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THESIS

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By: Ms Drihem Sarra

Subject

Business Intelligence as Innovation support activity. Algerian enterprises case study.

Defended publicly, on 08 /07/ 2026 , before a jury composed of:

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2025 /2026

ملخص :

حاولنا من خلال هذه الأطروحة فهم استراتيجية المؤسسات الجزائرية عند قيامها بعملية الابتكار، و ركزنا على يقظة الأعمال كعامل مؤثر على الابتكار داخل المؤسسة، ومن خلال الادبيات النظرية اعتمدنا على القدرة الاستيعابية كعامل يربط بين اليقظة و الابتكار و قمنا باعتماد على نموذج مقترح و الذي يشمل جميع متغيرات الدراسة .

تم الاعتماد على المنهج الوصفي في الجانب النظري و كذا المنهج التحليلي، و من أجل الاجابة على فرضيات الدراسة قمنا بصياغة استبيان تم توجيهه لعدد من المؤسسات الجزائرية (118) خلال تواجدها بمعرض الانتاج الوطني في طبعته 31 من سنة 2023 ، تم تحليل الاستبيان بواسطة التحليل العاملي لاختبار ثبات سلالم القياس، و الانحدار الخطي لتحديد العلاقة بين متغيرات الدراسة.

أظهرت النتائج وجود اثر ايجابي لليقظة على القدرة الاستيعابية ، كذلك وجود أثر ايجابي (بنسبة قليلة) للقدرة الاستيعابية على الابتكار، و في الاخير تم الاجابة على سؤال الدارسة من خلال تأكيد فرضية وجود اثر ايجابي لليقظة على الابتكار داخل المؤسسات الجزائرية.

الكلمات المفتاحية : يقظة الأعمال، الابتكار، القدرة الاستيعابية، مؤسسات جزائرية.

Abstract:

In this thesis, we sought to understand the innovation strategies of Algerian enterprises; we focused on Business Intelligence (BI) as a factor influencing innovation within the enterprise. Drawing on the theoretical literature, we identified absorptive capacity as the factor linking Business Intelligence and innovation, and we adopted a proposed model, which encompasses all study variables.

We employed a descriptive approach for the theoretical aspect as well as an analytical approach. To test the study's hypotheses, we designed a questionnaire that was distributed to a number of Algerian enterprises (118), during their participation in the 31st edition of the National Production Fair in 2023. The questionnaire was analyzed using factor analysis to test the stability of the measurement scales and linear regression to determine the relationship between the study variables.

The results showed a positive effect of Business Intelligence on absorptive capacity, as well as a positive (albeit slight) effect of absorptive capacity on innovation. Finally, the study's research question was answered by confirming the hypothesis that Business Intelligence has a positive effect on innovation within Algerian enterprises.

Keywords: Business Intelligence, Innovation, Absorptive Capacity, Algerian Enterprises.

Résumé:

Dans cette thèse, nous avons cherché à comprendre la stratégie des entreprises algériennes dans leur démarche d'innovation, Nous nous sommes concentrés sur la veille stratégique en tant que facteur influant sur l'innovation au sein de l'entreprise. À partir de la littérature théorique, nous avons retenu la capacité d'absorption comme facteur reliant la veille et l'innovation, et nous avons adopté un modèle proposé qui englobe toutes les variables de l'étude.

Nous avons utilisé une approche descriptive pour la partie théorique ainsi qu'une approche analytique. Afin de répondre aux hypothèses de l'étude, nous avons élaboré un questionnaire qui a été distribué à un certain nombre d'entreprises algériennes (118), lors de leur présence au Salon de la production nationale, lors de sa 31e édition en 2023. Le questionnaire a été analysé à l'aide d'une analyse factorielle afin de tester la stabilité des échelles de mesure, et d'une régression linéaire pour déterminer la relation entre les variables de l'étude.

Les résultats ont montré l'existence d'un effet positif de la veille stratégique sur la capacité d'absorption, ainsi qu'un effet positif (légèrement) de la capacité d'absorption sur l'innovation. Enfin, la question de l'étude a trouvé sa réponse grâce à la confirmation de l'hypothèse selon laquelle la veille stratégique a un effet positif sur l'innovation au sein des entreprises algériennes.

Mots-clés : Veille Stratégique, Innovation, Capacité d'absorption, Entreprises Algériennes

To the memory of my father,

To Marianna, Djamel, Nadia and Imene

To Moncef and Assil

To my friends, and Office colleagues

To everyone who prayed for me in their hearts

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General Introduction

General Introduction:

The current business climate is characterized by a high degree of change and complexity, which means that organizations are constantly facing a volatile and unstable environment that could lead them to fall from the top of the pyramid or disappear entirely from the competitive landscape, as was the case with Nokia.
In 1992, Nokia truly began to make its mark on history with the launch of its first GSM phone, the Nokia 1011. From that point on, the challenge was to appeal not only to business users but also to consumers.

“Nokia realized before anyone else that the cell phone would become a fashion item and a status symbol”. While competitors like Motorola and Ericsson offered square, black phones, Nokia dared to experiment with innovative shapes, colors, and materials. Take the Nokia 2110, released in 1994, for example: it had an ergonomic shape, curved keys, and the ability to swap out a single cover. It was a resounding, unimaginable success and paved the way for a series of phones with increasingly original and captivating designs.
Despite its dominant position and innovative culture, Nokia has also faced difficult times. The turning point came in 2007, when Steve Jobs unveiled the first iPhone and redefined the very concept of the mobile phone.

Apple's smartphone featured groundbreaking features such as a multi-touch screen, web browsing, and an app store. Nokia, which also had similar projects in the works, did not fully grasp the extent of this threat.
The story of Nokia offers many insights for anyone involved in technology, innovation, and management. First and foremost, it illustrates how important it is to have a long-term vision, remember, too, how easily leaders can become relics of the past if they don’t adapt quickly to change.

General Introduction

We are no longer talking about information; enterprises need accurate information, real time information. To ensure their growth, enterprises must invest not only in physical capital, but also in intangible capital, which essentially involves the acquisition, transfer, capitalization and exploitation of knowledge. for March (1991)(J. G. March, 1991), the information gives its meaning to a decision situation and therefore modifies the both the structure of the options and the preferences sought.

Likewise, quality information will have an effect positive on the social climate within organizations. Information is a factor of motivation, interest, social cohesion in business.
The useful information which interests the company is the only one to be exploited, but before it must be sorted, translated, validated and analyzed manually or automatically to produce elaborate information which meets the strategic needs of the enterprise.

Today, the information system is mainly based on the IT system. Numerous reporting and analysis software packages are available on the market, enabling each company to identify its strengths and areas for improvement(Mirdasse & Lhassane, 2021). However, business intelligence "is an informational process through which an organization listens to its environment in order to decide and act in pursuit of its objectives(Brouillard, 2002).

Business intelligence is an informational process that puts organization in active listening for weak signals and information from its environment in order to reduce uncertainty and find opportunities (H. Lesca, 1994). Business intelligence can be defined as the use of tools and techniques in order to gather and transform data into information that are both: meaningful and useful (Bentley, 2017). Lesca and Caron-Fasan (2006) had already observed in the

literature the wealth of terminology referring to"Intelligence" in English and " Veille" in French.

According to H. LESCA (2002), "intelligence is mainly associated with five strategic management themes: planning, strategic positioning and competitive advantage, decision-making, adaptation and reactivity, innovation and anticipation of discontinuities, sometimes also several of these processes at the same time".

Innovation is an economic impact of technological mutation (Schumpeter, 1982). According to Twiss, innovation is a process extended from the emergence of an idea and its transformation into a product or service, until its commercialization combining technology, economics and management. Innovation main goal is to achieve novelty. Innovation is a Latin word derived from Innovare, which means the change and according to (Drucker, 1985) Innovation is an act that gives resources a new capacity to create wealth and economic value.
The Oslo Manual developed by the OECD defines innovation in 4 different areas: product innovations, process innovations, Commercial or marketing innovations and organizational innovations.

