Algeria Digital Cluster: vector of development of the digital economy in Algeria

العنقود الجزائري للرقميات :عامل تطور الاقتصاد الرقمي في الجزائر

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Abstract :
The Algerian state has been prioritizing the creation of clusters since 2007, when the first national conference on industrial strategies took place. Therefore, the purpose of this article will be double: on one hand, it will proceed to the analysis of the economic relations inside the Algeria Digital Cluster and on the other hand it will study the impact that the cluster has on the competitiveness of the companies that constitute its members. In order to do so, the article will be structured in three parts. The first one focus on a review of the literature surrounding the concept of clusters, the second one will present a structural approach of clusters in Algeria and on the third one will carry out an analysis of economic relations inside Algeria's digital cluster (ADC).
Key words: clusters, economic relations, cooperation, ADC.
JEL classification codes : L14, L24

الملخص:
منذ سنة 2007 اعتمدت الدولة الجزائرية على سياسة إنشاء العناقيد الصناعية ؛حيث تمّ الإعلان عن ذلك في الندوة الوطنية الأولى حول الاستراتيجيات الصناعية، و بالتالي تهدف هذه الدراسة من جهة إلى تحليل العلاقات الإقتصادية داخل العنقود الجزائري للرقميات، و من جهة أخرى إلى إلقاء الضوء عل الدور الذي يلعبه هذا التجمع على تنافسية المؤسسات المكونة له. ولتحقيق هذه الأهداف، سنقسم المقال إلى ثلاث أجزاء؛ حيث يتناول الجزء الأول الإطار النظري للعناقيد الصناعية ،ثمّ ندرس في الجزء الثاني المقاربة الهيكلية للعناقيد الصناعية في الجزائر، و الجزء الثالث سيتناول تحليل العلاقات الاقتصادية و الصناعية ودورها داخل العنقود الجزائري للرقميات (ADC).
الكلمات المفاتيح: العناقيد الصناعية ،العلاقات الإقتصادية ، التعاون، العنقود الجزائري للرقميات.
التصنيف JEL :L14, L24

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Introduction:

For the past thirty years, the question of geographical concentration of industry and innovation activities has brought more and more attention both at the level of economic policies and at the theoretical, academic level. Since 2007, Algeria, like many, has been qualified as a developed and emerging country. Therefore, Algeria has given priority to the creation of clusters in various sectors, including the digital one, in order to strengthen the industrial fabric and build a solid basis for its economy. This is one of the reasons why this article was made. Indeed, it is part of a research project on the organisation and functioning of the digital clusters. We are particularly interested in economic relations and cooperation strategies within the cluster. This is mainly an analysis of the interactions between the actors involved in a cluster and the effect that this type of relationship has on them.

The article is hence organized in three parts. The first part sheds light on the theoretical and conceptual foundations of cluster analysis. The second part highlights a brief overview of the emergence and development of clusters in Algeria. And the last part is intended to present the analysis of the empirical results regarding the Algerian Digital Cluster.

I- Clusters: a conceptual Framework :

This part is focusing on the development of the concept of clusters, its historical aspects, and the different interactions between the actors involved in such a relationship.

The origin of the concept of clusters dates back to the 1890s. This phenomenon is analysed for the first time by the economist Marshall in his work on the concentration of certain industries in England.

Marshall uses the **industrial district** concept to describe a grouping of interdependent and organized enterprises around a specialized labour market. He explains that grouping companies within industrial districts increase their chances of benefiting from certain advantages *« generally the aggregation of a large number of small workshops, such as the creation of a few large factories, allows the benefits of large-scale production to be achieved* » (Lartigue, Largier, Soulard, & Tarquis, 2008). His ideas fell into oblivion before re-emerging a century later.

At the beginning of the 1980s, the Marshallian approach of the industrial district was rediscovered by Italian researchers (Becattini, 1981 ;Brusco, ; Bagnasco,1991 ;Garfoli1992,…). In a context of global economic crisis, some regions in the North-east of Italy have experienced spectacular economic growth thanks to a series of small highly competitive districts. Becattini defines such a district as *« a social-territorial entity which is characterised by the active presence of both a community of people and a population of firms in a one naturally and historically bounded area* » (Becattini, 2017, p. 15). Indeed, an industrial district is characterized by the following : a multitude of companies specialized in a specific branch ; cooperative and competitive relations ; a globalized value system ; and an organization open to the outside.

