

## The role of innovation management to enhancing the competitive advantage in Algerian High Tech Startups.

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Received: 14/11/2018

Revised 27/12/2018

Accepted: 31/12/2018

**Abstract:** The aim of this research is to clarify the relationship between innovation management and the competitive advantage in Algerian high tech startups, this study was conducted based on a questionnaire designed and distributed to a random sample of 220 innovators (managers) in 28 Algerian high tech startups. The response rate was 61% as 130 innovators filled the questionnaire in 21 high tech startups. We used statistical methods to analyze the four principal hypotheses developed. In particular, we found that: (a) Innovation management has an important existence in Algerian high tech startups. (b) competitive advantage have an important existence in Algerian high tech startups. (c) innovation management is strongly and positively associated with competitive advantage in Algerian high tech start ups. (d) There is a statistically significant difference amongst Algerian high tech startups due to personal determinants of innovators (gender, age and education level).

**Keywords:** Startups; Algerian High tech Startups; innovation; innovation management; competitive advantage.

**Jel Classification Codes:** O32, M13.

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### 1. Introduction

In knowledge economy we can find a wealth of research on startups and their great impact on innovation and economic growth. However, we are emphasized here on a subset of high tech startups which are based on new technologies. Such firms differ from other startups because typically they are established by highly qualified personnel, require large amounts of capital and are characterized by greater technical and market risk (Tidd, Bessant, and Pavitt, 2005).

According to the specifications of the high tech startups they must adopt the innovation as a basic way to get their aims. Where is innovation widely recognized as a source of a firm's and indeed a nation's wealth creation (Livingstone, 2000).

The innovation can achieve several goals at high tech startups, including: energizes the existing people and attract great new ones, changes the whole organization, even at the lowest levels, get the highest market share, return on investment, sustained growth, profitability and survival as a key reason for innovating.

### 2. Innovation in high tech startups

Innovation has been variously defined and can be examined from a variety of perspectives, from a broad definition such as "innovation refers to the process of bringing any new, problem solving idea into use" (Kanter, 1983), to a more outcome based approach,

here “innovation is the process whereby new ideas are transformed, through economic activity, into sustainable value creating outcomes”(Livingstone, 2000).

The high tech startups consider innovation as their lifeblood. Only with innovation, they can grow and compete: become even better, venture in new directions. Only with innovative high tech products and new features, the high tech startup can increase the demand for its high tech products/services or its market share. With innovative new business processes, the high tech startup can optimize its cost structure and thus sustainably position products/services more economically and/or more profitably in the market or reach customers better and respond better to their needs. The ultimate goal is always to prepare the high tech startup for the future, to maintain and improve competitiveness and ultimately to maximize profit.

The innovation funnel illustrates how ideas become inventions, how the inventions generate products/services, which then have to prove themselves in the market (Bernd X. Weis, 2013).

### **3. Innovation management in high tech startups**

Innovators in high tech startups to manage innovation successfully must be winning in leaping many high obstacles. They must develop a good idea, find resources, hire a good team, produce the product, market it, distribute it, sell it, advertise it, package it and service it(Shlomo, 2007).

Innovation management in high tech startups refers to such management activities that aim to enhance the creation and utilization of innovations, and it shall cover all aspects of high tech startup’s operations relevant to enhancing the high tech startup’s ability to identify promising business opportunities, to produce competitive offerings to the market and to generate value for its customer and financial profit for the high tech innovative startup(Kettunen, Ilomäki and Kalliokoski, 2007).

#### **3.1. Successful innovation management in high tech startups**

To have high tech startups successful innovation management, they need to:

– **Adopting innovation strategy:**

Research and experience point to three essential ingredients in innovation strategy:

- The *position* of the products, processes, technologies of high tech startup, and the national innovation system in which it is worked;
- The technological *paths* open to the high tech startup given its competencies;
- The high tech startup followed many organizational processes to integrate strategic learning across functional and divisional boundaries(Tidd, Bessant, and Pavitt, 2005).

– **Putting an effective internal and external linkages:**

The high tech startups are greet need to linkages, and to develop close and rich interaction with customers, competitors, markets, with suppliers of high technology and other organizational players, are critical.

– **Enabling mechanisms for making change happen:**

The high tech startups need to implement effective mechanisms to succeed in moving innovations from idea or opportunity to invention.

– **Existing within supporting organizational context:**

Finally, the innovation in high tech startup needs to have a supporting organizational context like work organization arrangements, training and development, reward and recognition systems and communication arrangements(Tidd, Bessant, and Pavitt, 2005) in which creative ideas can emerge and be effectively deployed.