In the recent years the Algerian market who experienced a significant upswing and began to rely increasingly on locally developed and manufactured products; observing this shift in Algeria's business climate led to the idea of this research studying the potential relationship between vigilance and innovation.

However, although the topics of 'business intelligence' and 'innovation' are widely discussed in the literature, only a few studies have aimed to understand the relationship between them.

General Introduction

By looking in the literature, studies suggested finding mediator variables between business intelligence and innovation, in order to link the two topics.

A good number of studies used what is called “Absorptive Capacity” as a mediator variable between business intelligence and innovation.
Absorptive capacity contributes to improving innovative capacity (Cohen and Levinthal, 1990) and innovation performance within the firm (Andreeva and Kianto, 2011; Bayarçelik et al. 2014; Lichtenthaler, 2016).
Cohen and Levinthal (1990) stated and introduced AC as the capability to assimilate, acquire and then use external knowledge for commercial ends, which can became as an important capability for enterprises to innovate by increasing manufacturing flexibility or improving new products.

Research problem:
This research is conducted in the aim of studying the relation between Business Intelligence and Innovation, and for this objective we have formulated the following research question:

- **« Does Business Intelligence influence Innovation through Absorptive Capacity in Algerian enterprises? »**

Our research focus can be outlined through the following questions:

1. Do Algerian enterprises practice Business Intelligence?
2. Is the practice of Business Intelligence a factor leading to the acquisition of an absorptive capacity?
3. Does Business Intelligence help the Algerian enterprises to be innovative?

Hypotheses of the research:

In an effort to answer the research questions, we have formulated the following hypotheses:

- Hypothesis 1: There is a positive significant relation between business intelligence and absorptive capacity.
- Hypothesis 2: There is a positive significant relation absorptive capacity and innovation.
- Hypothesis 3: There is a positive significant relation between Business Intelligence and Innovation.

Objectives of the Study:

The main objective of our research is to shed light on the importance of Business Intelligence for Algerian enterprises in achieving innovation. Especially that Business intelligence is widely used in the Western economy. It is very poorly addressed in our economy.

The significance of the research:

- This research is significant, because it will give added value to the literature since we will put to test the impact of Business Intelligence on innovation in Algerian enterprises.
- The large number of enterprises that participated in this research will enable us to gain a more accurate insight into the state of Business Intelligence and innovation in an Algerian context.
- This is one of the earliest studies in Algeria to examine Absorptive Capacity and Business Intelligence in a large number of national enterprises.
- This study is also important for entrepreneurs or those considering starting new businesses, as it highlights both the importance and the risks

associated with the external environment and information regarding the organization's operations.

Research Methodology:

Given the nature of the study, which aims to describe the phenomenon, the researcher adopted a descriptive-analytical approach, as this is the most suitable method for achieving this aim.

To conduct our field study, we designed a questionnaire and distributed it to a significant number of institutions, taking advantage of their high concentration in a single location: The 31st edition of the Algerian Production Fair 2023, that was held from December 14 to 23, 2023, at the Exhibition Palace in El Senouber El Bahri (SAFEX) in Algiers, under the high patronage of the President of the Republic.

The final sample comprises 118 enterprises that responded to the questionnaire. The first phase of the quantitative study involves measuring the validity and reliability of the constructs. To this end, principal component analysis was conducted successively. Once the validity and reliability of the measurement tools have been established, the hypotheses are tested using univariate analysis of variance (one-way ANOVA) and linear regression analysis. After hypothesis testing, the results are discussed and the research is concluded with a general summary.

In terms of structure, our thesis is divided into three chapters:

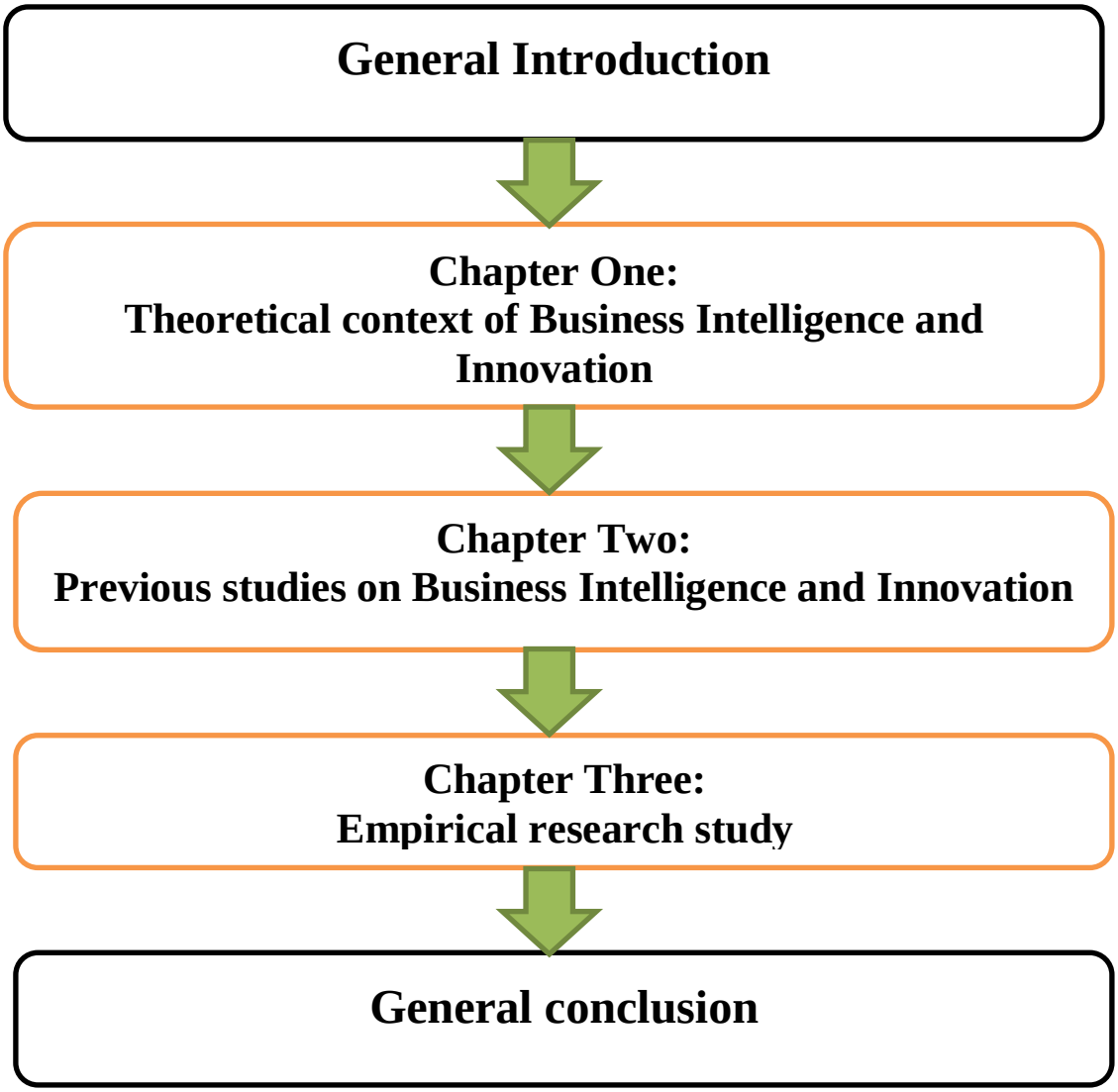
The first chapter is the theoretical chapter, in which we sought to review the various theoretical literatures on information and its importance within the organization, as well as in relation to the vigilance system. We also provided

definitions for vigilance, innovation, and absorptive capacity, and sought to demonstrate the relationship between these variables.