Since the unexpected and spectacular success of these Italian regions, Italian districts have gained an international reputation leading to the emergence of new concepts such as clusters, LPS, spill overs, etc.

In addition to that, many other authors have their own definition of clusters. The phenomenon of industrial agglomeration was popularized by Porter, in his book *the competitive advantage of nations* in 1991.

. According to Porter, clusters are defined as « *a geographic concentrations of interconnected companies and institutions in a particular field.* Clusters *encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery and services and providers of specialized infrastructures*» (Porter, 1998). Indeed, the Porterian approach presents a cluster as a grouping of specialized actors resembling a well-defined geographic area and based on a relational system around a strategy and a productive team.

The OECD also offers a definition of clusters, which is quite similar than Porter's. Indeed, for the organization, a cluster is « a *production network of highly interdependent companies (specialized suppliers), knowledge producing agents(universities, research institutes, engineering companies),intermediary institutions(brokers, consultants) and customers ,linking them in a value-added production chain* » (OECD, 2001)

Moreover, Khattabi also has his own definition of a cluster which is, according to him, « *a group of companies, close ones spatially, leading in the same field of activity, interdependent and working in close collaboration within other formal institutions, including mainly universities and public or private research laboratories in an institutional framework and in a logic of global performance of stakeholders , In order to identify visible economic synergies on the local , national or global space* » (Khattabi & Maillefert, 2012). He gives three dimensions to the definition of clusters: geographical proximity, organizational proximity and economic proximity.

If we sum up the definitions that were just mentioned and try to find a common one, a cluster consists of a set of actors from the same branch (companies, universities, research and training centers, institutions, etc.) which are concentrated in one geographical area and maintain competitive and cooperative relationships amongst them in order to implement collective projects. It should be noted that clusters exist everywhere, in many countries of the world.

Therefore, a country's approach for implementation will be different from one country to another. They may be emerging spontaneously or are initiated by public authorities. Indeed, the cluster is often understood as a presence of a relational environment, based on systematic relationships between local actors. One of its main objectives is to mobilize their members to engage in joint collaborative projects to stimulate innovation and promote competitiveness and business growth.

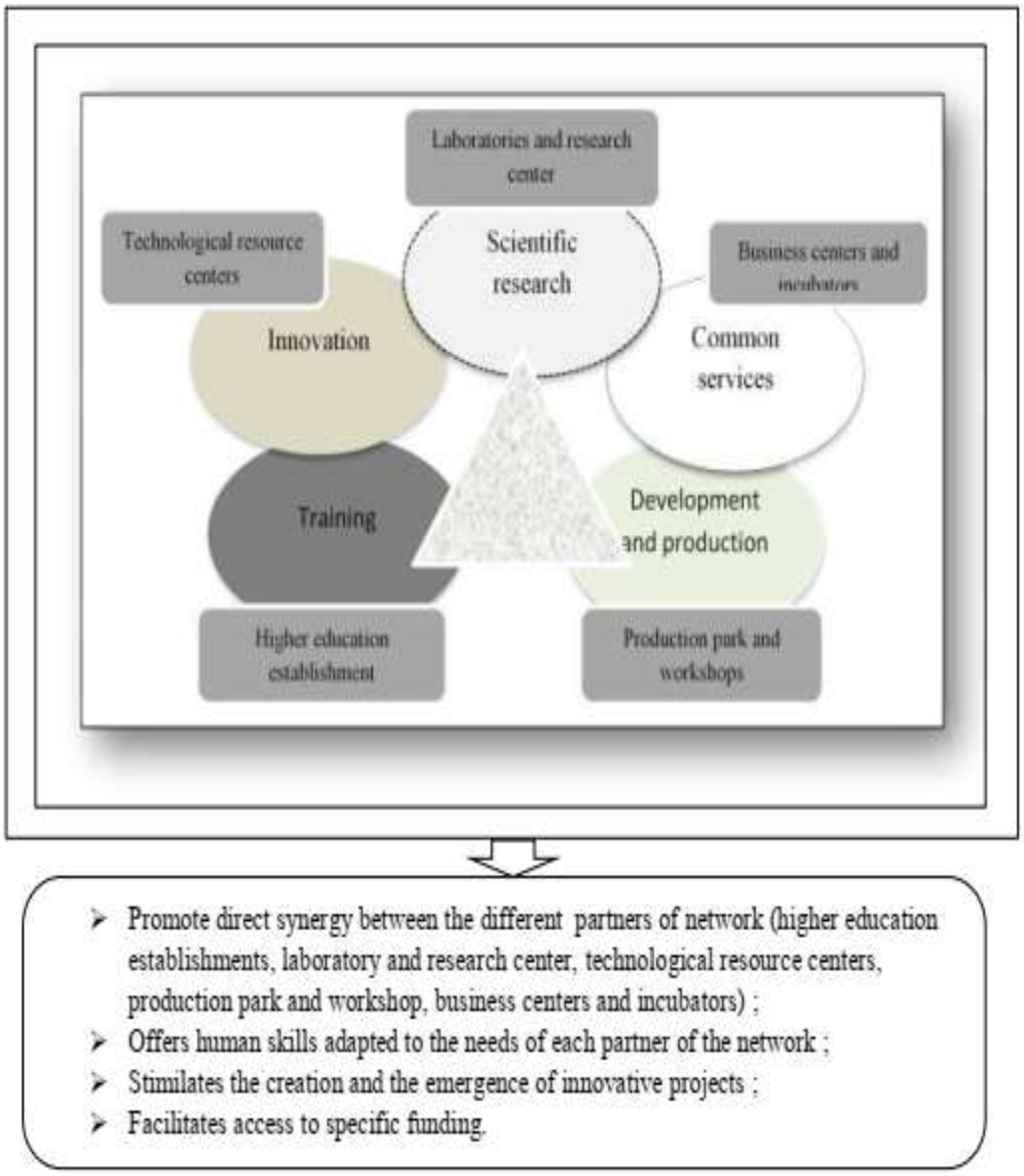
In addition, cluster members can be linked by many types of relations: cooperation, co-petition, outsourcing…They can be established in a formal way and therefore be based on a contract or have informal nature and be based on trust.