### **3.2. Improving innovation management practice in high tech startups**

#### **- Using learning to develop innovation management in high tech startups:**

To developing innovation management in high tech startups they need to involve a learning process through:

- Experience-sharing, learning other farms' experience of both their success and failure;
- Introducing new concepts and ideas about tools and techniques in their work;
- Experimenting, trying different approaches to the basic problem of innovation management(Tidd, Bessant, and Pavitt, 2005);
- Structured reflection, examining and reviewing how innovation is currently managed(Tidd, Bessant, and Pavitt, 2005).

#### **- Managing innovation portfolio mix and risk:**

An innovation portfolio that is diversified among projects of varying levels of innovativeness enables the effective management of innovation-related risks. By diversifying, managers can reduce risk without reducing their returns.

In high tech innovative startups the innovation portfolio mix should be diversified according to a number of parameters (e.g., long term versus short term, high risk versus low risk, and low projected versus high projected return)( Al-Ali,2003). And the managers can diversify their innovation portfolios by including, incremental innovation with low risk, standard innovation with moderate risk and radical innovation with highest degree of risk(Maital and Grupp, 2000).

#### **- Auditing innovation management:**

High tech startups need the ability to use tools of auditing to arranging the factors affecting innovation success and failure, and to improving the management of the innovation processes. Some of tools that could be used by high tech startups are as:

- Putting an audit framework to see and understand what they did right and wrong in their particular innovation;
- Doing a benchmark to see if they are doing their particular innovation as well as others;
- Putting a guide to continuous improvement of innovation management;
- Having a learning resource to help acquire knowledge and provide inspiration to try to do new things with different ways;
- A way of focusing on sub-systems with particular problems and then working with the owners of those processes and their customers and suppliers to see if the discussion cannot improve on things(Tidd, Bessant, and Pavitt, 2005).

### **4. Sources of competitive advantage in high tech startups**

The topic of this research is how high tech startups create and develop competitive advantage in their market to have the greatest share market and maximize their profits. How high tech startups must be able to adjust to customers, competitors and public authorities.

Depending on the degree of their competitiveness in the market, high tech startups have access to different general sources of competitive advantage, such as:

- Economies of scope;
- Adapting the strategic thinking;
- Exploit the local advantages(Hollensen, 2010);
- Having the ability to provide global services;
- Company-specific competitive advantages(Hollensen, 2010);
- The ability to use human resources in developing competitive advantage(Hollensen, 2010).

## 5. Model of the Research

To seek the research object, we can present the factors affecting competitive advantage of high tech startups in our model of research:

<b>Independent Variable</b>	<b>Dependent Variable</b>
<b>innovation management in high tech startups</b>	<b>Competitive advantage</b>
<ul style="list-style-type: none"> <li>- Managing innovation processes in Algerian high tech startups;</li> <li>- Strategic and organizational processes to success innovation management in Algerian high tech startups;</li> <li>- Learning and Auditing to improve the innovation management practice in Algerian high tech startups.</li> </ul>	

## 6. The problem of the research

Managerial practice has identified innovation as a central success factor for companies today, and CEOs underline innovation's importance with statements such as "all I've done since I got here is focus on one word: innovation"(Nicolas Zacharias, 2011) or "the only way for [...] companies to reach revenue goals [...] is to 'innovate like crazy'(Nicolas Zacharias, 2011). Managers regard innovation as a focal point of a company's competitiveness and "a crucial element for its long-term strength and survival"(Damanpour/Gopalakrishnan, 1998b). At the same time, managing innovation is one of the most effective functions that have the greatest impact on the process of creating and maintaining competitive advantage in high tech startups.

Today high tech startups search to have competitive advantages to confront their competitors, especially the big companies in the international markets. That's why they concentrate on the using of innovation management to get more competitive advantages. In this research we will try to study the relation of the innovation management in Algerian high tech startups and their competitive advantage in the markets.

## 7. Research hypothesis

From the review, it was noticed that innovation management is related to competitive advantages (Ayache, and Adjali, 2015).

The innovation management variables of Algerian high tech startups are defined in this study in relation to Tidd, Bessant classification of innovation management. And their interrelation and impact on the competitive advantages of Algerian high tech startups will be tested. Therefore, we developed four principle hypotheses to test that interrelation and impact:

- H1.** There is a statistically significant on the existence of “*innovation management*” in Algerian high tech startups;
- H2.** There is a statistically significant on the existence of the “*Competitive advantages*” in Algerian high tech startups;
- H3.** There is a statistically significant relationship between “*Innovation Management*” and “*Competitive advantages*” in Algerian high tech startups;
- H4.** There is a statistically significant difference amongst Algerian high tech startups due to privacy determinants (gender, age, and education level).

