Open Business Models Within Mobile Operators in Algeria: Matching Open Innovation Strategies

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Abstract :
Various studies showed the effectiveness of open innovation strategies; basically they focused on the impact of outsourcing innovation knowledge, collaborations with third parties and external commercialization of technology. Meanwhile some scholars emphasize on Business Model as an analyze tool to achieve different open innovation practices and implications; this study try to assess the level of openness in the business model of the three Algerian mobile operators. We do that by linked it with four main open innovation strategies namely; Market-based innovation strategy, Crowd-based innovation strategy, Collaborative innovation strategy and Networked-based innovation strategy. Multiple case study methodology is adopted, the results indicate different level of openness in the Business Model of the three Algerian Mobile operators.
***Key Words*:** Open innovation, Business Model, Open Business Model, Mobile Market, Mobile Operator.

JEL Classification : L96, O31.

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Introduction

Nowadays, it is widely recognized that companies, regardless the industry they belong to, in order to increase the perceived value of their service as well as to enlarge their competitive areas, are forced to introduce innovations that involve the business strategy (Chesbrough and Appleyard, 2007, Bigliardi et al., 2012). The Mobile telecommunication industry is highly dynamic. Strategic, marketing and technological disruptive changes are the norm in this industry. In such context, strategy formulation and implementation is a challenge for Mobile network Operators (Ghezzi et al., 2015,P346)

The emergence of advanced technologies and new networks such as mobile internet and multimedia forces mobile operators to redefine the method used to enhance, value and personalize the communication offer provided to the end user. The expansion of mobile services brings more industry participants, while new technology and services require more collaborations than before, each participant must deal with complex business networks that may span multiple industries.

Modern innovation literature discusses Open innovation; which is the new paradigm applied in innovation management (Chesbrough, 2003, Chiaroni et al., 2011, Bogers et al., 2018). Several studies have shown that mobile operators in Europe and Asia adopt Open innovation models; for the development of their

services, especially those related to the high bandwidth (Bigliardi et al., 2012, Rohrbeck et al., 2009, Zhang and Zeng, 2009, Ghezzi et al., 2016, Hahn, 2015)

Open innovation strategies involves many practices and applications that affect the firm's business models. Some authors have distinguished between different strategies for open innovation, and the importance of open business models has been emerged in this context.

Through the above, this paper tries to answer the following question:

To what extent have business model been modified to fit open innovation strategies of Algerian Mobile Operators?

Our main hypotheses are:

H_0) There is no statistical significant difference between the applied Open Business Model and that's build on deferent open innovation strategies.

$H_0 - 1$) There is no statistical significant difference between the applied Open Business Model and that's build on Market-based strategy.

$H_0 - 2$) There is no statistical significant difference between the applied User-centric Open Business Model and that's build on crowd-based strategy.

$H_0 - 3$) There is no statistical significant difference between the applied collaborative Open Business Model and that's build on collaborative strategy.

$H_0 - 4$) There is no statistical significant difference between the applied Open Platform Business Model and that's build on networked-based strategy.

Through this study, we focus on two main objectives:

- Shedding light on the Open innovation model that is widely discussed in the innovation management literature, and try to linking it to the Business Model.
- Attempting to measure the level of adopting open innovation strategies by mobile operators in Algeria, we do that from a business model perspective.

In order to answer the research question a multiple case study methodology is adopted. We did a literature review related to open innovation and Business Model particularly in ICT; trying to extracting the main variables for this study; then we use a list of questions containing the main issues. Depending on 5 points Likert scale; we did a statistical analysis of the questionnaire.

I. Theoretical background:

1. from closed to Open Innovation :

In the past, most technology-oriented companies focused on internally developing new technologies and applying them in their own products and services. Accordingly, the firms pursued closed approaches to innovation, in which the interactions with their environment were strongly limited (Lichtenthaler, 2008,P148, Chesbrough, 2003,P21), firms relied on the assumption that innovation processes needed to be controlled by the company (Elmquist et al., 2009,P327).