Cooperation is a collective action aimed at the achievement of joint work in order to obtain mutual benefit or gain (Dameron, 2005). This cooperation can take two main forms :

- *Cooperation with non-competitors « vertical cooperation »:* a form of relations between companies and other groups, such as research circles and government institutions or between companies themselves as they can build relationships because their activities are complementary (supplier-client, subcontracting…).
- Cooperation with competitors, « horizontal cooperation » or « co-opetition »: a form of relations between competing companies that cooperate in a few activities (Dagnino, Roy, & Yami, 2007). This type of strategy involves the coexistence between individual destiny (competition) and collective destiny (cooperation).

Interaction within the cluster and cooperative relationships allow the sharing of a collective identity based on common values. Each company therefore knows the importance of cooperation. Clusters create the basis for real synergy between the spheres of scientific research, university, education and industrial production. According to Lartigue « *the value of a cluster thus often lies in the synergies that are created through networks and personal relationships between the actors. They really constitute an intangible and specific asset for the intransferable cluster (…). The individual propensity to cooperate and to coordinate in like the trust produced from a common background of the individuals who interact: common background of the individual who interact: common history or culture. In his perspective, the trust is a product of the entrenchment of daily economic relations in the wider field of social and political institutions, of the tacit norms and rules upon which the reproduction of the community depends .This confidence is decisive for the proper functioning of a cluster and its economic efficiency* » (Marciano, 2005 cited by (Lartigue, Largier, Soulard, & Tarquis, 2008). These synergies support economic growth by providing an ambling environment for innovation and entrepreneurship. They allow the actors involved to both have better national and international visibility and to improve their competitiveness (Diagram n°.1).

Diagram n°1: the cluster, a locomotive of economic development.



Source: (haddad, 2012, p. 38).

II-The emergence and development of clusters in Algeria:

This part first focuses on the economic policies that promote the emergence of clusters in Algeria, and then it presents the Algerian experience with clusters.

II-1- Clusters in economic policies for industrial and territorial development:

The process of emergence and development of clusters in Algeria is part of crossroads of two ministerial strategies: the new industrial strategy initiated by the Ministry of Industry and the National Spatial Planning Scheme (NSPS 2025) initiated by the Ministry of Spatial Planning ,Environment and Tourism .