## 8. The objectives of our research

- To determine the extent of using and exploiting the innovation management in Algerian high tech startups;
- To determine the level of competitive advantages in Algerian high tech startups;
- To testing the relation and the impact of innovation management on the competitive advantages of Algerian high tech startups.

## 9. Review of the literature

- **Erik Zijdemans, Stoyan Tanev, 2014.**

The article emphasizes that the early internationalization of new ventures should be considered as an innovation process in itself and that innovation and internationalization have a positive effect on each other( Zijdemans, Tanev, 2014). In addition, it points out the role of knowledge acquisition and networking capabilities as key innovation enablers and refers to the emergence of the lean startup perspective on the innovation processes in born-global firms( Zijdemans, Tanev, 2014). The suggested insights will be relevant to researchers and practitioners interested in the relationship between early internationalization and innovation in international new ventures and lean global startups( Zijdemans, Tanev, 2014).

- **Gerard Groenewegen and Frank de Langen, 2012.**

The purpose of the article is to determine which factors are most important for the success of a startup with a radical innovation in the first three years(Groenewegen and Langen, 2012). It searches to design which three main factors determine the success of growth: the uniqueness of the advantages of the innovation, the startup organization characteristics and the person of the entrepreneur(Groenewegen and Langen, 2012).

- **Alfredo De Massis and Tommaso Minola, Diego Viviani, 2012.**

Many academics agree with the opinion that small firms are more suitable than bigger ones to manage radical innovations(Massis and Minola, Viviani, 2012). A multiple case study on five Italian high-tech start-ups has lastly been conducted, obtaining some useful results on the directions to pursue a successful learning(Massis and Minola, Viviani, 2012).

## 10. The methodology of our research

### 10.1. Instruments of the research:

Table (1) describes the dimensions of the study. Where we have been relying on questionnaire includes 4 fields and 39 items, to be briefing the components of innovation management in Algerian high tech startups.

**Table (1):** Dimensions of the research

<b>N o</b>	<b>Dimension</b>	<b>No. of Items</b>
1	Managing innovation processes in Algerian high tech startups.	4
2	Strategic and organizational processes to success innovation management in Algerian high tech startups.	12
3	Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	13
4	Competitive advantage of Algerian high tech startups	10
<b>Total</b>		<b>39</b>

## 10.2. Sampling

Sampling techniques can be divided into two types: probability and non probability sampling (Ayache, and Adjali, 2015). In this research, we prefer to use probability sampling. We are used a simple random sample, where 220 innovator members in 28 high tech startups were surveyed and 130 innovator members responded (response rate 61%).

## 11. The statistical treatment used in our research

For each type of measurement there is an appropriate method that can be applied and not others. As table (2) illustrate, in this research, we use the ordinal scales, which is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the importance (1,2,3,4,5) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels.

**Table (2):** The Likert scale model in answering the questionnaire

<b>Weight</b>	<b>Descriptive interpretations</b>
<b>5</b>	Strongly agree
<b>4</b>	agree
<b>3</b>	neutral
<b>2</b>	disagree
<b>1</b>	Strongly disagree

In statistical treatment of the instrument of our research we use Kolmogorov-Smirnov test of normality, validity to choosing tests that suite our research. From table (3), the p-value for each field is smaller than 0.05 the level of significance, then the distribution of each one is not normally distributed and the instrument of research (questionnaire) is valid, so it can be used to measure what it supposed to be measuring.

**Table (3):** Kolmogorov-Smirnov Test of Normality, Validity and reliability

	<b>Kolmogorov-Smirnov<sup>a</sup></b>		
	Statistique	ddl	(Sig)
- Managing innovation processes in Algerian high tech startups.	5,303	130	0.000
- Strategic and organizational processes to success innovation management in Algerian high tech startups.	2,719	130	0.000
- Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	3,244	130	0.000
- Competitive advantage of Algerian high tech startups	5,822	130	0.000

Source : Extracts of SPSS.

Consequently, we will use non-parametric tests to analyze the statistical data of this research. The data will be analyzed by (spss), and we would utilize the following statistical tests:

- Cronbach's Alpha to test the reliability statistics;
- Spearman rank to test the correlation coefficient;
- Frequency and descriptive analysis;
- Nonparametric tests.

## 12. Questionnaire

### 12.1. Questionnaire validity

The statistical validity of the questionnaire is used to evaluate the instrument validity for using it in measuring what it supposed to be measuring. And it refers to the correlation degree between each field in the questionnaire and the whole questionnaire, what is named structure validity.