The second chapter is dedicated to presenting a series of previous studies on vigilance, innovation, and the mediating variable of absorptive capacity, along with an overview of the various models proposed to study these practices within organizations.

Chapter Three consists of the applied study, in which we designed a questionnaire and administered it to a number of Algerian organizations, then analyzed it and drew conclusions.

Figure 1. Research Plan



Chapter One: Theoretical context of Business Intelligence and Innovation

Introduction to chapter one:

At a time when the pace of technological developments is increasing, and consumer preferences are constantly changing, it has become difficult for enterprises to keep up with this growing and accelerating pattern. Obtaining important and useful information in a timely and cost-effective manner has become a task for enterprises to develop their own systems to identify, collect, process and distribute important information within the enterprises to allow them to obtain the right opportunity and uniqueness that may lead to innovation.

In order to reach the innovation stage, the enterprise must have access to timely and useful information, and this can only happen if the enterprise relies on an effective intelligence system that enables it to monitor its environment and allows it to pick up even weak signals that may provide valuable opportunities to innovate and differentiate it from others.

Business intelligence is defined as the processes and methods used to collect, store and analyze data produced by operations or activities with the aim of optimizing performance.

Business intelligence is a means of deliberately absorbing knowledge in order to improve the ability to develop innovations (Berghman, Matthyssens, Streukens, & Vandenbempt, 2013) and improve the introduction of new products into a market, particularly if the innovative company has sought information from a variety of sources in unfamiliar and distant terrain (Li, Yang, Yao, Zhang, & Zhang, 2012).

In our study we try to identify the impact on business intelligence on innovation relaying on absorptive capacity, and for that we focus in this first chapter on the theoretical context of business intelligence and innovation.

First section is for information, as it is the fuel of any system within an enterprise, especially for the business intelligence system and the innovation

process.so, define information, its different types and mostly its importance for the enterprise.

Second section is for business intelligence conceptual back ground, when we understand more about the evolution of this concept and its different types, importance and relation to similar concepts.

Third section is for innovation, we try to give a definition of innovation and its types, the Different ways to access innovation, its benefits and finally highlight the factors facilitating or hindering innovation.

Fourth section will be devoted to understand the relationship between business intelligence and innovation, through various theories that link these two concepts, and so we will carry out a literature review of them. And by the end we highlight a new element that will help us to make the link between intelligence and innovation. This element is absorptive capacity.

Fifth section is about absorptive capacity, as it was highlighted at the end of the previous section. In this section, we will in large this concept for more understanding.

Chapter One: Theoretical context of Business Intelligence and Innovation

Section one: Information an important resource

To ensure their growth, enterprises must invest not only in physical capital, but also in intangible capital, which essentially involves the acquisition, transfer, capitalization and exploitation of knowledge.

The enterprise is a complex system in which a great deal of information flows. Without an arrangement of this flow, the enterprises can very quickly become overwhelmed and can no longer operate with a satisfactory quality and quantity of service.

The spectacular increase in the amount of information manipulated now days is no longer possible to conceive of using common sense alone. The information system paradigm has emerged in this context as a response to information management needs.

1.1.1. Information: a strategic raw material

Organizations are societies of minds where actions and decisions emerge from information processes. Information is the recording of knowledge for the purpose of transmission. This implies that knowledge must be recorded on a medium, so that it can be preserved and coded, since any representation of reality is by nature symbolic(Cacaly & Le Coadic, 1997). Now days, businesses operate in a particularly unstable environment. The globalizations of trade, the globalization of markets, technological innovation constitute risk multiplication factors which make the position of companies increasingly vulnerable. Being attentive to your competitive environment, that is to say knowing and understanding it in order to adapt to it. Information has then become an essential material for the life of the company while mastering this information makes it possible to improve decisions and encourage action.

Today, information is also a raw material, an essential element in any production process. It represents an asset of power in a competitive environment, as an integral part of strategy, in conditions where the offensive or defensive actions

of structures increasingly take on an informational content. And so Information constitutes a strategic raw material:

To act:

It involves constructing analyzes to provide decision-making arguments within the framework of the company's strategic or operational projects (developing a new product, export to a new geographical area, modernizes the production tool production, etc.):

To anticipate:

It involves understanding future developments and changes in the company's environment based on the detection of weak signals in order to detect threats and seize looming opportunities and thus fuel its thinking prospective;

To react:

The company is alerted in a timely manner to important events to which it must react quickly.

1.1.2. Different types of information:

There are several classifications of information types; each one could serve the company's Intelligence activity:

1.1.2.1 White, gray or black information:

- **White information:** to which access is very easy. It is open to everyone without any legal barrier. It is present in the press, conferences, specialized publications and databases;
- **Gray information:** essentially reserved, consists of information which has been the subject of appropriation by obtaining a private right: patents, models, copyrights... Its exploitation is limited, subject to the authorization of the holder;
- **Dark information:** confidential, (information protected by secrecy): manufacturing secrets, commercial secrets (market studies, sales forecasts), or relating to the organization (organization chart). Access to it is subject to the risk of civil and criminal sanctions.

1.1.2.2 Open or closed information:

- **Open information:** easily accessible. It may be public or semi-public, but available free of charge or at low cost. This is the case for statistics published regularly by official institutions (Ministries, public research embassies, public documentation centers, etc.). This type of information, even if the content is often disappointing because it is old or limited, can provide very interesting information as part of preliminary research.
- **Closed information:** this refers to information that already exists, but to which access is either costly (multi-customer studies carried out on the initiative of private institutes or consulting firms) or difficult (studies carried out on behalf of a competitor or confidential studies that have not been disclosed).

1.1.2.3 Internal or external information:

- **Internal information:** whether formal or informal, information comes first and foremost from the company itself (memos, meeting minutes, internal press reviews, study and audit reports, etc.).This information can be gathered either through systematic collection by the business intelligence department, which generally centralizes this type of information, or through an in-house documentation center or database.
- **External information:** comes from a variety of sources, both documentary, accessible directly or via the Internet (public and professional organizations, competitors, the specialized press, multi-customer studies, etc.), and non-documentary. Specialists must rely on trusted private contacts, both official (professional clubs, industry federations, etc.) and unofficial (former colleagues, journalists, suppliers, competitors, etc.).

1.1.3. Sources of information:

The information flow is made up of different kinds of information (advertising, culture, knowledge and action, etc.). Good information management must take

into account distinctions between different sources of information, and at this level two categories stand out: formal and informal sources.

1.1.3.1 Formal sources:

Mainly composed of the press, television, radio, books, data banks and patents, legal information, public studies carried out by public or private providers, and we can classify them as follows:

Table 1.1 The main sources of information for business intelligence

Source categories	Main sources of information
Institutions	Administrations, international organizations, associations, research centers, institutes, foundations, universities, etc.
Partner groups	Subcontractors, suppliers, customers, competitors, professional groups, financiers, etc.
Electronic sources	Search engine, discussion lists, databases, etc.
Personal networks	Clubs, colleagues, etc.
Information providers	Press, bookstores, libraries, servers and brokers, data banks, information centers, etc.
Events	Conferences, trade fairs, study trips, industrial visits, etc.
Consultants and experts	Engineering schools, academics, experts, technical centers, consultants, design offices, etc.
Internals	…you still had to think about it!

Source:(Peter, 2011)

1.1.3.2 Informal sources:

According to (B Martinet & Marti, 1995), to collect informal information, you need to be in contact with it, i.e. move around, spend time, be able to hear, smell and touch it, so as to perceive it.