In the closed system, large companies hired the best researchers and engineers for the technologies involved, and protected those inventions with intellectual property rights. Those people discovered all application opportunities of technologies, all new products and services were developed in-house and served the

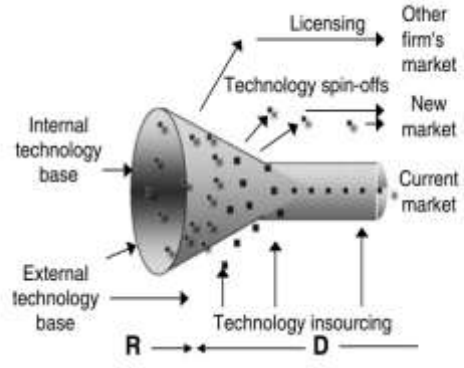
company to enter the market first and win (Dittrich and Duysters, 2007,P512), the strategy of most firms was primarily directed at achieving a competitive advantage by means of exclusive utilization of new technologies relative to competitors (Lichtenthaler, 2011,P173)

At the beginning of the seventies, innovation began to appear in a complex iterative process where communication, learning and social interaction play important roles. Some researchers emphasized that communication and the flow of knowledge play a crucial role in innovation. Over the past decades, the closed innovation strategies have changed because many firms across industries now acquire a considerable volume of their technologies from external sources (Lichtenthaler, 2009,P317), recently innovation literature has tended to include external elements from the environment such as users, manufactures and suppliers (Von Hippel, 1988,P6, Von Hippel, 2017,P4)

Chesbrough has coined the term Open Innovation in his seminal book (Chesbrough, 2003), he considered that Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology (Chesbrough et al., 2006,P2, Chesbrough, 2003,P43), the figure N°1 depict this model.

The open innovation model summarizes the firm's strategies and the organizational changes; that occur, as innovation becomes a more diffuse actively across a wide range of different actors. In addition, where the innovation process becomes participatory, it is achieved through establishing links between firms and other parties, i.e. systems of relationships or methods of interaction, and cooperation becomes necessary and a good way to explore creative individuals, innovation communities and other collaborative initiatives. Open innovation bring new managerial challenges (Öberg and Alexander, 2019,P211, Elmquist et al., 2009,P275)

Fig.1. The Open innovation model



Source:(Chesbrough et al., 2006,P3)

The attractiveness of OI as business strategy is the way in which it leads to the exploitation of benefits; from ideas imported from outside the organization and the export of intellectual capital that would be in some cases remain untapped. Open innovation can be considered as a set of practices for profiting from innovation and also a cognitive model for creating, interpreting and researching those practices (Chesbrough et al., 2006,P286), the practices that companies have adopted with greater intensity as a result of pursuing a strategy of open innovation (hence the term "open innovation practices"), particularly include:(Petroni et al., 2012,P184, Ghezzi et al., 2016,P574)

- R&D outsourcing and alliances (Chesbrough, 2003)
- Research contracts with university departments and other public and private research centers (Bigliardi et al., 2012)
- Involving other external parties like customers, suppliers in the innovation process (joint ventures, joint R&D projects, strategic cooperation…)
- Licensing intellectual property to and from other firms (Chesbrough, 2003)
- Recourse to small but highly specialized research firms
- Increased participation in technology transfer programs (Dodgson et al., 2006)
- Increased involvement in other companies through minority holdings or corporate venture capital investments (Richter et al., 2018)

The previous types of OI initiatives are strategic in nature, in the sense that they stem from or drive the business strategy of the involved firms (Ghezzi et al., 2016,P574), these practices requires different business models, modified and adapted according to the enterprise's Ecosystem.

2. Business Model:

The business model has been employed mainly in trying to address or explain three phenomena: (1) e-business and the use of information technology in organizations; (2) strategic issues, such as value creation, competitive advantage, and firm performance; and (3) innovation and technology management (Zott et al., 2011,P1023). The term *business model* is usually applied in the context of entrepreneurial firms, it also has value in understanding how companies of all sizes can convert technological potential into economic value. Firms can create and capture value from their new technology in three basic ways: through incorporating the technology in their current business, through licensing the technology to other firms, or through lunching new ventures that exploit the technology in new business arena (Chesbrough, 2003,P63)

The business model tells a logical story explaining who your customers are, what they value, and how you will make money in providing them that value (Magretta, 2002,P4), business model could be defined as the content, structure, and governance of transactions inside the company and its external partners in support of the company's creation, delivery, and capture of value (Saebi and Foss, 2015,P201, Zott and Amit, 2008,P3)