In 2007, The Algerian government embarked on national projects to relaunch the industrial sector, which was discussed and enriched during the *national foundations on industrial strategy*. This strategy aims at endogenous growth both from priority sectors and from a fabric of industrial SMEs. It focuses, on the one hand, on industrial and spatial development through the creation of integrated industrial development zones (IIDZ) and technopoles (clusters and poles of competitiveness) , and, on the other hand, on crosscutting policies of industrial development (upgrading, investment promotion) (Preure, 2007) .

In addition, NSPS 2025 is project with which public authorities draw strategic guidelines for sustainable development in the whole territory 2025 .Actually, four guidelines orient the NSPS and respond to the challenges of developing the Algerian territory. These guidelines are: resources sustainability; territory rebalance; attractiveness and competitiveness of territories; social and territorial equity (MATET, 2008).

Inside the third guideline regarding the attractiveness and competitiveness of territories, the approach taken for competitiveness clusters in Algeria appears. The aim of the approach for clusters in Algeria is to catch up in key sectors (biotechnology, advanced technology, micro and nanotechnology) , to anticipate the problems that will be faced by half of the world and to transform material disadvantages into built comparative advantages.
Six poles of competitiveness and excellence planned in this scheme emerged (Ferrah & M'Hamed, 2014):

- Alger Sid Abdallah (ITC)- Bouinan : life sciences, biotechnology, food and sports medicine ;
- Pole Oran-Mostaganem- Sidi Bel Abbès- Tlemcen : telecommunications, energy and space technology, organic chemistry ;
- Constantine- Annaba- Skikda : biotechnology, agro-food industries, mechanical and petro chemistry ;
- Sétif –Bejaia _Bordj Bou Arreridj- Msila: biotechnology, food industries and plastics;
- Médéa- Boughezoul- Laghouat : Biotechnology, renewable energies, environment, agriculture and food, water resources ;
- Ouargla- Hassi Messaoud- Ghardaïa : renewable energies ,petro chemistry, biotechnology of arid areas.

II-2- The Algerian experience of clusters:

The creation of cluster does not happen overnight, and this was taken literally by Algeria, as it kind of lagged in the department. In fact, the Algerian experience with cluster is still in the embryonic phase, although it has been advocated for since (Touari, 2014).

In 2008 the Algerian state engaged in the first experiments to support local productive systems in the craft sector. Three years later, a workshop is organized by the Algerian authorities in cooperation with GIZ . Indeed, The Minister in charge of SMEs launched a pilot operation to create the first innovation clusters in Algeria. In this context, German cooperation has taken over the setting up of the two clusters in the agro-food industry, and more precisely in the industrial tomato industry in Annaba or the cluster of date –producing in Biskra . Indeed, the Minister in charge of SMEs launched a pilot operation to create the first innovation clusters in Algeria. In this context, German cooperation has taken over the setting up of the two clusters in the agro-food industry, and more precisely in the industrial Tomato industry in Annaba or the cluster of date-producing in Biskra.

When it comes to the cluster for the beverages industry, it was created a year later, in 2012 (GIZ & MISMEs, 2013, p. 4). At the same time other clusters in other sectors were tested and created , such as the precision mechanics one, the digital one, the one for solar energy , the one for dates and tourism one. Therefore, clusters in craft sectors such as brassware and jewellery were selected as part of the "creative Mediterranean" project supported by UNIDO (Pommier, 2019, p. 31).

The following table represents the exhaustive list of clusters formed and currently active in Algeria.

Tablen°1: list of industrial clusters established in Algeria

Cluster	Date of creation	Territories	sectors
« Algerian Digital Cluster -ADC-»	2015	Alger	ICT
« Beverages-Agrologistics cluster»	2015	Bejaia	Food industry
« Precision Mechanical cluster»	2017	Alger	Auto-mechanical
Solar energy Cluster	2017	Alger	Solar energy
Algerian Tourism Cluster	2017	Alger	Tourism
Dates' cluster	2017	Biskra	Food industry
Jewellery Cluster	2015	Batna	Arts and crafts
Brassware Cluster	2015	Constantine	Arts and crafts

Source: developed by ourselves according to the interview with the general manager of SMEs.

There are other clusters that have developed. The informal olive oil cluster in Bouira, launched in 2004 as a group of olive growers, as well as emerging clusters such as the mechanical cluster in Constantine, the milk cluster in Bejaia or the plastics industry in Setif. We will only detail below the characteristics of the studied cluster, the digital one. Indeed, the initiative to create the digital cluster is part of a consensus among several ICT sector actors who felt the need to regroup to develop the digital economy in Algeria.