The importance of informal information lies in having it before other competitors, which allows you to act before others and gain a competitive advantage unlike formal information which loses its usefulness over time

because it is accessible to everyone (Debliquy, 2015). Informal information comes from competitors, suppliers, subcontractors, missions, trade fairs and exhibitions, conferences, etc.

- **Exhibitions and trade fairs:** there's usually not enough time to gather enough information at these events. Given that such visits and missions have to be prepared before departure, the key is to know how to manage your time well, and to have drawn up a timetable so as to be able to manage activities and visits on the spot.
- **Suppliers:** we must not forget that the same supplier can also be that of the competitor. It will therefore be necessary to be able and know how to exploit this data.
- **Conferences, congresses, clubs:** we exchange information there, we communicate. The information that circulates can be strategic. You should not hesitate to do new acquaintances, new contacts that can form a personal network.
- **Competitors:** We can find useful information in their publications, reports of their general meetings, their press releases, or their speeches. The subcontracting link with a competitor facilitates access to certain information and certain internal documents such as the company journal.
- **Certain websites:** personal sites, studies and research carried out by a group of students or doctoral students, etc. Student dissertations, theses and research contracts with universities and laboratories constitute very interesting sources of information for the company which is engaged with students, researchers and universities; In some countries, university libraries are also a source information that the company sometimes seeks, for example a dissertation which deals with the technical aspect of its competitor.
- **Internal sources of the organization:** 80% of the information that a decision maker seeks is found within his or her organization. It would therefore be very

important to have and to establish internal contacts within organizations so as to know what is happening there.

- **Personal networks:** the cousin, the business friend from X, the representative from Y, the neighbor who works at Z, overhears, "by chance", a conversation on a plane, a train, during a dinner...Within the limits of legality and ethics.
- **Social media:** are a general category of channels and applications that highlight collaboration and working together to create and distribute content (Westerman, Spence, & Van Der Heide, 2014). Social media networks offer free access to a large number of users and provide a platform for posting, sharing information, and responding to others' postings, making it a valuable source of information in various domains.

1.1.4. The value of information:

With the internalization of markets, the company must adapt, if possible anticipate, sometimes influence, and in any case react with agility. To achieve this in good conditions, business managers need the appropriate information, at the appropriate time, for decision-making. The central place that information occupies in the decision-making process no longer needs to be demonstrated.

Information also has value, because it allows to choose, make decisions and act. Its value is thus linked to its use in the context of taking decisions. Thus for March (1991)(J. G. March, 1991), the information gives its meaning to a decision situation and therefore modifies the both the structure of the options and the preferences sought.

Likewise, quality information will have an effect positive on the social climate within organizations. Information is a factor of motivation, interest, social cohesion in business.

According to LESCA(H. Lesca, 1992):

- Information is useful for reducing uncertainty in decision-making;

- Information is a determinant of behavior, an influencing factor both inside and outside the company;
- Information is a factor of synergy: a company's performance depends on the quality of its relationships and links.

The useful information which interests the company is the only one to be exploited, but before it must be sorted, translated, validated and analyzed manually or automatically to produce elaborate information which meets the strategic needs of the company and which is used to decision-making.

According to MOIGNE (Le Moigne, 1990) the value of information is based on three criteria:

- Information has value if it helps reduce future uncertainty;
- Information has value if it is likely to affect the decision(s) under consideration. The difficulty with this criterion is that we are not always in a position to know whether a piece of information we don't yet know will modify the decision under consideration.
- Information has value if it contributes to a significant change in the consequences of a decision.

1.1.4.1 The role of information in a company:

Information has the ability to create its own added value, because it can be reused, shared, distributed or exchanged, without losing any of its value, but rather gaining it. According to studies, information occupies an important place in the company, and can be a source of decision-making, a source of performance and competitiveness, and a source of innovation. We will develop this idea in the following:

1.1.4.2 Information as a decision-making tool:

"The right information to the right person to make the right decision" M.PORTER.

Chapter One: Theoretical context of Business Intelligence and Innovation

Today, we're talking about a knowledge-based economy, where information is considered a strategic raw material for companies, enabling them to gain greater control over their environment and reduce uncertainty in decision-making. H.SIMON considers it to be an essential element in the decision-making process, involved in the intelligence phase of the "Intelligence, Modeling, Choice" (IMC) model. That's why an executive spends an average of 30% of his or her time looking for information(Pateyron & Salmon, 1996). In fact, before a decision is taken, whether strategic or operational, the information gathered should be complete, that is to say having relevant, reliable, accurate and recent information to choose the most relevant decision possible.

In the post-decision phase, it is essential that the decision taken is communicated to all members of the company, so that it is understood, accepted and applied by all, in line with the defined objective.

However, collecting information enables us to monitor the consequences of the decision and measure its effectiveness.

It is clear that information is a primordial strategic resource that helps decision-makers make relevant decisions, however, their capacity to collect and process this information is limited (Simon, 1981). Two recently developed systems can compensate for this limited rationality of individuals: the information system and the intelligence system.

The information system gathers financial, commercial and managerial data, enabling us to better analyze the company as a whole and continually improve. Today, the information system is mainly based on the IT system. Numerous reporting and analysis software packages are available on the market, enabling each company to identify its strengths and areas for improvement(Mirdasse & Lhassane, 2021). However, business intelligence "is an informational process through which an organization listens to its environment in order to decide and act in pursuit of its objectives(Brouillard, 2002).

1.1.4.3 Information as a source of business performance:

Information is at the heart of business performance, it influences the behavior of employees within the company, so that they follow set objectives, but also the behavior of external partners, so that they act in the company's favor. Information influences the behavior of employees within the company, so that they follow set objectives, but also the behavior of external partners, so that they act in the company's favor. It is also a production factor: thanks to relevant information, the firm can create and market high value-added products. It is a tool for creating synergy: through information, the company identifies its weak link and tries to make it effective, since its performance depends on it.

Information is therefore a productive resource in its own it is increasingly important for the economic success of companies.

Poor information management leads to delays, wasted time and money, lack of competitiveness and, in extreme cases, even company closure.

Section two: business intelligence conceptual back ground

Business terminology has been conversant with numerous business intelligence (BI) concepts since the late 1990s. Among these are complexity, references to the accelerating pace of change, globalization, information flow, new economy, networking and proactivity. These terms, and the new ways of thinking and acting that may be associated with them, have had a hand in the movement of society from a capitalist-driven to a knowledge-driven economy. In addition to the changes in society, advancing technologies and applications have wreaked remarkable change on traditional business models and operations. According to (Pietersen, 2002), running a business is now harder than ever because of the new rules of competition and the greater complexity and accelerated rate of change in the new economy. Because a good portion of economic theory dates from the time of industrialization, both the business and academic world are seeking new

ways of increasing their business awareness and know-how in the information society(Pirttimaki, 2007).

1.2.1. The evolution of the business intelligence concept:

The term Business Intelligence was used in the first time in the book «Cyclopaedia of Commercial and Business Anecdotes» wrote by Richard Devens in1865 while describing a financier success over his competitors: *«He had an understanding of political issues, instabilities, and the market before his competitors».*

And so World War II, when information systems knew a paradigm shift, where the Allies used cryptography to collect massive amounts of encrypted information from different sources and scrutinized it to find any useful information in breaking Germans' infamous «Enigma» cipher and allowing them to gain intelligence advantages.