Chesbrough stated that the term business model is often used, but not often clearly defined. He proposes the useful working definition that clarifies functions

and uses of the business model as follows: (Chesbrough and Rosenbloom, 2002,P533, Chesbrough, 2003,P64, Foss and Saebi, 2017,P202)

- To articulate the *value proposition*, that is, the value created for users by the offering based on the technology
- To identify a *market segment*, that is, the users to whom the technology is useful and the purpose for which it will be used
- To define the structure of the firms *value chain*, which is required to create and distribute the offering, and to determine the complementary assets needed to support the firms position in this chain
- To specify the revenue generation mechanism(s) for the firm, and estimate the *cost structure* and *target margins* of producing the offering, given the value proposition and value chain structure chosen
- To describe the position of the firm within the *value network* linking suppliers and customers, including identification of potential complementary firms and competitors
- To formulate the *competitive strategy* by which the innovating firm will gain and hold advantage over rivals

To design business models, Zott & Amit proposed a set of design parameters that characterize the activity system; namely the design elements of content, structure and governance. The content design includes choosing the activities that will be performed, for example, in addition to its regular activities, a bank adopted activities designed to offer microcredit to the more than 60% of specific group of customers, while the structure describes how the activities are linked e.g., the sequencing between them. Activity system governance refers to who performing the activities, franchising, for example, represents one possible approach to activity system governance (Zott and Amit, 2010,P220). Designing business model can be done in three simple steps; starts with thinking about the opportunity to satisfy a real customer who needs a job done. The second step is to construct a blueprint laying out how the company will fulfill that need at a profit. The third is to compare that model to the existing model to see how much need changes to capture the opportunity (Johnson et al., 2008,P60)

The business model plays a critical role in the innovation process (Chesbrough, 2012,P24), it can be a vehicle for innovation as well as a subject of innovation (Zott et al., 2011,P1034, Trapp, 2014,P12); in the first case, the new business model is used as a means to market an innovative idea or technology, in the second case the existing business model is renewed.

Some authors believe that the success in innovation strategies could be achieved through the ability to conduct parallel innovation in business model used to create value, firms must develop new business model based on technological innovation (Valérie and Marie-Laurence, 2007,P23)

3. Business Model Innovation:

Business model innovation (BMI) is about innovating the value creation, delivery and capture mechanism of firms to entice customers to pay for value and convert this into profits (Teece, 2010,P172, Bocken and Geradts, 2020,P1). It is

perceived as a key activity for large multinational corporations to remain competitive (Bocken and Geradts, 2020, Zahra et al., 2006, Zott et al., 2011), it also leading new customer offerings and revenue streams (Chesbrough, 2010, Teece, 2010).

Business model innovation is vitally important, and yet very difficult to achieve. The barriers to changing the business model are real, and tools such as maps are helpful, but not enough. Organizational processes must also change, companies must adopt an effectual attitude toward business model experimentation. And they will need to identify internal leaders for business model change, in order to manage the results of these processes and deliver new, better business model for the company (Chesbrough, 2010,P362), the success or failure of a company's business model depends largely on how it interacts with models of other players in the industry. The propensity to ignore the dynamic elements of business models results in many companies failing to use them to their full potential. Few executives realize that they can design business models to generate winner-take-all effects that resemble the network externalities that high-tech companies such as Microsoft, eBay, and Facebook have created (Casadesus and Ricart, 2011,P4)

Companies wishing to engage in open innovation must (at least partly) re-organize their business model as to accommodate their open innovation strategies and to subsequently enhance innovative performance (Saebi and Foss, 2015,P201). Chesbrough point out the importance of Open business models; as they enable an organization to be more effective in creating as well as capturing value. They help create value by leveraging many more ideas because of their inclusion of a variety of external concepts. They also allow greater value capture by utilizing a firm's key asset, resource or position not only in that organization's own operations but also in other companies businesses (Chesbrough, 2007,P23). Saebi & Foss linked four types of open innovation strategies with the content, structure and governance of the business model dimensions as follows:(Saebi and Foss, 2015)

- Market-based innovation strategy "Efficiency-centric open business model"
- Crowd-based innovation strategy "User-centric open business model"
- Collaborative innovation strategy "collaborative open business model"
- Network-based innovation strategy "open platform business model"