On 10 november 2015, and in order to implement this digital cluster, the SME directorate-General of the Minister of industry and Mines in collaboration with the IDEE program of the GIZ created a workshop in Algiers. This workshop brings together actors of the ICT sector and aims to generate the first cluster revolving around the development of digital economy in

Algeria. Following this workshop , a group of operators signed an agreement with the national agency for the promotion of technology parks (ANPT) for the creation of a cluster in the field of information and communication technologies (ICT). This agreement sets out the terms and conditions for hosting the cluster. This cluster is hosted at the Cyber Park in Sidi Abdellah (GMSMEs, 2015).

The following table identifies the different actors involved in the cluster's creation process (table n°2).

Table n°2: actors of Algeria Digital Cluster

Level	Category of actors	Actors identified
National level	***Companies***	Public companies
		Private companies
	Training institutions	Houari Boumediene University of Science and Technology (HBUST) /National Institute of Post and Information and Communication Technologies (NIPICT)
		Scientific and Technical Information research Center (STIRCE)
national level	***Ministry***	Ministry of post and information and communication technologies (MPICT)/ Ministry of Industry and SME'S (MISME) /Ministry of Commerce
	Organs	The National Agency for the Promotion and Development of Technology Parks (NATP), National Agency for development of SME (NADSME).
Supranational level	***Expertise***	GIZ

Source: developed by ourselves.

II-3- Empirical results from the field and discussion:

This section resents the empirical results of our study. We opted for a qualitative and quantitative survey. With the performance of semi-directional maintenance and a questionnaire as a means of collecting data relating to the organization of the cluster, cooperation relations within and outside the cluster and the economic and relational benefits derived from the group. This study was carried out with the cluster leader and sixteen member companies.

The following table summarized the progress of this investigation.

Table n°3: technical data sheet of the survey

Investigation	leader Cluster	Public and private companies that constitute the members of the cluster
Duration of the investigation	2 hours and 30 minutes *(7/07/2019)*/ 30 minutes *(8 /02/2020)*	7 months (23 /07/ 2019 to 3 /02/ 2020)
Investigation tool	Semi directive interview	questionnaire
Administration mode	Face to face	Face to face, phone calls, google forms
Theme addressed in the study	The organization and the functioning of the cluster; The coordination between the actors of the cluster	Relationship inside the cluster /Inter-company organization The economic benefits of joining the cluster

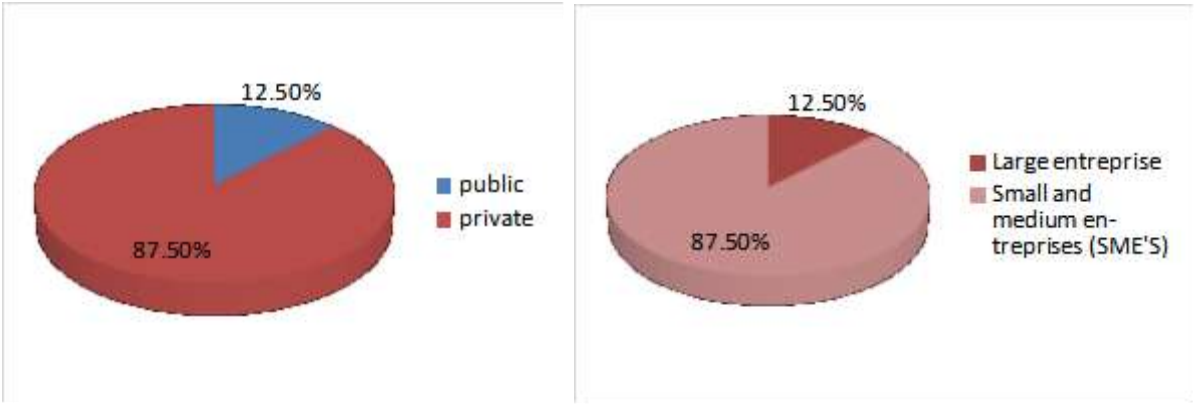
Source: developed by ourselves.