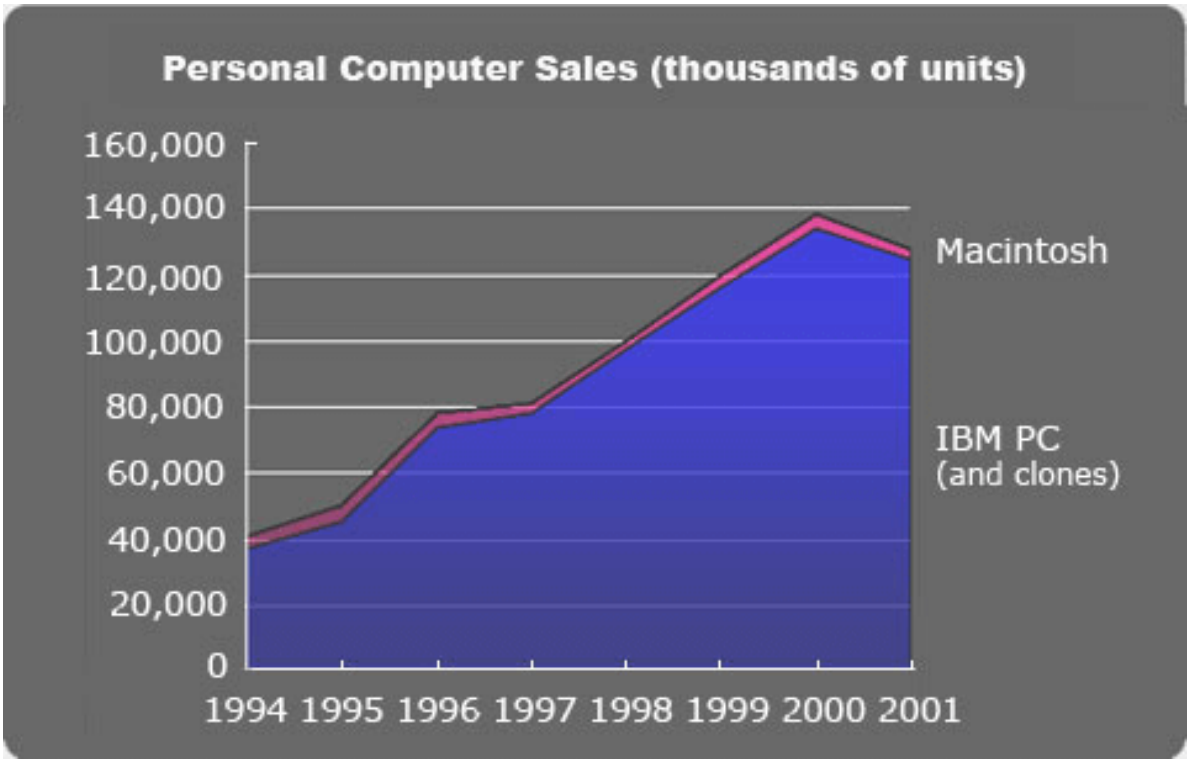
In 1956, an IBM innovation made history and marked the beginning of modern business era with the invention of hard disk drives that allows the storage of big amounts of data. The hard disk, which at the time had 5MB of memory storage and with its gigantic dimensions weighted over a ton. This landmark is particularly relevant to BI as it gave way to the replacement of physical filling systems for digital ones.

In 1958, Hans Peter Lhun (an IBM employee) published an article in the journal paper (A business intelligence system).This paper was a revolution, where it highlighted the challenges that organizations face in making decisions based on the huge amount of information, where he outlined what became known as data-driven decision-making (DDDM) using technologies developed by IBM. DDDM is defined as *"using facts, metrics, and data to guide strategic business decisions that align with your goals, objectives, and initiatives"*.

In 1970, BI moved from theory to practice, with the emergence of specialized companies like SAP (Systems, Applications and Products for data processing), which offered to organizations the storage of their data in what was known as DATABASES. And so organizations were able to create more efficient reports. However databases were criticized for their leak of flexibility due to being one dimensional. In 1980 the history of big data knew a dramatic change with the creation of DATA WEARHOUSES (DW) that could be used to access and manage data in one place. DW is defined as "*A technology that brings together structured data from one or more sources so that it can be compared and analyzed for better business intelligence ».*

Business intelligence took a big leap with the emergence of data warehouses; however it was not available for average business users due to the expensive cost of specialized IT team required to a business intelligence platform. Adding to all of this the fact that computers at that time were very limited, so reports took time to run, and mostly they were irrelevant by the time they were finished. In 1995 Microsoft released Windows 95, furthermore, Intel dispatched the Pentium Pro processor and so the sales of PCs accelerated from 1994 to 2001. PCs went from selling around 20,000,000 units per year to almost 140,000,000 units in 2000**.**

Figure 1.1 Computer sales developement



Source: ***Ars Technica***

And this development increased the demand on Internet:

Table 1.2 Developement of internent demand

DATE	NUMBER OF USERS	% WORLD POPULATION	INFORMATION SOURCE
December, 1995	16 millions	0.4 %	IDC
December, 1996	36 millions	0.9 %	IDC
December, 1997	70 millions	1.7 %	IDC
December, 1998	147 millions	3.6 %	C.I. Almanac
December, 1999	248 millions	4.1 %	Nua Ltd.
March, 2000	304 millions	5.0 %	Nua Ltd.
July, 2000	359 millions	5.9 %	Nua Ltd.
December, 2000	361 millions	5.8 %	Internet World Stats
March, 2001	458 millions	7.6 %	Nua Ltd.
June, 2001	479 millions	7.9 %	Nua Ltd.
August, 2001	513 millions	8.6 %	Nua Ltd.

Source: ***Internet World Stats***

With fast computers and internet all over the world BI marked a new era, more BI terms were used like OLAP, Dashboards, Data marts…

BI is an activity that aims to keep an eye on the environment of the enterprises, however, we can say that BI itself as showed by its history was very interactive, and was affected by the ongoing changes in the IT systems, computers, Internet and software.

In the recent published article of (AI-Nawaiseh & Alnawaiseh, 2026), the others give the most recent updated evolution of BI, by reviewing developments in the areas of application of business intelligence over the years.

Table 1.3 The evolution of business intelligence over time

Time duration	Evolution	Description
2010–2015	Traditional BI to modern BI transition	Replace static, report-focused business intelligence- The emergence of cloud-based BI tools.
2015–2017	Data discovery tools	Growing acceptance of data exploration and visualization platforms like Table, Power BI…
2016–2022	Mobile BI	Increasing demand for mobile business intelligence (BI) solutions.
2018–2020	Integration of AI and machine learning	BI solutions are being enhanced with AI and machine.
2020–2021	Focus on data governance	An increasing focus on data governance is necessary to guarantee data security, quality, and compliance with laws.
2020–2023	Advancements in natural language processing (NLP)	Integrating NLP with business intelligence (BI) solutions allows users to interact with data through natural language queries and gain valuable insights.
2017–2023	Data democratization	Continued efforts to make data accessible to non-technical users.
2018–2023	Real-time analytics	There is a growing demand for real-time analytics skills to help companies respond

		quickly to changes in the market.
2021–2023	Focus on augmented analytics	Increased use of augmented analytics, which automates data preparation, insight discovery, and sharing by utilizing AI and machine learning.
2022–2023	Enhanced data collaboration	BI solutions include enhanced collaboration tools.
2015–2023	Continuous evolution of cloud BI	Cloud-based BI solutions are gaining popularity due to their ease of scaling, affordability, and accessibility.

Source : (AI-Nawaiseh & Alnawaiseh, 2026), p.460. Adapted

As can be seen from the table above, BI has developed considerably in recent years. This evolution requires data to be accessible to everyone (data democratization). This evolution has also changed the way information is stored, with more and more reliance on cloud-based BI tools due to their ease of scaling, affordability and accessibility.

More analytical skills are required, as well as integration with AI and machine learning.

1.2.2. Definition of business intelligence and its importance:

1.2.2.1 Definition:

1- Business intelligence can be defined as the use of tools and techniques in order to gather and transform data into information that are both: meaningful and useful (Bentley, 2017) .

2- Business intelligence means different things to different people; the concept may be defined as an umbrella that is composed of tools, applications, data bases that is designed to insure interactive data access that helps in decision making process(Sharda, Delen, Turban, Aronson, & Liang, 2014).

