individuals themselves or their environments. Hernandez and Marco [23] view that the decision to set up a business is counted as a bridging motivator leading from intention to action. In this case, there is, therefore, a clear-cut distinction between the business decision-making and triggering. Hernandez and Marco believe that when triggering comes from intention, synchronization between them takes place as they are principal concepts in business creation. Bruyat and Julien [24] consider that time is an inevitable dimension in entrepreneurship. In this respect, Audet [25] and Fayolle and DeGeorge take the time factor into consideration. With them, the entrepreneurial intention is possible to evolve with time and circumstances. Intention at a given point of time is not a predictable tool for future action particularly when time between intention and acting is perceived long. The occurrence of the newly significant circumstances may change or invalidate the decision of creating a business altogether. Audet introduces a number of events which are likely to influence the intention of individuals. Indeed, the fact that the individuals are satisfied with their employment constitutes an inhibitor for them to create their enterprises. Other events are considered as positive. They stimulate the intention to set up a business such as the effect of experience on self-confidence, freedom constraints related to wage status, recognition of an opportunity, etc. Other negative intervening events may prevent an actor's intention from starting a business due to a lack of required competencies as well as an anchoring to the benefits of stability, wages and the like. All in all, the external factors play an important role in the act of creation.

After the events of 2011, Tunisia ended up with an unbearable unemployment rate for a young economy especially for graduates from Tunisian universities. It faces unmerciful poverty and thousands of young people are found in despair at the impossibility of the country's economic apparatus to create the necessary jobs. This has led to over-education which encourages young people to push their curriculum further and end up accepting a lesser career particularly when the duration of queuing is longer. Boudabbous and Maalej [26] argue that this phenomenon particularly affects young female graduates and more generally young people who have spent a long period of unemployment. Thus, these young people would rather be tempted, given the dissatisfaction they feel, to embark on entrepreneurship than to continue in unemployment or to accept jobs below their

qualifications. Pochic [27] suggests an attempt for explaining this phenomenon at a sociological level. With him, when the status of jobseekers is often devaluated, the status of business creators is respected by taking into account the positive and dynamic images of the entrepreneurs in accordance with their internal dominant liberal values. He also argues that the skillful unemployed people are prone to entrepreneurship, although there are various reasons proving a preference for wage-earners (financial risk, refusal of the spouse, experiential failure of relatives). Thus, the business creation/ takeover project is often a relief for avoiding decommissioning. It is gradually becoming the unique solution to the problem of unemployment. Added to that, enterprise creation refers to the desire for autonomy, the willing to control one's career and future and the struggle against the precariousness of wage-earning. However, few people will become real creators because of the project's profitability, the absence of a solid financial support or the lack of skills.

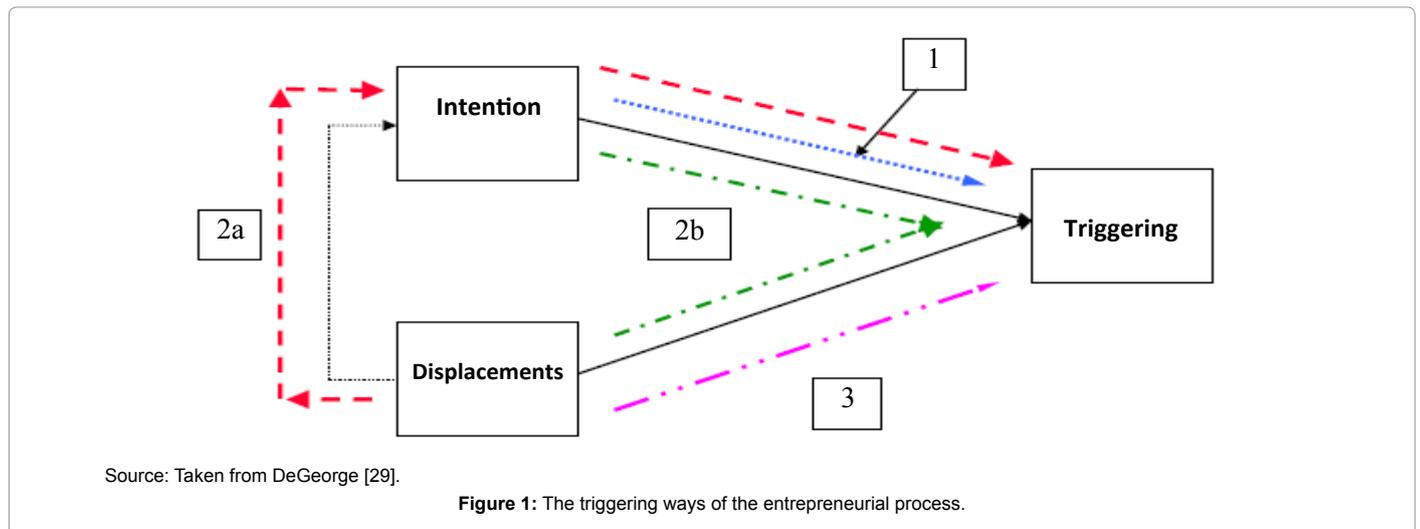
With reference to Fayolle et al. [28], during their careers, the engineers, particularly the entrepreneur ones, are influenced by four factors: the role of the school of origin, the type of training and specialization, the experience and the nature of the representations of the engineers entrepreneurs. They classify the entrepreneurial engineers into two models: the first as an engineer-entrepreneur-manager and the second as an engineer-entrepreneur-technician. The former seeks for acquiring non-technical skills and is more interested in the areas of services and consulting. The second leads a technical project and particularly targets industry and technology that require knowledge and experience.