III. Mobile Communications market:

1. Mobile technology development:

Since its first commercial rollouts in the 1970s and 1980s, mobile communications have evolved through some five generations; (depending on the marketing definitions) with advances in technical capabilities, functions and economic contributions, each generation has had a reign of approximately 10 years (Forge and Vu, 2020,P3). The mobile communication industry in the last twenty years has been characterized by constant technology development from lower generation network connectivity (2G) to higher generation network connectivity (3G, 4G, 5G) (Mihailovic, 2019,P79). Since the early stages of its development in the 1990s, the mobile communications industry has been characterized by the strategic dominance of mobile network operators, due to their basic resources

ownership; assets like market licenses, network infrastructure, billing and accounting systems thanks to SIM cards.

Mobile network operator refers to a company that possesses a mobile communications network and provides mobile communication and information services to customers. In the 2G (the second-generation mobile communications) era, mobile network operators where undoubtedly at the center of the mobile communications industry. But in the 3G era, contents and applications are indispensable for developing data services, which is drastically different from voice-centric services (Zhang and Liang, 2011,P157)

The development of mobile communications has drastically influenced people's lives. Each new release resulted in faster, higher bandwidth and more intelligent network. The terms internet of things, virtual reality, artificial intelligence, big data, machine learning are all used in the context of digitalization. Companies in the telecommunications sector are undergoing a fundamental shift to adapt to a digital world and have been developing from telephony service providers into data companies (Mihailovic, 2019,P73)

The focus of mobile operators has increasingly shifted towards data transfer and value-added services. As the main factors causing disruptive changes in the mobile communications industry can be identified by the increasing use of mobile data, with the continuous decline in revenues from voice services; due to the spread of video broadcasting, peer to peer services, and social networking services (Ghezzi et al., 2015,P350)

The mobile revolution was triggered by the introduction of Apple's iPhone, and since then, the business environment around such platforms has brought about increased competition. The emergence of new information and communication technologies ICT and of the internet have opened new opportunities, to design open market business models by enabling companies to fundamentally change how they organize and engage in economic exchanges; both within and across companies as well as through industry boundaries (Han and Cho, 2015,P2, Zott and Amit, 2007,P194)

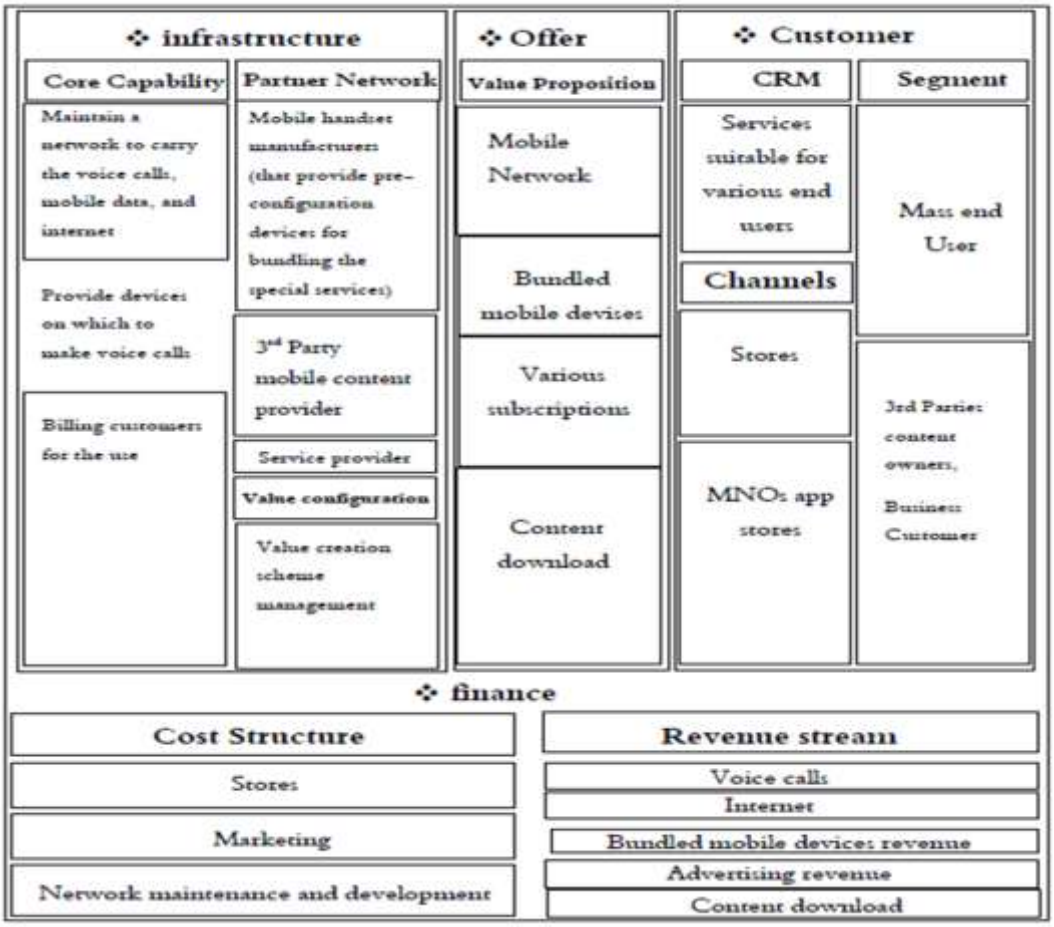
2. Business model of mobile operator:

Some authors considers that a business model describes the rationale of how an organization creates, delivers and capture value. In this context Osterwalder & Pigneur have developed the business model canvas; consisting nine elements that include Key Partners, Key Activities, Value proposition, Customer relationships, Customer Segments, Key Resources, Channels, Cost Structure and Revenue Streams (Osterwalder and Pigneur, 2010,P44). Based on this canvas, Xia et al. provide a mobile operator Business model (Xia et al., 2010,P4). Figure N°2 represents a business model for a mobile operator designed based on the two previous models.

Literature have linked disruptive changes in the context of mobile market, usually to changes in the business model, especially in the value dimensions, four dimensions can be classified:(Ghezzi et al., 2015, Madjdi and Hüsig, 2011, Mihailovic, 2019, Zhang and Liang, 2011)

- Value proposition, which include (a) target customer segments, (b) customer value perception, and (c) value proposition characteristics.
- Value creation, that contain internal value creation resources, e.g., specific processes or organizational structure.
- Value delivery, i.e., position and role in the value chain.
- Value appropriation; value capture mechanism (the revenue model) and cost structure.

Fig.2. Mobile Operator Business Model



Source: (Xia et al., 2010,P4)

3. Innovation Management in Mobile services:

Today, mobile operators are preparing for the fifth generation network that will enable a wide range of use cases for massive internet of things, mobile operators need to expand their offer, beyond pure voice and data. Rarely do operators have enough knowledge, skills and finance to create new products internally which means they have to make some changes in the business model to empower innovation and generate new data services. For mobile operators, innovation in the business model is as important as innovation in technology (Mihailovic, 2019,P79), the challenge is

not the service itself, but also the approach to innovation, i.e. how new services are developed (Yamasaki and Carlos, 2014,P154). The increased diversification and the disruptive nature of technologies led to R&D activities that moved to a great extent from central research laboratories of the telecom operators to specialist equipment supplier (Hahn, 2015,P24).

Preliminary investigations indicate that open innovation has wider application and implications in the telecommunications industry. The platform strategy and the needs of external collaboration are becoming largely diffused throughout the telecommunications industry. However, external collaboration is not something new in the context of incumbent telecommunications operators, and the issue of control remains a major theme of debate (Yamasaki and Carlos, 2014,P154)

Adopting open innovation is one solution for mobile operators; to face the current environment and develop innovative offers (Bigliardi et al., 2012, Rohrbeck et al., 2009, Hahn, 2015, Mihailovic, 2019, Ghezzi et al., 2016), various discussions with managers from European and Australian telecommunications companies in the years 2011 and 2012 reveal, that open innovation approaches finds its way in innovation management and new product development (Hahn, 2015,P3)