In table (4) we have tested the structure validity of the questionnaire by using Spearman Rank Correlation Test for Validity to calculate the correlation coefficient for each field and the whole questionnaire. The result shows that, there is a high degree of consistence and validity of the instrument of research (questionnaire). Where the test of Spearman-Brown gives very high levels of correlation, they were in the range from 0.924 and 0.980.

**Table (4):** Correlation coefficient of each field of the questionnaire (Split Half Method)

<b>N<sup>o</sup></b>	<b>Fields</b>	<b>Spearman-Brown Correlation Coefficient</b>
<b>1</b>	Managing innovation processes in Algerian high tech startups.	<b>0.951</b>
<b>2</b>	Strategic and organizational processes to success innovation management in Algerian high tech startups.	<b>0.980</b>
<b>3</b>	Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	<b>0.963</b>
<b>4</b>	Competitive advantage of Algerian high tech startups	<b>0.924</b>
<b>5</b>	All paragraphs of questionnaire	<b>0.975</b>

Source : Extracts of SPSS.

## 12.2. Questionnaire Reliability

The reliability of an instrument is the degree of consistency which measure the attribute; it is supposed to be measuring (Polit & Hunger, 1985). The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (Polit & Hunger, 1985).

In this research we used the test of Cronbach's coefficient alpha to measure the reliability of the questionnaire between each field and the mean of the whole questionnaire. Table (5) shows the values of Cronbach's coefficient alpha for each field and the whole questionnaire. For each fields, the values were in the range from 0.601 and 0.924. This range is considered high; the result ensures the reliability of each field of the questionnaire. And Cronbach's coefficient alpha of the entire questionnaire is **0.601**, which indicates a reliability of the instrument of our research (the questionnaire).

**Table (5):** Cronbach's Alpha for each field and the entire questionnaire

N°	Field	Cronbach's Alpha
1	Managing innovation processes in Algerian high tech startups.	<b>0.748</b>
2	Strategic and organizational processes to success innovation management in Algerian high tech startups.	<b>0.626</b>
3	Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	<b>0.871</b>
4	Competitive advantage of Algerian high tech startups	<b>0.924</b>
5	All paragraphs of questionnaire	<b>0.601</b>

Source : Extracts of SPSS.

## 13. Profile of the study sample

To perform the aim of our research we choose some profiles of the study sample table (6), which include the gender of innovators in Algerian high tech start ups, their age, and education level, to illustrate the impact of these profiles on the competitive advantage of these startups.

**Table (6):** Profile of the study sample

Gender	Frequency	Percent
Male	96	73.84
Female	34	26.16
Total	130	100.00
Age	Frequency	Percent
Less than 20	31	23.94
20 to 25	66	50.77
25 and older	33	25.39
<b>Total</b>	<b>130</b>	<b>100.00</b>
Education level	Frequency	Percent
student	13	10.00
College student	70	53.84
Engineer	38	29.23
Other level of education	9	06.93
<b>Total</b>	<b>130</b>	<b>100.00</b>

#### 14. Results of research

**H.1:** There is a statistically significant on the existence of “*innovation management*” in Algerian high tech startups.

This hypothesis can be divided into the following sub-hypothesis:

**H1a:** There is statistically significant on the existence of “*Managing innovation processes in Algerian high tech startups*” in Algerian high tech startups. Table (7) shows these results:

The mean of paragraph number 2 “You are always succeed in develop new idea, find resources to fund it, hire a good team to produce a new product, market it, distribute it, sell it, advertise it, package it and service it” equals 4.5, S.D =0. 45, test value=5.1, and p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ .

So we can conclude that the innovators in Algerian high tech startups are *strongly agreeing* to this paragraph, because its mean is greater than 4 and the sign of its test is positive. The mean of paragraph number 4 “You control all type of activities that cover all aspects of the operations relevant to enhancing the high tech startup’s ability to identify promising business opportunities, to produce competitive offerings to the market” equals 3.6, S.D =0. 75, test value=4.07, and p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ .

So we can conclude that the innovators in Algerian high tech startups are *agreeing* to this paragraph, because its mean is greater than 3 and the sign of its test is positive.

The mean of paragraph number 3 “You manage all activities that aim to enhance the creation and utilization of innovations in your high tech startup” equals 2.8, S.D =0.58, test value=3.87, and p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ .

So we can conclude that the innovators in Algerian high tech startups are *disagreeing* to this paragraph, because its mean is smaller than 3.

The mean of paragraph number 5 “*Managing innovation processes in Algerian high tech startups*” equals 4.42, S.D =0.69, test value=3.84, and p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ .

So we can conclude that the innovators in Algerian high tech startups are *agreeing* to this paragraph, because its mean is greater than 3.