3-Business intelligence is a process that combines technologies and tolls to transform data into information, information into knowledge, and knowledge into plans to achieve business success(Loshin, 2012).

From this definition we can expose two important notions:

- BI is more than a set of tools for collecting data; it depends also on adequate process and human resources.
- BI is more valuable when it is used in profitable business action.

BI is an approach of business management used in an organization to determine useful and relevant information to support decision making (Gibson, Arnott, Jagielska, & Melbourne, 2004)

Business intelligence is an informational process that puts organization in active listening for weak signals and information from its environment in order to reduce uncertainty and find opportunities (H. Lesca, 1994)

The concept of BI first appeared in the United States, many miscellaneous names were used to express the term:

Table 1.4 Evolution of BI's determination

Expressions	Author/s	Year
Strategic environmental scanning	Stoffels	1982
Strategic information scanning system	Aker	1983
Environmental scanning	Lenz Engledew	1985 1986
Environmental Intelligence	Stoffels Lenz Engledew	1982 1985 1986
Environmental analysis	Lenz Engledew	1985 1986
Business Intelligence	Gilad	1986

Source: (Caron-Fasan & Lesca, 2006)

If several definitions of monitoring are given in the literature, the terminologies are just as numerous. Lesca and Caron-Fasan (2006) had already observed in the literature the wealth of terminology referring to"Intelligence" in English and " Veille" in French (Table 1.5).

Table 1.5 List (non-exhaustive) of terminologies associated with monitoring in academic publications

Typology	Terminologies used by the authors	authors	number of publications
Competitor intelligence	Business competitor intelligence	Sammon et al. (1984)	1
	Competitor intelligence	Fuld (1985)	4
	Competitor analysis	Ghostal et Westney (1991)	1
Competitive intelligence	Competitive analysis	Prescott et Smith (1987)	
	Competitive intelligence	Ghoshal (1988)	2
	Veille prospective	Antoine (1992)	36
	Veille concurrentielle	Delbes (1995)	1
			1
Business intelligence	Competitive analysis	Green (1966)	12
	Competitive intelligence	Kefalas et Shoderbeck (1973)	3
	Veille prospective		
	Veille concurrentielle	Calori (1989)	1
		Fuld (1991)	1
Veille technologique	Monitoring the environment	Bright (1970)	1
	Documentation	Jakobiak (1991)	1
	Veille technologique	Lainée (1991)	9
	Veille	Dou et al. (1995)	2
	Information scanning	Vandenbosch et Huff (1997)	1
Environmental scanning	Environmental scanning	Aguilar (1967)	56
	Mixed-scanning	Etzioni (1967)	2
	Organisational intelligence	Wilensky (1967)	1
	Multinational scanning	Keegan (1974)	1
	Environmental analysis	Diffenbach (1983)	4
	Corporate intelligence	Tomioka (1990)	1
	Global scanning	Davidsn (1991)	1
Social intelligence	Social intelligence	Dedijer et Jéquier (1987)	5
	Techno-economic intelligence	Radosevic (1991)	
	Intelligence économique	Martre (1994)	1
			5
Veille stratégique	Strategic information scanning system	Aaker (1983)	
	Strategic scanning		
	Management stratégique de	El Sawy (1985)	1
	l'information	Lesca (1986)	3
	Surveillance de l'environnement	Marteau et Lesca (1986)	2
	Chief executive scanning	Daft et al. (1988)	3
	Veille stratégique	Calori et al. (1988)	1
	Vigilance	Walls et al. (1992)	24
	Strategic environmental scanning	Stoffels (1982)	1
	Strategic intelligence system	Montgomery et Weinberg	1
	Intelligence stratégique	(1998)	1
	Veille anticipative-Intelligence collective	Revelli (1998)	1
	(VAS-IC)	Lesca (2003)	1
Total			193

Source: (Caron-Fasan & Lesca, 2006)

Since this book was released in 2006, few new terms emerged. However, we have identified two new endings:

The first is « Corporate Foresight » of Rohrbeck et al (2015) (P.2) defined as *"Corporate Foresight is identifying, observing and interpreting factors that induce change, determining possible organization specific implications, and triggering appropriate organizational responses. Corporate foresight involves multiple stakeholders and creates value through providing access to critical resources ahead of competition, preparing the organization for change, and permitting the organization to steer proactively towards a desired future"*(Rohrbeck, Battistella, & Huizingh, 2015).

In this definition we find an importance given to the strategic mission of monitoring to help the company understand its environments in order to put in place appropriate strategic responses.

The second is « Horizon Scanning » by Rowe et al (2017) and Miles & Saritas (2012) with the following definition (P.266): *"Horizon Scanning" is intended to develop an organization's capabilities to identify subtle changes in the environment, enabling the enterprise to cultivate a high awareness and understanding of its environment, resulting in a rapid and effective response to changes and events"*(Miles & Saritas, 2012; E. Rowe, Wright, & Derbyshire, 2017).

Horizon Scanning (HS) is often confused with Environmental Scanning (ES)

ES looks into the contexts (or environments) and may be very short-term in focus, while HS is concerned with future-oriented 'emerging' trends, issues and uncertainties in the topic of concern (Miles, Saritas, & Sokolov, 2016).

1.2.2.2 The importance of Business Intelligence:

Why do business intelligence? Answer the question: why do companies do business intelligence? Above all, it's a question of identifying the objectives

assigned to it. Business intelligence is not an end in itself. It is more of a tool, a means that contributes to the realization of a process, the development of an activity or the design of a strategy.

According to (H. Lesca, 2003), "intelligence is mainly associated with five strategic management themes: planning, strategic positioning and competitive advantage, decision-making, adaptation and reactivity, innovation and anticipation of discontinuities, sometimes also several of these processes at the same time".

Support planning:

As part of their annual planning process, companies (and public institutions) may define specific orientations in terms of business development, research & development, etc. These orientations can often be translated into monitoring axes (customer, competition, operations & production, etc.).

Support reactivity:

Reactivity is generally defined as the ability to present a change in response to an external action (Gueguen, 1999). It enables company to constantly adapt to changes in its environment. In order to better react to changes in the environment, the company must constantly listen to it.

Support innovation:

According to (Galland, Boulanger, & Quoniam, 2004) stay informed to obtain new ideas by setting up a monitoring system allows the company to analyze and strengthen its innovation potential in order to validate the initial idea and compare it with the company's strategic objectives. The method that can be used consists of a diagnosis of the company's resources, a formulation of strategic orientations and the choice of development axes, finally, an evaluation of the company's environment.

Resolve and support decision:

The decision model (IMC) represented by Herbert Simon 1945, which states that effective decision-making depends on the decision-maker's ability to have the right information at the right time based on three phases:

Intelligence, modeling and choice. According to decision theory, the effectiveness of decision-making relies on the decision-maker's ability to have the right information at the right time. Intelligence is a crucial element in strategic decision-making (Roberts & Wernstedt, 2019).

Explore and support anticipation:

Some companies use business intelligence to increase their ability to detect information that prefigures change as early as possible and anticipate change, in particular the possible ruptures and discontinuities in the company's relevant environment (H. LESCA & BLANCO, 2002).

Business intelligence is very important to enterprises, we can narrow down a long list to the most important ones (قادري, 2019):

- allow the enterprise to make decisions safely and confidently, and to be aware of what is going on around its environment;
- To monitor, predict and anticipate events proactively and detect opportunities and threats, to keep up with any environmental evolution of technologies, or other factors.
- Objectively assess its current and future competitive position;
- Increase the profits by better marketing of its products ;
- the introduction of new products, and the entry or positioning on new markets;
- Have a clear and forward-looking view of competitors' current and future business and activities, and anticipate their intentions.