The Conceptual Framework of the Entrepreneurial Process

If triggering is considered as part of the entrepreneurial process as a whole, it is presumably the consequence of both an endogenous and exogenous dynamism [29]. The endogenous dynamism is manifested in the appearance and the development of intention; whereas, the exogenous one is closely associated with the environment of the called individual according to Shaper and Sokol [30]. They are both named "displacements". Indeed, the intention of setting up a business without considering its surroundings is likely to be a result of a purely endogenous dynamism. There is the environment whose each point of changeability is stimulating, as a causal factor, for the intention of creating a business. Accordingly, a transition from the logic of intention into the logic of action is noticed. This logical transition is clearly explained in the diagram below (Figure 1).

The model above is suggestive of several ways of the triggering of the entrepreneurial process. Firstly, intention may be developed all along a process over temporal axis before reaching its culmination. Intention may be shimmered over time for the individuals concerned in order to start putting their ideas into actions. As it may seem, over the temporal factor, the entrepreneurs may clarify their attitudes, rationalize their thoughts and make their right decisions. Secondly, with a strong intention, the individuals may refrain from making their decisions to start their own businesses. In this case, the external factors, known as displacements, are necessary for increasing the level of intention and stimulate triggering. Hence, a certain amount of time is required for setting triggering in motion. A deliberate strategy remains as potentialities. The process is, then, considered as rational. Finally, a small step is one inch before executing the presumed policy [31]. Moreover, when intention is combined with displacements, a triggering of the immediate process is represented in the figure

¹The Global Entrepreneurship Monitor (GEM) project is an annual assessment of the entrepreneurial activity, aspirations and attitudes of individuals in a wide range of countries. It was initiated in 1999 as a partnership between London Business School and Babson College.



of the way (2a and 2b). Thirdly, displacements can be viewed as the basis for triggering the entrepreneurial process without any prior intention. Intention, therefore, is merely counted as the consequence of displacements. A dynamic exogenous triggering is a case in point. Triggering is considered as a reactionary decision to deal with a given event. In turn, it is a posteriori decision for rationalization which may be called an occurring one.

Data and Methodology

As it demonstrated in the literature above, the triggering factors of the entrepreneurial act do not only come from the intentions of the potential creators themselves, but also from their related external factors such as culture, environment and/or training. In this process, the determinants of the entrepreneurial triggering for engineers who graduated for three years are under examination. A sample is selected from among young graduates belonging to the National School of Engineering of Sfax during the academic year 2012/2013. The survey has been begun in July 2016. Three months are needed to collect the necessary data from a questionnaire² established and administered to all the graduates through their e-mails. The choice of the e-mails as a communicative channel is inevitable given the difficulty of contacting the interviewed graduates personally. 665 graduates are targeted. Nevertheless, only 84 responses are received. The size of the sample is adequate to the analysis. With Carricano and Poujol [32], in an Exploratory Factor Analysis, the total number of observations should not be below 50. However, it is desirable to interview at least 100 individuals.

Again, with reference to the concerned respondents, it should be noted that they have not started a personal business. 41.67% are still looking for a first job (without professional experience). The remainders evolve in companies widespread throughout the whole country. This sample is predominantly female with only 45% of a male sex.

A 5-level likert scale (ranging from 1 as a total disagreement to 5 as a total agreement) is used to collect the reactions of the interviewees towards the proposed items. This scale of measurement is intensively used in several entrepreneurial researches [33-35].