**Table (7):** mean and test values for “Managing innovation processes in Algerian high tech startups”

N	Items	Mean	S.D	Test value	p-value
1	There is top management commitment and support for Innovation.	4.3	0.46	5.1	0.00
2	You are always succeed in develop new idea, find resources to fund it, hire a good team to produce a new product, market it, distribute it, sell it, advertise it, package it and service it.	4,5	0.5	3.9	0.00
3	You manage all activities that aim to enhance the creation and utilization of innovations in your high tech startup.	2.8	0.58	3.87	0.00
4	You control all type of activities that cover all aspects of the operations relevant to enhancing the high tech startup’s ability to identify promising business opportunities, to produce competitive offerings to the market.	3.6	0.75	4.07	0.00
5	All paragraphs	4.42	0.69	3.84	0.00

Source : Extracts of SPSS.

**H1b:** There is statistically significant on the existence of “Strategic and organizational processes to success innovation management in Algerian high tech startups” in Algerian high tech startups. Table (8) shows the following results:

The mean of paragraphs number (4, 8, 3, 7, 10, 5) are successively equal to (4.96, 4.92, 4.85, 4.62, 4.46, 4.15), their S.D = (0.19, 0.27, 0.36, 0.48, 0.50, 0.54), and their test value= (6.16, 4.56, 5.82, 4.56, 4.10, 4.36), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are **strongly agreeing** to these paragraphs, because its mean is greater than 4 and the sign of its test is positive.

The mean of paragraphs number (6, 1 and 9) are successively equal to (3.85, 3.46, 3.59), their S.D = (0.36, 0.75, 0.78), and their test value= (5.82, 4.33, 4.13), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are **agreeing** to these paragraphs, because its mean is greater than 3 and the sign of its test is positive.

The mean of paragraphs number (2, 11 and 12) are successively equal to (2.85, 2.02, 1.69), their S.D = (0.66, 0.54, 0.46), and their test value= (3.24, 4.08, 5.00), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are **disagree** to these paragraphs, because its mean is smaller than 3 and the sign of its test is positive.

The mean of paragraph number 13 “*Managing innovation processes in Algerian high tech startups*” equals 4.18, S.D =1.03, test value=3.95, and p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are **agreeing** to this paragraph, because its mean is greater than 3.

**Table (8):** mean and test values for “Strategic and organizational processes to success innovation management in Algerian high tech startups”.

N	Items	Mean	S.D	Test value	p-value
1	Your high tech startup adopts an innovation strategy.	3.46	0.75	4.33	0.00
2	Our innovation strategy is clearly communicated so everyone knows the targets for improvement.	2.85	0.66	3.24	0.00
3	Your high tech startup have a perfect position where its products, processes, technologies are embedded in the national innovation system.	4.85	0.36	5.82	0.00
4	The technological path given its accumulated competencies to your high tech startup.	4.96	0.19	6.16	0.00
5	Your high tech startup follows organizational processes, which integrate strategic learning across functional and divisional boundaries.	4.15	0.54	4.36	0.00
6	Your high tech startup puts an effective internal and external linkage.	3.85	0.36	5.82	0.00
7	Your high tech startup develops close and rich interaction with all forces of competitiveness like customers, competitors, markets, with suppliers of high technology.	4.62	0.48	4.56	0.00
8	Your high tech startup develops close and rich interaction with all organizational players, like its human resource.	4.92	0.27	6.11	0.00
9	Your high tech startup implements effective mechanisms to move innovations from idea to invention to diffusion in	3.59	0.78	4.13	0.00

	the markets.				
<b>10</b>	We have effective mechanisms for managing process change from idea through to successful implementation.	4.46	0.50	4.10	0.00
<b>11</b>	Your high tech startup having a supporting organizational context in which creative ideas can emerge and be effectively deployed.	2.02	0.54	4.08	0.00
<b>12</b>	Your high tech startup Builds and maintains organizational conditions of innovation management, and involves working with structures, training and development, reward and recognition and communication systems.	1.69	0.46	5.00	0.00
<b>13</b>	All paragraphs	4.18	1.03	3.95	0.00

Source : Extracts of SPSS.

**H1c:** There is statistically significant on the existence of “*Learning and Auditing to improve the innovation management practice in Algerian high tech startups*” in Algerian high tech startups. Table (9) shows the following results:

The mean of paragraph number (3) equal to (4.77), its S.D = (0. 42, and its test value= (5.34), and its p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are ***strongly agreeing*** to this paragraph, because its mean is greater than 4 and the sign of its test is positive.