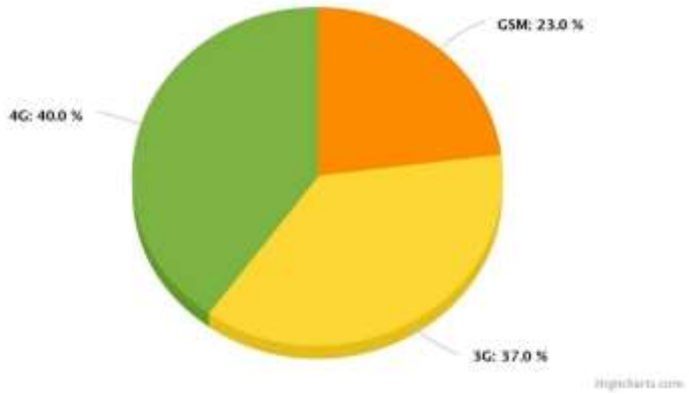
Ghezzi et al. studied a sample of mobile operators and manufacturers; based on the analysis of their open innovation strategies they conclude that this firms achieve competitive advantage by opening up and expanding the value chain. Through including external parties, reconfigure or reshaping key activities, assets or resources, increasing service excellence, providing alternatives to intellectual resource for competitive advantage; such as communities of customers, users, developers and the coordination of external parties (Ghezzi et al., 2016,P588)

Zhang & Liang found how mobile operator establishes a complex business network; they recognized the success factors of cornerstone strategy of 3G services, which mainly included building and sharing valuable assets, encouraging and developing innovation especially from other parties, managing value creation and sharing it with other parties, in addition to formulating the external network (Zhang and Liang, 2011). More specifically Mihalovic clarified the role of open business models for mobile operators and the different strategies of cooperation with partners; such as emerging ICT startups. That contribute in expanding their portfolios and remaining competitive in the market, and it showed the importance of business model innovation in mobile communication industry (Mihailovic, 2019).

IV. Mobile telecommunications market in Algeria :

The Algerian market includes three operators; they divides shares as follow: Algeria Telecom Mobilis ATM owns the largest share in 2019 with 42,64%, followed by OTA Optimum Telecom Algeria 30,54%, and Watania Telecom Algeria with 26,82% (Arpce, 2019,P9), while the proportions of the technological generations are distributed as shown in the following figure:

Fig.3. Technological generations in the Algerian mobile market in 2018



Source:(Arpce, 2019)

Fig.4. Development of Technological generations in the Algerian mobile market

Source:(Arpce, 2019)

As shown in previous figure, high generations (3G and 4G) represents the major technologies adopted in the Algerian mobile telecommunications market (77%). Like Europeans telecommunications markets, that is due to a number of sub-factors. Such as the diffusion of value-added services by the operators, the growing popularity of bandwidth consuming services like video streaming, the emergence of more accessible data traffic plans, the popularity of social networking services (include rich media applications such as photo and video sharing), the diffusion of

easy-to-use internet-capable smartphones and the decisive marketing effort of operators (Ghezzi et al., 2015,P350)

According to the latest report of Arpce; which is shown in the figure N°3, approximately 25 million subscribers use 3G and 4G services, basically these users focus on mobile internet services, this illustrates the current trend in mobile telecommunications industry in Algeria.

V. Results:

1. Open Business models for mobile operators:

Four main open innovation strategies could affect the business model of mobile operator as follows:

- Market-based innovation strategy; that makes a "market-centric Open Business model". Where openness plays an important role in market orientation. The core of the concept consists of acquiring, disseminating and using market information, a market-oriented firm may more actively collect and analyze market information. Deeper market insights may strengthen the effect of open innovation (Cheng and Huizingh, 2014,P1239). For mobile operator:
  - Technology information of 3G, 4G and 5G is acquired through the market.
  - R&D outsourcing for internet related and internet of things services.
  - Acquiring ICT startups.
  - Licensing intellectual property to and from other firms for 3G, 4G and 5G services.
- Crowd-based innovation strategy; result in "User-centric Open Business model"
  - The operator rely on users, or lead user in the evaluation of value proposition, or new service innovations.
  - The operator use user communities to acquire the knowledge, or new ideas.
  - The use of incentives to engage and manage communities of users for own employees.
  - Operator use web 2.0 platforms in the evaluation of their own offers.
- Collaborative innovation strategy; which makes a "collaborative Open Business model"
  - The operator establishes alliances with extensive knowledge partners; mainly "university departments, or research institutions", to create services for the advanced generations.
  - Seek to introduce radical innovations with new markets; based on new technology.
  - Develop the skills of its employees to interact and share knowledge with external parties.
  - Make external partners as key assets in the operator's service innovations activities.
- Network-based innovation strategy result in "Open Platform Business model"
  - The operator aims to provide a multi-party platform, which allows innovations related to high bandwidth.