To verify the reliability of the scales used, the Cronbach alpha test is piloted for getting information about the internal consistency of the

items. The coefficient of alpha is estimative of the variance of the total score of the common factors specific to the tested scaled items. When this coefficient is below a certain threshold, it is necessary to eliminate certain items in order to improve the remaining ones' overall coherence. According to Evrard et al. [36], in an exploratory study, it is proved that alpha is acceptable if it is between 0.60 and 0.80. However, for a more confirmatory study, a value greater than 0.80 is recommended. As far as the current research is concerned, a 0.70 threshold is hold.

The dependent variable

Triggering: It is measured with 9 closed items. Their factorization is made by the Principal Component Analysis which reveals three factors that are represented in "D1", "D2" and "D3".

"D1" triggering factor is explained by 4 items which are composed of pursuing training, establishing a business plan, seeking information or devoting time to the project. This factor can be considered as a prerequisite for triggering.

The "D2" factor is defined by 3 out of the 9 proposed items. These are the search for a premise, equipment or even funding.

The factor "D3" is essentially defined by 2 out of the 9 proposed items. It involves the search for a prototype as well as a team embodied in partners, prospective employees, associates, etc.

"D2" and "D3" factors mark the commitment to the entrepreneurial act.

These factors figure out in the Table 1 below.

The explanatory variables

1. Intention: It is measured by 7 items with the wage/entrepreneurial as an alternative taken into account. In order to maintain consistency 5 items are selected. The Principal Component Analysis is indicative of only one factor as it shown in the Table 2 below.

2. The external factors: These factors are triggering for the entrepreneurial process. They are analyzed by examining 30 items. 6 of them are used for analyzing a positive event, 16 for a negative event and lastly 8 for the triggering inhibitors. The Principal Component Analysis is suggestive of only 8 factors as shown in the Table 3 below.

Results

The first factor "D1" is not significantly explained by the chosen

²The work of DeGeorge (2007) is drawn up for establishing the questionnaire.

Rotation Method: Varimax with Kaiser Normalization Bartlett's test signification <0,001		Three factors		
Items		D1	D2	D3
1- I am currently looking for a premise as part of my business creation or takeover project			0.954	
2- I am currently looking for material as part of my business creation or takeover project			0.896	
3- I am currently looking for funding as part of my business creation or takeover project			0.650	0.564
4- I am currently or have already undergone training with the aim of creating or resuming a short-term business	0.818			
5- I am currently looking for a prototype as part of my business creation or takeover project				0.721
6- I am currently looking for a team (partners, prospective employees, associates...) as part of my business creation or takeover project				0.826
7- I currently carry out or have already completed a business plan as part of my business creation/takeover project	0.826			
8- I am currently looking for, or have already searched for information (in the market...) as part of my business creation or takeover project	0.776			
9- I'm currently spending time on my business creation or takeover project	0.690			
Eigenvalues		2.564	2.412	1.555
Total variance explained			72.572%	
Cronbach's Alpha			0.733	

Table 1: Factorization.

Rotation Method: Varimax with Kaiser Normalization Bartlett's test signification <0,001		One factor
Items		Intention
1- If you had to choose between becoming your own employer and being employed by a company or an administration, what would you prefer before you decide to create or take over your business?		0.714
2- I will probably create (or acquire) and run my own business one day.		0.787
3- It is very likely that I will create (or acquire) and run my own business in the near future		0.858
4- I often think about creating (or acquiring) and running my own business.		0.912
5- I am willing to make sacrifices to create (or resume) and run my own business.		0.816
Eigenvalues		3.362
Total variance explained		67.247%
Cronbach's Alpha		0.866

Table 2: Principal component analysis.

explanatory variables ($R^2=0.136$, $F(9,74)=1.3$). Consequently, this triggering phase does not attract the interest of the interviewees and does not define the entrepreneurial triggering. This factor is not counted in the present research. The triggering variables "D2" and "D3" are strongly explained as shown in the Table 4 below:

The "D2" factor is also significantly explained by the intention as by the external factors (Fe3, Fe5, Fe6, Fe7 and Fe8). While «Intention», "Fe3", "Fe5" and "Fe7" stimulate positively and significantly the triggering, "Fe6" and "Fe8" factors have a negative and significant effect on it.

"D3" factor is significantly explained by the intention and all the external factors with the exception of "Fe3". «Intention» as well as "Fe1", "Fe5", "Fe7", and "Fe8" have a positive and significant effect on triggering. However, "Fe2", "Fe4" and "Fe6" stimulate it negatively and significantly.