The mean of paragraphs number (4, 1) are successively equal to (2.38, 2.15), their S.D = (0.62, 0.77), and their test value= (3.40, 2.82), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are ***disagreeing*** to these paragraphs, because their means are smaller than 3 and the sign of their tests are positive.

The mean of paragraphs number (9, 8, 5, 11, 13, 10, 6, 7 and 12 ) are successively equal to (1.85, 1.77, 1.69, 1.62, 1.62, 1.54, 1.31, 1.15 and 1.15), their S.D = (0.36, 0.42, 0.46, 0.48, 0.48, 0.50, 0.46, 0.36 and 0.36), and their test value= (5.82, 5.43, 5.00, 4.56, 4.56, 4.10, 5.00, 5.82 and 5.82 ), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups ***are strongly disagreeing*** to these paragraphs, because their means are smaller than 3 and the sign of their tests are positive.

The mean of paragraph number (14), “*Learning and Auditing to improve the innovation management practice in Algerian high tech startups*” equal to (1.62), its S.D = (0. 48, and its test value= (5.56), and its p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups ***are strongly disagreeing*** to this paragraph, because its mean is greater than 2 and the sign of its test is positive.

**Table (9):** mean and test values for “Learning and Auditing to improve the innovation management practice in Algerian high tech startups”

N	Items	Mean	S.D	Test value	(Sig)
1	Your high tech startup is learning to manage innovation.	2.15	0.77	2.82	0.00
2	Your high tech startup tries to learn from the experience of others in its environment of both their success and failure.	1.69	0.46	5.00	0.00
3	Your high tech startup is introducing new concepts, ideas about tools and techniques to enhance the utility of the customer.	4.77	0.42	5.34	0.00
4	Your high tech startup is working on structured reflection, examining and reviewing how innovation is currently managed.	2.38	0.62	3.40	0.00
5	Your high tech startup managing innovation portfolio and risk.	1.69	0.46	5.00	0.00
6	Your high tech startup diversifies its innovation portfolio to reduce the level of risk.	2.31	0.46	5.00	0.00
7	Have you innovation portfolio mix, which includes incremental innovation with low risk, standard innovation with moderate risk and radical innovation with highest risk.	1.15	0.36	5.82	0.00
8	Your high tech startup has many tools of auditing to ranging the factors affecting innovation success and failure.	1.77	0.42	5.43	0.00
9	Your high tech startup done a benchmark to see if you are doing them as well as others.	1.85	0.36	5.82	0.00
10	Your high tech startup has a guide to continuous improvement of innovation management.	1.54	0.50	4.10	0.00
11	Your high tech startup look ahead in a structured way (using forecasting tools and techniques) to imagine future threats and Opportunities.	1.62	0.48	4.56	0.00
12	We systematically compare our products and processes with other firms.	1.15	0.36	5.82	0.00
13	We use measurement to help identify where and when we can improve our innovation management.	1.62	0.48	4.56	
14	All paragraphs	1.62	0.48	4.56	0.00

Source : Extracts of SPSS.

**H2:** There is a statistically significant on the existence of “*Competitive advantages*” in Algerian high tech startups. Table (10) shows these results:

The mean of paragraphs number (3, 4, 1, 8, 5, 7, 6, 2, 9, 10) are greater than 4, their S.D are (0.47, 0.49, 0.43, 0.46, 0.49, 0.50, 0.50, 0.48, 0.49, 0.47 and 0.27), and their test value= (4.82, 4.42, 5.35, 5.05, 4.60, 4.20, 4.29, 4.69, 4.42, 4.96 and 1.99), and their p-value=0.00 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are *strongly agreeing* to these paragraphs, because its mean is greater than 4 and the sign of its test is positive.

**Table (10):** means and test values for “competitive advantage of Algerian high tech startups”

N	Items	Mean	S.D	Test value	p-value
1	Your high tech startup has the greatest share market.	4.66	0.47	4.82	0.00
2	Your high tech startup maximizes its profit.	4.54	0.49	4.42	0.00
3	Your high tech startup is good at understanding the needs of its customers or end-users.	4.75	0.43	5.35	0.00
4	People know what your distinctive competence is – what gives us a competitive edge.	4.70	0.46	5.05	0.00
5	Your high tech startup works closely with ‘lead users’ to develop innovative new products and services.	4.62	0.49	4.60	0.00
6	Your high tech startup has the ability to provide global services.	3.55	0.50	4.20	0.00
7	Your high tech startup has the ability to use human resources in developing competitive advantage.	4.57	0.50	4.29	0.00
8	By innovation your high tech start up maintains and improves competitiveness.	4.64	0.48	4.69	0.00
9	With innovation, your high tech startup can grow and compete.	3.41	0.49	4.42	0.00
10	Your innovation generates value for customer and increase the financial profit for the high tech startup.	4.32	0.47	4.96	0.00
11	All paragraphs	4.58	0.27	1.99	0.00

Source : Extracts of SPSS.