After the processing and analysis of the different answers obtained, we evoke the following points:

The emergence and development of the ADC:

1. the size of the cluster (from of ownership of the survey sample, type of companies): according to the following table , we note that private companies have the largest share with a percentage of 87,5% , while public companies represent 12,5%. Most of these companies are start-up or small and medium enterprises with also 87, 5%.

Figure n°1: distribution of sample by type and form of ownership of companies.

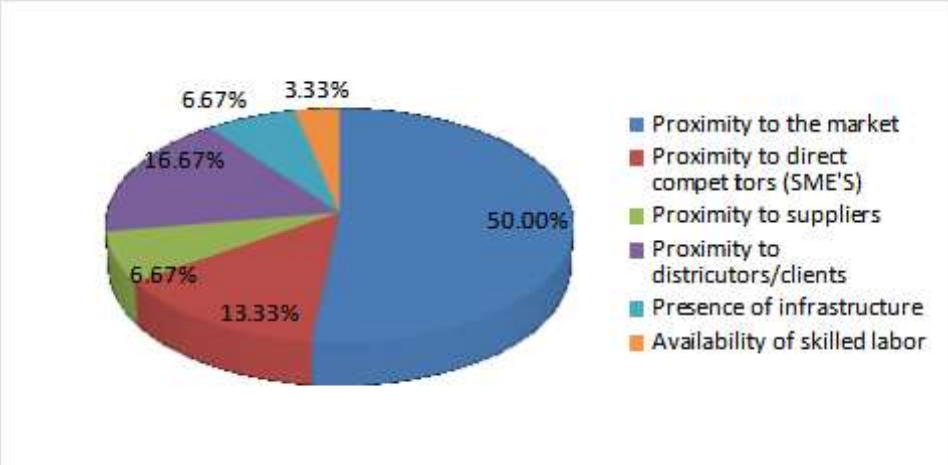


Source: developed by ourselves according to the results of the field study.

2. Concerning the process of joining the cluster: the interviewees state that the process of joining the cluster is simple. It can be done just by setting up a membership application and sending an administrative file, knowing that the emergence of the ADC has been done thanks

to a joint decision from a significant number of actors in the sector (solidarity of ICT entrepreneurs).

3. The reasons that motivate companies to join the cluster: one of the main motivations that drive companies to join the digital cluster is the proximity of the market for 50% of the responses, followed by the proximity with customers for 16, 67% of the answers, and the proximity with competitors for 13, 33%.



Source: developed by ourselves according to the results of the field study.

Regarding the expectations of the operators belonging to this network, access to information comes in first place, followed by support for growth, support for innovation, the achievement of economies of scale, and access to local customers and partners.

Analysis of the inter-company organization and the exchange between the different actors:

1. Main communication channels in the cluster: according to the answers of different actors , we can say that the main means of contact between the actors are email and meetings for 87,5% of the answers.

2. Inter-firm cooperation within the cluster: concerning inter-firm cooperation relations within the cluster, they are relatively low, collecting 43.75% of the answers. Indeed, they are low especially between large companies and start-ups, whose habit of working individually is stronger than collective work, except for some cases. Thus, competitive relations are stronger than cooperative relations. This is justified on one hand by lack of communication, as a good amount of respondents replied that there is no exchange within the cluster (37.5%), and on the other hand by the lack of trust and opportunistic behaviour of some members. According to the cluster facilitator "*time and perseverance are necessary factors to unite the actors who work individually and preserve their commitment to the cooperation process*" (Omarouayache, 2019).

3. Cooperation between companies in the cluster and higher education institutions: according to the responses from the actors, there is little cooperation between companies and the academic world, with a rate of only 31.25%.

4. Cooperation with other clusters: according to its leader, *the Algerian Digital Cluster* is in contact with other clusters at the national *level, such* as the one for Tourism, for Beverages or for precision mechanics, etc.... Six Algerian clusters have signed on October 15, 2019 an agreement to create a platform of exchanges under the name "Algeria's Cluster". This kind of inter-cluster relations can help actors to share experiences and good managerial practices.

5. Cooperation with public authorities: according to the cluster facilitator, the CDA benefits from the commitment and support of the Algerian State, in particular that of the Ministry of Industry and SMEs and the Minister of Trade. For him, the relationship with the public player opens the door for companies in the digital sector to communicate their concerns, particularly issues relating to the rigidity of regulation of the ICT market. For example, the digital cluster has contributed to administrative and tax facilitation for the creation of start-ups. For example, the cluster was consulted on the e-commerce law. According to its president, the Ministry of Commerce accompanies the cluster in national and international events, it is the one that finances the participation of Algerian start-ups in their participation in the VIVATECH exhibition through the support and promotion fund of FSPE exhibitions.