It seems that the individuals with strong intention are keener to set up their own businesses. In this respects, Jusoh et al. argue that intent is required to become an entrepreneur. Shirokova et al. maintain that each intention eventually turns into actual behaviour.

In any case, the professional environment plays an important role in triggering. Indeed, nothing is more frustrating than the feeling of not being free, the lack of promotion, the lack of fulfilment and stagnation in career development. Added to them is the age factor. This frustration leads the engineers to attempt to create their own businesses. It is therefore the external factor "Fe1" which has a positive and significant impact on "D3" triggering. A debatable question that should be answered is how is it found difficult to understand that the individuals

who are dissatisfied with their professional occupations or those who are underpaid do not think of being subservient to their employers? Hence, these categories of employees resort to entrepreneurial engagements. Lim et al. support the idea that low household incomes constitute an important factor in triggering entrepreneurship. Here, it should be noted that in Tunisia, the labour market of the graduates is very unbalanced and consequently the offered wages are generally of a low level.

However, contrary to the literature above, an unfortunate family event, a move and the end of a contract defining "Fe2" do not account for triggering. Similarly, divorce and the possibility of a partnership defining "Fe4" do not stimulate the "D3" triggering.

The individuals from our sample who can find a financing or a potential market are correlated with "Fe3" and explain to a great extent the "D2" triggering. It corroborates with literature introduced by Fayolle and DeGeorge.

Notwithstanding the need for freedom is negatively correlated with "Fe3" and therefore does not seem to stimulate triggering. This finding seems as the consequence of the choice of the examined sample which represents a significant percentage of the individuals seeking a first job. The present findings are contrary to those proposed by the literature above according to which the desire for freedom and independence is an important factor in triggering [37,38].

Risk-taking as well as the lack of experience in the search for opportunity does not seem to dissuade the interviewees from triggering. "Fe5" has a positive and significant effect on "D2" and "D3"; whereas, meeting a partner and occupational stability defining "Fe6" have no

Rotation Method: Varimax with Kaiser Normalization Bartlett's test signification <0,001	Eight external factors							
	Fe1	Fe2	Fe3	Fe4	Fe5	Fe6	Fe7	Fe8
Items: positive displacement								
1-Finding a financing allowed me to study the feasibility of my project			0.688					
2-The possibility of meeting a potential client allowed me to start the study of my project			0.833					
3-The possibility of a partnership with a friend allowed me to study the feasibility of my project				0.919				
4-The possibility of a partnership with a colleague allowed me to study the feasibility of my project				0.838				
5-The possibility of a partnership with a client allowed me to study the feasibility of my project						0.577		
6-My experience, combined with my professional situation, allowed me to easily recognize an opportunity to create or take over a company					-0.68			
Items: negative displacement								
7-The dissatisfaction with my current situation leads me to study concretely a project of creation or takeover of company								
8-I take various actions towards the creation or the takeover of company after a dismissal						-0.794		
9-I take various actions towards the creation or the takeover of company after my boss sold the company in which I worked								0.591
10-I take various actions towards the creation or the takeover of company after being transferred								0.591
11-The impossibility of evolution in my job orients me towards a project of creation or takeover of company	0.851							
12-The lack of interest of my work leads me to study my project of creation or takeover of company	0.867							
13-The lack of flourishing in my job leads me to study my project of creation or takeover of company	0.845							
14-The lack of communication with my boss (proposed solutions, innovations, requests for evolution ...) leads me to seek for setting up my project	0.688							
15-The need for freedom leads me to free myself from the constraints of a salaried job (rules, schedules, authority, fixed salary ...)	0.611		-0.589					
16-The refusal of a promotion leads me to seek for creating or take over my own business	0.723							
17-The reaching a certain age leads me to assess my career, and therefore to study precisely my project of creation or takeover of company	0.541							
18-A step back on my career leads me to concretely study my project of creation or takeover of business	0.771							
19-My divorce leads me to concretely consider the creation or takeover of a company				0.576				
20-An unfortunate event in my family (death ...) leads me to reorient my career and to consider creating or resuming my business		0.759						
21-Moving to a new region leads me to study a project of creation or takeover of a company		0.693						
22-The end of a project or a mission in my job has leads me to reorient my career and to study concretely the creation or the takeover of my own company		0.871						
Items: inhibitors								
23-For me, the creation or the takeover of company is a risky adventure					0.698			
24-The uncertainty related to the study of a project or takeover of company leads me to avoid it as a solution for the rest of my career						0.503		
25-The professional situations that have been introduced to me have always been in line with my expectations (salary, stability ...)			-0.507					
26-It has always been very difficult for me to consider changing jobs or occupational status						0.540		
27-I realize that my knowledge is less than I thought and that the process of creating or taking over is not as simple as I expected								-0.657
28-Despite an attraction for the creation or the takeover of a company, the lack of time has hitherto prevented me from studying concretely a project of creation or takeover of a company								
29-Despite an attraction for the creation or the takeover of a company, the lack of financial means has hitherto prevented me from studying concretely a project of creation or takeover of a company							0.901	
30-Despite an attraction for the creation or the takeover of company, the absence of technical and / or human means has hitherto prevented me from studying concretely a project of creation or takeover of company							0.869	
Eigenvalues	5.61	3.39	3.13	2.8	2.4	2.32	2.30	1.9
Total variance explained	79.778%							
Cronbach's Alpha	0.836							