From table (11) the mean of all questionnaire is 4.66, S.D=0.47, its test value= 4.82, and its p-value= 0.000 which is smaller than the level of significance  $\alpha=0.05$ . So we can conclude that the innovators in Algerian high tech startups are **strongly agreeing** to this questionnaire, because its mean is greater than 4 and the sign of its test is positive.

**Table (11):** mean and test values for “All paragraphs of the questionnaire”

N	Items	Mean	S.D	Test value	p-value
1	All paragraphs of the questionnaire.	4.66	0.47	4.82	0.00

Source : Extracts of SPSS.

**H3.** There is a statistically significant relationship between “**Innovation Management**” and “**Competitive advantages**” in Algerian high tech startups. This hypothesis can be divided into the following sub-hypotheses:

**H3a.** There is a statistically significant relationship between “*Managing innovation processes in Algerian high tech startups*” and “*Competitive advantages*” amongst Algerian high tech startups.

The table (12) of spearman coefficient correlation shows Test value= +**0.753** the p-value (sig) =0.00 which is smaller than the level of significance 0.05. The sign of test is positive, so there is a statistically significant relationship between “*Managing innovation processes*”

in Algerian high tech startups” and “Competitive advantages” amongst Algerian high tech startups.

**H3b:** There is a statistically significant relationship between “Strategic and organizational processes to success innovation management in Algerian high tech startups” and “Competitive advantages” amongst Algerian high tech startups.

The table (12) of spearman coefficient correlation shows Test value= **+0.833** the p-value (sig) =0.00 which is smaller than the level of significance 0.05. The sign of test is positive, so there is a statistically significant relationship between “Strategic and organizational processes to success innovation management in Algerian high tech startups” and “Competitive advantages” amongst Algerian high tech startups.

**H3c:** There is a statistically significant relationship between “Learning and Auditing to improve the innovation management practice in Algerian high tech startups.” and “Competitive advantages” amongst Algerian high tech startups.

The table (12) of spearman coefficient correlation shows Test value= **+0.832** the p-value (sig) =0.00 which is smaller than the level of significance 0.05. The sign of test is positive, so there is a statistically significant relationship between “Learning and Auditing to improve the innovation management practice in Algerian high tech startups” and “Competitive advantages” amongst Algerian high tech startups.

**Table (12):** correlation coefficient of each field and the whole of questionnaire

N	Items	Mean	S.D	Test value	(Sig)
1	Your high tech startup is learning to manage innovation.	2.15	0.77	2.82	0.00
2	Your high tech startup tries to learn from the experience of others in its environment of both their success and failure.	1.69	0.46	5.00	0.00
3	Your high tech startup is introducing new concepts, ideas about tools and techniques to enhance the utility of the customer.	4.77	0.42	5.34	0.00
4	Your high tech startup is working on structured reflection, examining and reviewing how innovation is currently managed.	2.38	0.62	3.40	0.00
5	Your high tech startup managing innovation portfolio and risk.	1.69	0.46	5.00	0.00
6	Your high tech startup diversifies its innovation portfolio to reduce the level of risk.	2.31	0.46	5.00	0.00
7	Have you innovation portfolio mix, which includes incremental innovation with low risk, standard innovation with moderate risk and radical innovation with highest risk.	1.15	0.36	5.82	0.00
8	Your high tech startup has many tools of auditing to ranging the factors affecting innovation success and	1.77	0.42	5.43	0.00

	failure.				
9	Your high tech startup done a benchmark to see if you are doing them as well as others.	1.85	0.36	5.82	0.00
10	Your high tech startup has a guide to continuous improvement of innovation management.	1.54	0.50	4.10	0.00
11	Your high tech startup look ahead in a structured way (using forecasting tools and techniques) to imagine future threats and Opportunities.	1.62	0.48	4.56	0.00
12	We systematically compare our products and processes with other firms.	1.15	0.36	5.82	0.00
13	We use measurement to help identify where and when we can improve our innovation management.	1.62	0.48	4.56	
14	All paragraphs	1.62	0.48	4.56	0.00

Source : Extracts of SPSS.

**H4.** There is a statistically significant difference amongst Algerian high tech startups due to privacy determinants (gender, age, and education level).

**H4 a:** There is a statistically significant difference amongst Algerian high tech startups toward the competitive advantage due to gender as personal determinants.

Table (13) shows that the p-value (sig) =0.000 of all fields are smaller than the level of significance 0.05, and then there is significant difference in respondents' answers toward these dimensions.