(N. Lesca, Caron-Fasan, Akoka, & Comyn-Wattiau, 2006) drew up a list of missions and expected results from Business Intelligence (table1.6).

Table 1.7 The missions and expected results of Business Intelligence (Lesca and Caron-Fasan, 2006, p.166)

Theme	Mission of BI	Expected results
Planning	Support decision-making during short-term and long-term strategic planning.	The facilitation and development of strategic thinking in organizations.
The competitive advantage	Support the analysis of the specific environment, the identification of opportunities and threats, the construction and maintenance of a competitive advantage and the choice of a generic strategy.	An understanding of the current dynamics of environmental forces that allows the company to position itself and gain a competitive advantage.
decision	Supporting the decision in the intelligence and choice phase of the IMC model – intelligence, modeling, and choice – by Herbert Simon.	Important data for strategic decisions and their transformation into a satisfactory level of intelligence to enable the choice and implementation of a decision.
Adaptation, contingency, reactivity	Perceive the external forces of change and guide the company's adaptation.	An understanding of current and potential changes taking place in the environment allowing the company to adapt and remain competitive.
Innovation	Support incremental or disruptive innovation.	Know-how, interpersonal skills or new and innovative uses that can be valued by the market or sources of better internal performance.
Anticipation of discontinuities	Perceive the seeds of change and weak signals from the environment to anticipate changes and strategic discontinuities.	Early enough perception of relevant and important changes in the environment to give the company time to act in anticipation and take advantage of them.
Entrepreneurship, intrapreneurship	Support the training, evaluation and implementation of an entrepreneurial or intrapreneurial vision in a business plan and value-creating activity.	The vision of an opportunity to create a company, a new activity or a business.

Source(N. Lesca et al., 2006)

1.2.3. Different types of business intelligence:

Business intelligence can be classified into different types, each type is specialized in a certain area of the enterprise's field activity, and according to the most popular and widespread classifications.

1- Competitive Intelligence: According to the (SCIP) CI is an essential moral business discipline and/or abilities to make decision depending on understanding the enterprises competitive environment in order to command the competitive advantage.

There for, a company could be practicing some sort of CI, if it has employees that work on gathering, analyzing and disseminating information about the customers, suppliers, technology, etc.(Calof & Sewdass, 2020)

2- Technological Intelligence:(Jakobiak, 1991) defines it as a process of observing and analyzing the environment followed by diffusion of selected and treated information to be used in making decision.

3- Commercial Intelligence: This type of intelligence is focused on the clients, the market, the company's suppliers and labor, subcontractors and partners. It is also used in the development of products or the product mix (Distribution - price - products - Advertising), and it can be used in the evolution of customer needs over the long term.

4- Societal Intelligence: The environment intelligence is the potential of the environment to give information to individuals in order to solve problems in a more intelligent way (accurate, efficient and/or flexible). This monitoring includes the rest of the field (excluding technology, competition and commercial) of the company. It is often in this capacity to integrate the elements of the political, social, cultural, legal environment... that a company will be able to differentiate itself from competitors. Environmental monitoring concerns various information (statistics, regulations, trends and perspectives) concerning the company's environment (Hermel, 2001).

The following table shows each type of monitoring allows specific needs to be met. Table(1.7) illustrates the four types of monitoring and their axes of surveillance according to the preferred subjects and the strengths of the Porter model(Porter, de Lavergne, & Sudrie, 1982).

Table 1.8 the four types of monitoring according to Porter

Types of Intelligence		Areas of surveillance	
		Favored topics	**Porter's Forces (1982)**
Strategic Intelligence	Technological Intelligence	- Scientific and technological achievements - Information system - Materials, products and processes	Substitute products
	Competitive Intelligence	- Competitor strategy	Direct competitors and potential competitors
		- Clients	Clients and suppliers
	Commercial Intelligence	- Customers and markets - Suppliers and labor	
	Societal Intelligence	- Economic environment - Sociocultural environment -Political and legal environment - Ecological environment - Demographics	

Source: (Porter, 1980b)

So what are exactly the Porter's five forces? And why is it related to Business intelligence?

Porter's contribution to the literature of business strategy:

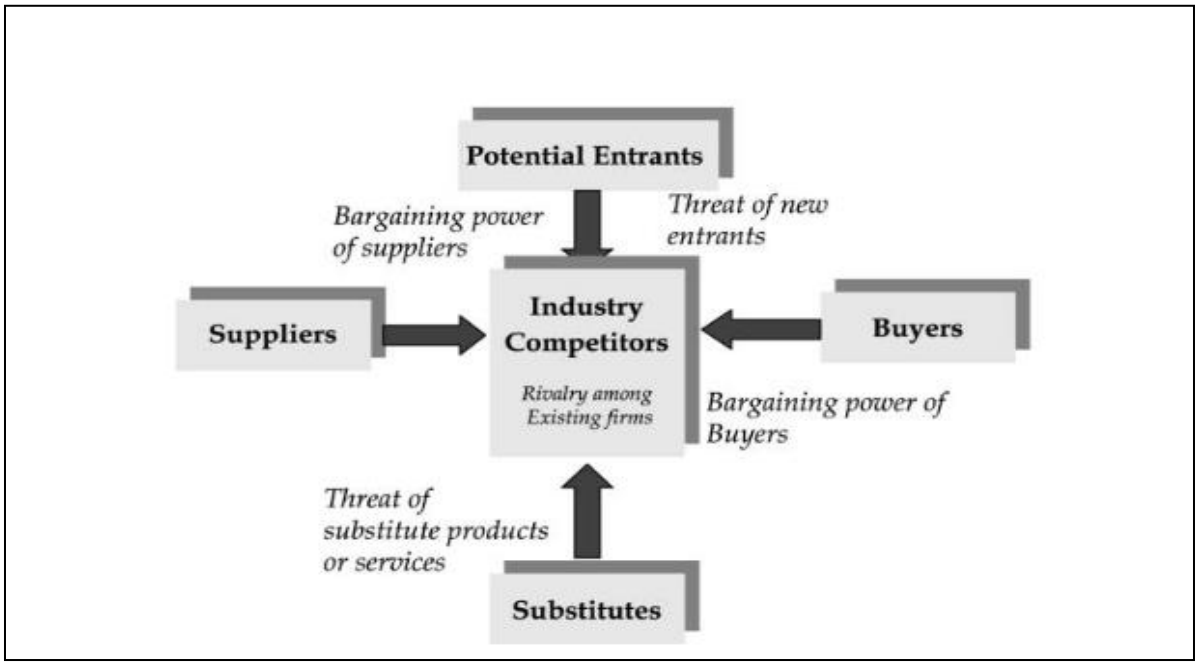
Before Michel Porter's work, many researchers tried to understand the relationships between the structure of the industry and performance, and there for a new sub-field of economics was used, it was known as Industrial Organization IO, but the contribution of this new sub-type in business was limited due to the focus economists had on the public policies rather than the

private policies, and in the other hand the usage of short list of structural variables to explain industry profitability in a way that business strategy was neglected.

Meanwhile, in 1974 Porter had worked on IO to study the structure of industry and business strategy, he wrote a note on the structural analysis of industries, as he attempted to turn IO limited usage by concentrating on commercial policy of maximization of profit on the opposite of the public policy objective of minimizing profit.

Competitive Strategy was his first book that he published in 1980, the book was a success and mostly due to the "Five forces" framework he introduced to link between an industry average profitability of the participants to competitive forces as demonstrated in the following figure (Fig 1.2).

Figure 1.2 Porter's five forces model



Source: (Porter, 1980b)

In the framework for business analysis, Porter expended the supply-demand analysis of individual market to several aspects or forces.

Force 1: the degree of rivalry

The intensity of rivalry helps determine the extent to which the value created by an industry will be dissipated in competition. The most contribution of Porter's "five forces" framework is that it suggested that rivalry is important, but it makes only one of other forces that determine industry attractiveness.