- Establish an internal network to access knowledge and organize interactions among multiple parties.
- Developing incentives system for multi parties involved.
- Set up an applications store that work like a virtual marketplace for both developers and end users

2. hypotheses testing :

To assess the level of the four main open innovation strategies, we use a questionnaire (see appendix), with 5 Likert degrees, the results are shown below:

a. Methodological approach :

The study population consists managers and employees of the three Algerian Mobile operators, the first category is managers and employees in the sale points of Algeria Telecom Mobilis ATM in Algiers, Blida, Bouira, M'sila, Tizi, Boumerdes, Djelfa, Tipaza. The second category is managers and employees in the sale points of OTA Optimum Telecom Algeria or Djezzy in Algiers, Bouira, M'sila, Tizi, Boumerdes, Djelfa, Tipaza, the last is managers and employees in the sale points of Watania Telecom Algeria or Ooredoo in Algiers, Bouira, M'sila, Tizi, Boumerdes, Djelfa, Tipaza. It's worth noting the weak degree of response between the groups, we distributed 750 forms, 418 retrieved and we could analyze 289, which represents 38,53% out of the number originally has been distributed.

We use several statistical technique; namely Cronbach's Alpha to measure the internal consistency, Means and standard deviation to measure the dispersion of the data, and determine the level and the ranks of the different open innovation strategies, and we use also the t-test to analyze the difference among means in a sample.

b. Reliability coefficients:

Table 1. Cronbach's Alpha

Cronbach's Alpha	N of Items
.723	4
.693	4
.823	4
.773	4

The reliability coefficients for all variables is about 69,5%; which is acceptable.

c. T-test

Table 2. Means, t-value and Sig of ATM sample

Number	item	Mean	t-value	Sig (2 – tailed)
1	Technology information of 3G, 4G and 5G is acquired through the market.	4.8969	8.071	.042
2	R&D outsourcing for internet related and internet of things services	3.9698	7.141	.281
3	The operator seek to acquire ICT startups	2.9741	6.387	.000
4	We have licensing intellectual property to and from other firms for 3G, 4G and 5G services	4.7963	-5.475	.000
5	The operator rely on users, or lead user in the evaluation of value proposition, or new service innovations.	2.3669	10.071	.000
6	The operator use user communities to acquire the knowledge, or new ideas.	3.2798	10.141	.003
7	We use incentives to engage and manage communities of users for own employees.	2.6841	6.387	.000
8	Operator use web 2.0 platforms in the evaluation of the offers	1.5963	14.475	.000
9	We established alliances with extensive knowledge partners; mainly "university departments, or research institutions.	2.6669	4.595	.005
10	We aim to introduce radical innovations with new markets; based on new technology.	4.8798	-.567	.271
11	The operator seek to develop the skills of our employees to interact and share knowledge with external parties.	4.3841	-11.339	.000
12	External partners are key assets in the operator's service innovations activities.	2.8963	-7.687	.000
13	We have provide a multi-party platform, which allows innovations related to high bandwidth.	1.3669	-2.302	.000
14	We established an internal network to access knowledge and organize interactions among multiple parties.	1.9798	13.475	.001
15	We develop incentives system for multi parties involved.	1.3441	4.595	.000
16	The operator set up an applications store that work like a virtual marketplace for both developers and end users	1.8711	-.891	.000

One-sample Test for the hypothesis number one:

Table 3. One-sample Test of ATM sample

	N	Mean	Std. Deviation	Std. Error Mean
	107	4.1592	.90284	.45142

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
	6.256	106	.058	2.82410	1.3875	4.2607

Source: SPSS outputs

Sig. (2-tailed) > 0,05

We accept the hypothesis number one:

$H_0 - 1)$ There is no statistical significant difference between the applied Open Business Model and that's build on Market-based strategy.