**Table (13):** Mann-Whitney test of the fields and p-value for innovators gender.

N <sup>o</sup>	Field	Test value	(sig)
1	Managing innovation processes in Algerian high tech startups	-8.199	0.000
2	Strategic and organizational processes to success innovation management in Algerian high tech startups	-9.26	0.000
3	Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	-8.55	0.000
4	Competitive advantage	-8.69	0.000
5	All paragraphs of the questionnaire	-8.64	0.000

The mean difference is significant a 0.05 level.

Source : Extracts of SPSS.

**H4 b:** There is a statistically significant difference amongst Algerian high tech startups toward the competitive advantage due to age as personal determinants.

Table (14) shows that the p-value (sig) =0.000 of all fields are smaller than the level of significance 0.05, and then there is significant difference in respondents' answers toward these dimensions.

**Table (14):** Kruskal-Wallis test of the fields and their P-values for age.

	<b>Khi-deux</b>	<b>N</b>	<b>Sig</b>
Managing innovation processes in Algerian high tech startups	76.113	2	0.000
Strategic and organizational processes to success innovation management in Algerian high tech startups	89.405	2	0.000
Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	76.086	2	0.000
Competitive advantage	76.38	2	0.000
All paragraphs of the questionnaire	100.625	2	0.000

The mean difference is significant a 0.05 level.

Source : Extracts of SPSS.

**H4 c:** There is a statistically significant difference amongst Algerian high tech startups toward the competitive advantage due to education level as personal determinants.

Table (15) shows that the p-value (sig) =0.000 of all fields are smaller than the level of significance 0.05, and then there is significant difference in respondents' answers toward these dimensions.

**Table (15):** Kruskal-Wallis test of the fields and their P-values for education level.

	<b>Khi-deux</b>	<b>N</b>	<b>Sig</b>
Managing innovation processes in Algerian high tech startups	94.207	2	0.000
Strategic and organizational processes to success innovation management in Algerian high tech startups	110.010	2	0.000
Learning and Auditing to improve the innovation management practice in Algerian high tech startups.	116.962	2	0.000
Competitive advantage	88.428	2	0.000
All paragraphs of the questionnaire	104.633	2	0.000

The mean difference is significant a 0.05.

Source : Extracts of SPSS.

## 15. Discussion:

From this research we proved our hypothesis about innovation management in Algerian high tech startups, where we can conclude some results, as:

- The basis for starting the Algerian high tech startups is the innovation, where they start with new ideas, they work to transfer it to invention, then to innovation for solving the customer's problems;
- The innovation in Algerian high tech startups is the only factor of their success and it is the principle tool to creating competitive advantages in their markets;
- After the starting of Algerian high tech startups they work to manage their innovation processes, by manage the cycle of the innovation and put the right structure and culture to support and enhance their innovation processes. In our research we find the mean of managing innovation processes in Algerian high tech start ups equal 4.42, what is indicates the high level of agreement of their managers;

- The Algerian high tech startups adopt innovation strategic to develop their innovation and put some organizational processes to ensure the success of their innovation, where we find in this research the mean of the field “Strategic and organizational processes to success innovation management in Algerian high tech startups” equal 4.18, what is indicates the agreement of their managers;
- The Algerian high tech startups often stop at innovation success step, and they don’t work to improve their innovation management by auditing their innovation to ranging the factors affecting innovation success and failure, or learning from the experience of their competitors in its environment of both their success and failure, or learning to find new innovation to diversifying their innovation portfolio to reduce the level of risk. Where we find in this research the mean of the field “Learning and Auditing to improve the innovation management practice in Algerian high tech startups” equal 1.62, what is indicates the strongly disagreement of their managers about the continent of the field;
- The Algerian high tech startups are getting competitive advantages in their markets, because they have started with an innovation, and they have obtained intellectual property, what give them protection from the competition. And we find in this research the mean of the field “Competitive advantage” equal 4.66, what is indicates the strongly agreement of their managers about the continent of this field.
- There is a strong relationship between innovation management and the competitive advantage of Algerian high tech startups. Where we find the correlation coefficient of the innovation management and the competitive advantage equal 0.685;
- There is a significant difference amongst Algerian high tech startups due the personnel factors of innovators, especially their gender, age and the education level, where the male factor take the big portion of the total number 73.84%, aged 20 to 25 and most of them are college student where they are exploiting what they are learning.

## 16. Conclusion

The study concluded with the summary in the light of results revealed with mean, standard deviation and t-value that the Algerian high tech startups based in their starting on innovation, and they managing it to get competitive advantages in the market, to ensure their success in the future.

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