Table 3: Principal component analysis is suggestive of only 8 factors.

Explanatory variables	Dependent variables	
	D2	D3
Intention	0.448*	0.210**
Fe1	-0.076	0.390*
Fe2	0.105	-0.298*
Fe3	0.387*	-0.007
Fe4	0.127	-0.162**
Fe5	0.394*	0.301*
Fe6	-0.302*	-0.133**
Fe7	0.229*	0.218*
Fe8	-0.312*	0.313*
constant	-2.48E-07	-2.15E-06
R2	0.534	0.615
F	9.43*	13.14*
Population number	84	84

Signifying level: *p<0.01; **p<0.05.

Table 4: Triggering variables.

significant effect on triggering "D2" and "D3". This confirms that people who are unemployed are ready to overcome all the difficulties they may encounter in their endeavours to job-seeking. They venture into entrepreneurship since this would be their best resort to escape unemployment.

"Fe7", as inhibitor, has a positive and significant effect on "D2" and "D3". As it is expected, the lack of financial, technical and human resources significantly inhibits triggering. This is consistent with the findings of Pochic.

Finally, it is noted that among the factors triggering the creation of a company, one cites the acquired knowledge, geographical displacement and the change of the owner as an employer following a sale. "Fe8" therefore has a positive and significant effect on "D2" and "D3". Indeed, according to Miranda et al. the graduates' experiences and skills contribute to the entrepreneurial act [39-42].

Conclusion

The factors that can trigger the entrepreneurial process among the population of the young engineers from the Tunisian universities are examined in the current article.

Taking intention into account, the importance of the external factors that may lead these young graduates to embark on the entrepreneurial process is demonstrated. Although intention is found significant, several other external factors may influence and complement the attempt of triggering.

In the light of the identified variables as intention, positive and negative displacements and inhibitors, it is found that there is a strong relationship between intention on the one hand and the entrepreneurial process of triggering on the other. The external factors may have a significant impact on the triggering process from time to time at both the positive and the negative levels.

It seems that school boards, in addition to the responsible for the engineer training system, are invited to adapt their trainings and their communicative channel by focusing mainly on entrepreneurship and the creation of enterprises. Along with the engineering schools' restructuring of their curricula, a preparation of the students for a job-market orientation is promising to overcome the expected encountering situations.

The engineering students are required to have a minimum

knowledge of how to create enterprises as well as to takeover businesses. It is also essential to change the engineering schools' educational policies into an entrepreneurial guidance. Barba-Sánchez and Atienza-Sahuquillo support the positive contribution of entrepreneurial education on entrepreneurial intent among young engineers in Spain. Dalhoum [39] studied the Tunisian context. She argues that the involvement of entrepreneurship into education motivates the students to create their own businesses. She believes that the Tunisian universities should introduce entrepreneurship courses and encourage the training centres to foster students' intentions and improve the rate of entrepreneurship. This policy is considered as an economic surge for a country as Tunisia in which the unemployment rate exceeds the roof. It was 15.2% in 2015³. The rate is considered higher particularly for graduates. It reaches 30.2%⁴. According to Léger-Jarniou, changing the behavior and attitudes of young engineers require a whole new pedagogical approach to provide the necessary knowledge and to facilitate the learning situation in order to enable them to hold the necessary experience and to solve any training problem that may arise later. Constructivist pedagogy should be more oriented towards the creation of an environment promoting learning as well as the development of self-confidence. It may be workable for engineering students as future graduates.

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