The hypothesis number two:

Table 4. One-sample Test of ATM sample

	N	Mean	Std. Deviation	Std. Error Mean
	107	2.4844	.90284	.45142

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
	7.298	106	.007	2.82410	1.4742	3.0999

Sig. (2-tailed) < 0,05

We reject the null hypothesis:

$H_0 - 2)$ There is no statistical significant difference between the applied User-centric Open Business Model and that's build on crowd-based strategy.

We accept the alternative:

$H_1 - 2)$ There is a statistical significant difference between the applied User-centric Open Business Model and that's build on crowd-based strategy.

The hypothesis number three:

Table 5. One-sample Test of ATM sample

	N	Mean	Std. Deviation	Std. Error Mean
	107	3.7067	0,84283	.17324

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
	8.954	106	.221	2.82410	1.3875	4.2607

Source: SPSS outputs

Sig. (2-tailed) >0,05

We accept the following hypothesis:

$H_0 - 3)$ There is no statistical significant difference between the applied collaborative Open Business Model and that's build on collaborative strategy.

The hypothesis number four:

Table 6. One-sample Test of ATM sample

	N	Mean	Std. Deviation	Std. Error Mean
	107	1.6407	0,76103	.54324

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
	7.3254	106	.000	4.24075	3.5349	4.9466

Source: SPSS outputs

Sig. (2-tailed) <0,05

We reject the null hypothesis:

$H_0 - 4)$ There is no statistical significant difference between the applied Open Platform Business Model and that's build on networked-based strategy.

We accept the following hypothesis:

$H_1 - 4)$ There is a statistical significant difference between the applied Open Platform Business Model and that's build on networked-based strategy.

For the other two operator; OTM and WTM the following table summarizes the results:

Table 7. One-sample Test of OTM and WTM sample

The operator	N	Open innovation strategy	Sig (2-tailed)	Rejected/accepted null Hypothesis
OTM	98	**Market-based**	.056	**accepted**
		crowd-based strategy	.000	**rejected**
		collaborative strategy	.002	**rejected**
		networked-based strategy	.000	**rejected**
WTM	84	**Market-based**	.123	**accepted**
		crowd-based strategy	.000	**rejected**
		collaborative strategy	.023	**rejected**
		networked-based strategy	.067	**accepted**

Source: SPSS outputs

Conclusion

Through this paper we can reached the following conclusions:

- Mobile operators tend to establish a network of relationships and alliances with multiple parties in the structure of their business model; due to technological complexity in 3G, 4G and especially in 5G with internet of things considerations.
- Open innovation is the new paradigm in the innovation process, in today context with massive use of ICT around the globe.
- Many empirical studies have demonstrated the tendency of Mobile operators in Europe and Asia to adopt the principles and philosophy of open innovation in their activities.
- The applied Open business models is vary among operators in Algeria, some open innovation strategies appeared at a high level; such as market-based and collaborative innovation strategies, while other strategies appeared generally at medium level.

Like most studies, the plan of this study is subject to limitations, which opens up opportunities for future research. Firstly, though we found four open innovation strategies could affect the business model of the operator, we do not explain the level of openness that result, and secondly, we do not identify the more effective

combination which enhancing the open innovation success. Future research could focus on these issues.

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Appendix

	Items					
Market-Based open innovation	Technology information of 3G, 4G and 5G is acquired through the market.					
	R&D outsourcing for internet related and internet of things services					
	The operator seek to acquire ICT startups					
	We have licensing intellectual property to and from other firms for 3G, 4G and 5G services					
Crowd-based innovation strategy	The operator rely on users, or lead user in the evaluation of value proposition, or new service innovations.					
	The operator use user communities to acquire the knowledge, or new ideas.					
	We use incentives to engage and manage communities of users for own employees.					
	Operator use web 2.0 platforms in the evaluation of the offers					
Collaborative innovation strategy	We established alliances with extensive knowledge partners; mainly "university departments, or research institutions.					
	We aim to introduce radical innovations with new markets; based on new technology.					
	The operator seek to develop the skills of our employees to interact and share knowledge with external parties.					
	External partners are key assets in the operator's service innovations activities.					
Network-based innovation strategy	We have provide a multi-party platform, which allows innovations related to high bandwidth.					
	We established an internal network to access knowledge and organize interactions among multiple parties.					
	We develop incentives system for multi parties involved.					
	The operator set up an applications store that work like a virtual marketplace for both developers and end users					