When it comes to the innovation and *collaboration* of R&D projects, it has been brought to light that *since* the creation of the cluster, its different actors have not yet engaged in *innovative, collaborative* projects (0 collaborative projects in research and development) According to the cluster leader "this delay is explained by a lack of trust towards collective initiatives by some actors of the cluster". But this objective will always remain amongst the main objectives set in the cluster's action plan.

***The economic benefits of joining the cluster*:**

1. Concerning advantages linked to the geographical proximity of the actors: according to the cluster leader, geographical proximity between different actors of the cluster does not generate any economic advantage. For them, the territorial aspect is not very important for the digital sector, the ADC cluster relies much more on solidarity between the entrepreneurs involved. Indeed, the main objective of the cluster is to federate players in the digital sector throughout the national territory.

2. As for the success of the digital cluster : its actors, more precisely the start-ups, participate more in major digital fairs at both national and international levels, which is also thanks to tha action of the ADC . For example, since 2016, a significant number of them have been regularly invited to participate in the VIVATECH fair. The latter is an international event dedicated to innovation, bringing together start-ups and leaders of the digital economy once a year in Paris to exchange on the subject, discover innovations and analyse the impact of the digital field on other sectors.

The ADC had a role to play in that because its participation, especially in 2019, has enabled start-ups to promote their companies and their products, and thus both to promote the image of the Algerian digital ecosystem and to highlight the capabilities and potential of these companies. That will allow them to have international visibility and to know the global ecosystem through direct contact with major buyers, major investors and large global companies .Thus, the ADC is developing several partnership with different countries particularly in Sub-Saharan Africa , which will enable its members to market their products in these countries.

3. Regarding the effect of cooperative relations within the cluster: 62, 5% of companies surveyed said that cooperation with other members of the cluster is favourable factor to generate several benefits through a process of collective intelligence. According to the cluster's president "*start-ups are involved in the digital cluster to improve their competitiveness and achieve collective objectives that they could not achieve individually*".

To conclude our paper, we chose to realize a SWOT matrix synthesizing the data that we collected (table n°4).

Table n°4: SWOT analysis of Algeria Digital Cluster.

Forces — The diversity of the actor's fields of activity (a large electronics and IT industrial group, telephone operators, communications agencies, banking) ; — The presence of training institutions (NIPICT and HBUST); — The participation of start-ups in major digital trade fairs (e.g. Salon VivaTechnology in Paris) ; — Proximity with public authorities (GE SMEs and MPICT);.	***Weaknesses*** — Lack of collaborative R&D projects ; — Problem of animation (lack of communication between some members and the cluster leader) ; — Lack of cooperative spirit.
Opportunities — The presence of innovative Start-ups which encourages the promotion of innovation between the members of a cluster. ; — The hosting of the cluster at the level of Sidi Abdellah's Cyberpark and consequently the bringing together of the actors with an ICT study and research center (Research and development laboratories, test laboratories and technology transfer platforms) ; — Interclustering partnerships with five clusters (Beverages, solar energy, tourism, dates, precision mechanics) at the international level between sub-Saharan African countries in order to market the products of the companies involved in the cluster.	***Threats*** — Weakness of the technology transfer process explained in particular by the lack of a real exchange of information and transfer of knowledge between actors.

Source: developed by the authors.

Conclusion:

This article has put its focus on analyzing both the different interactions between actors of the digital cluster and the benefits that they can generate from cooperative relationships.

According to these empirical results, many things can be concluded: Algeria's Digital Cluster has some weaknesses which relatively slow down its evolution and the performance of the companies that constitute its members. These weaknesses include a serious lack of communication and a weak relationship between the members and research institutions such as universities. However, the strong relationships between these companies that form the cluster and public authorities open the door to the development of innovative companies and start-ups. Therefore, new agreements between all the Algerian clusters will maybe, in the future, make the sharing of experiences and good managerial practices possible. Other empirical studies will be necessary to, on one hand, have a better understanding of the issue

regarding the different interactions that exist within clusters and, on the other hand, analyze the effect of cluster implementation on its members.

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