Force 2: the threat of entry

Average industry profitability is influenced by both potential and existing competitors, and the key concept used to analyze the threat of new entrants is the entry barriers. There are many forms of entry barriers such as intrinsic physical or legal obstacles and the most common forms is the scale and the investment required to enter an industry with a strong position.

Force 3: the threat of substitutes

Substitute products are a big threat to an industry's profitability and it's related to price-performance ratios of different products or services to which consumers can turn to satisfy their needs.

Force 4: the buyer power

One of the two horizontal forces is buyer power. It is mostly determined by the size and the concentration of customers, how well are they informed, and the concentration or differentiation of competitors.

Force 5: the supplier power

The analysis of supplier power focuses on the relative size and concentration of suppliers relative to industry participants, and the degree of differentiation in the products and services provided.

Another way of distinguishing types of intelligence relates more to the approach than to the fields of study.(Dupré & Duhard, 1997) distinguished two other types of business intelligence:

Passive Intelligence: Only deals with information already broadcast, most often documentary, this type of monitoring is carried out continuously and without planning.

Active Intelligence: active monitoring which "targets information not yet disseminated" called gray information, most often oral and can only be obtained through the establishment of human networks.

To these two types of monitoring, we can add a third, offensive monitoring. The latter covers both very aggressive processes of information acquisition and techniques of influence and destabilization based on processed information.

Indeed, active monitoring and passive monitoring can complement each other perfectly, in the strategic phase passive monitoring will make it possible to detect weak signals, by alerting managers to market developments such as the emergence of a new product or the arrival of a new competitor. In the operational phase, active monitoring will make it possible to nourish and fuel the information cycle. Active monitoring allows you to react, while passive monitoring allows you to take action and anticipate.

1.2.4. The missions and expected results of the types of Business Intelligence:

In the following table a set of different types of BI, their missions and results expected was set by (N. Lesca et al., 2006).

Table 1.9 Different types of BI, their missions and results expected

Type of Intelligence	Mission of Intelligence	Results
Commercial	Monitor the company's commercial environment (customers, prospects, distribution channels and current but also potential suppliers): news, needs, customer dissatisfaction, prospects, private calls for tenders and public, the financial health of customers and suppliers, supplier news, the release of	- identify new prospects, - develop its products, - optimize purchases (deadlines, prices, etc.), - quickly find a source of supply in the event of a supplier default, - identify customers at risk or who could become so.

	new products, etc.	
Marketing	Monitor the company's current and potential markets: the evolution of its market, its image, consumer behavior, competitors' communication lines, the impact of a communication campaign, etc.	- identify new markets, - Offer new products or services to its customers; - support the launch of a new product or service.
image	Monitor the image and reputation of a company or brand: rumors, discontent, the fallout from a communication campaign, the fallout from press releases, discussion forums, review sites consumers, etc.	- measure the impact of a communication campaign, - measure customer satisfaction, - measure the notoriety of a brand or product.
Competitive	Monitor the company's competitive environment: the behavior, progress, processes and products of direct and indirect, current and potential competitors; the strategy of competitors, their pricing policy, their new products or services, their financial results, their recruitment, their customers, their new contracts, their new suppliers, their press releases or articles, their agreements, partnerships, takeovers, alliances, arrival of new competitors, etc.	- adjust your commercial argument, - implement more effective commercial strategies, - identify the most threatening competitors, - understand the possible emerging strategies of our competitors, their development projects.
Technological Scientifical	Monitor the scientific, technical, technological environment and current and potential economic impacts to deduce threats and opportunities for innovation and development: patent filings, technology transfers, evolution of standards, development technologies, technological breakthroughs, manufacturing processes, fundamental research, scientific articles, theses, scientific reports, etc.	- identify the sectors from which major innovations will come, - identify ideas for incremental innovations, - review the state of the art on a technology or scientific process, - identify the players involved in certain technologies.
Legal Jurisprudence Regulatory Normative Tax Community	Monitor the legal environment of the company: be attentive to the possible consequences of new legislative texts: laws and decrees, case law, parliamentary debates, legislative proposals, employer proposals, taxation, public procurement regulations, etc. on a national, community or global scale.	- anticipate any change linked to the adoption of a legal text, - enter, completely legally, foreign markets subject to specific national rules.
Policy Geopolitics Diplomatic Lobbying	Monitor current and potential changes in power in certain countries with which we have relationships, for example: meetings in embassies, professional groups such as oil lobbying, travel by political leaders, etc.	- anticipate changes in international and socio-economic policy, - make you heard by professional lobbyists.

Societal Socio-Economic Socio-political Sociocultural Environmental	Monitor the socio-economic, socio-political and socio-cultural environment of the company: changes in morals and mentalities, consumer behavior, the environment, risks (disorders, conflicts, etc.), social movements , protest movements, filing of petitions, etc.	- anticipate changes in society, - adapt to changing morals and social phenomena.
Strategic	Monitor the company's overall environment in order to anticipate threats and opportunities: This brings together all the types of monitoring mentioned above.	- help strategic decisions, - seize market opportunities, - measure risks, sense medium and long term developments, - disengage from a declining market.

Source: (Caron-Fasan & Lesca, 2006), p.172. adapted

1.2.5. Economic Intelligence and Business Intelligence:

The concept of «Economic Intelligence» has evolved over time, from the earliest writings, Economic Intelligence was presented as a communication system, a monitoring process, a defensive practice or an offensive one, some presented it as a set of methods and management tools and for others it was a management style. The concept changed over time from «Business Intelligence System» to the current acceptance of «Economic Intelligence»(Briciu, Vrîncianu, & Mihai, 2009).

In 1958, H.P.Luhn evolved the concept of «Business Intelligence System», when he defined the notion of intelligence in a general moral sense, as the" capability to recognize the interconnections of facts in a way as to guide action in the direction of desired goal"(Luhn, 1958) .Another definition by Wilensky was presented in 1967 to the concept of "Organizational Intelligence" as "the gathering, processing, interpreting, and communicating of the information required in decision-making process"(Wilensky, 2015).Over all the period between 1958 and 1967 is qualified by J.Prescott as the period of "emergence of the notion Intelligence and its vocabulary"(Prescott, 1995).For Baumaard, "Economic Intelligence" is not just about the observation, but also an

"offensive" and "defensive" act of information, it aims to associate multiple fields together, so as to better serve tactical and strategic objectives. It is a tool of connection between the knowledge and the action in the firm(Baumard & Dedijer, 1991) .

The Marte Report in 1994 defines Economic Intelligence as a set of coordinated actions of searching, processing and distribution of useful information for economic actors. These actions are carried out legally and protected with the best quality, delay and cost(Martre, Clerc, & Harbulot, 1994). In 1995 Lesca, employed the concept "Competitive Intelligence" or "Strategic Vigil" and described it as an information process which the organization carries out in listening of those weak signals of the firm's economic environment in order to track down opportunities and to reduce risks due to uncertainty (H. Lesca, 1997). According to (Salles, 2003), all the previous definitions indicate that there are four periods in the evolution of the concept Economic Intelligence:

- The first period, goes from 1980 and early 1990s, where the definitions concentrated on the processes, techniques and tools;
- The second period, covers the 1990s, and concentrated primarily on the use of economic intelligence and its objectives;
- The third period, began in the late 1990s, when concepts like co-management and collective learning, and collaborative work emerged;
- The fourth period began in the 2000s adding to the previous notions, the cultural identity, regionalism and economic defense.

Over all there are common elements in all the previous definitions:

1. Economic Intelligence is a moral and legal business practice;
2. It focuses on the firm's external business environment;
3. It is a process of gathering information and transform it into intelligence to serve in decision making;

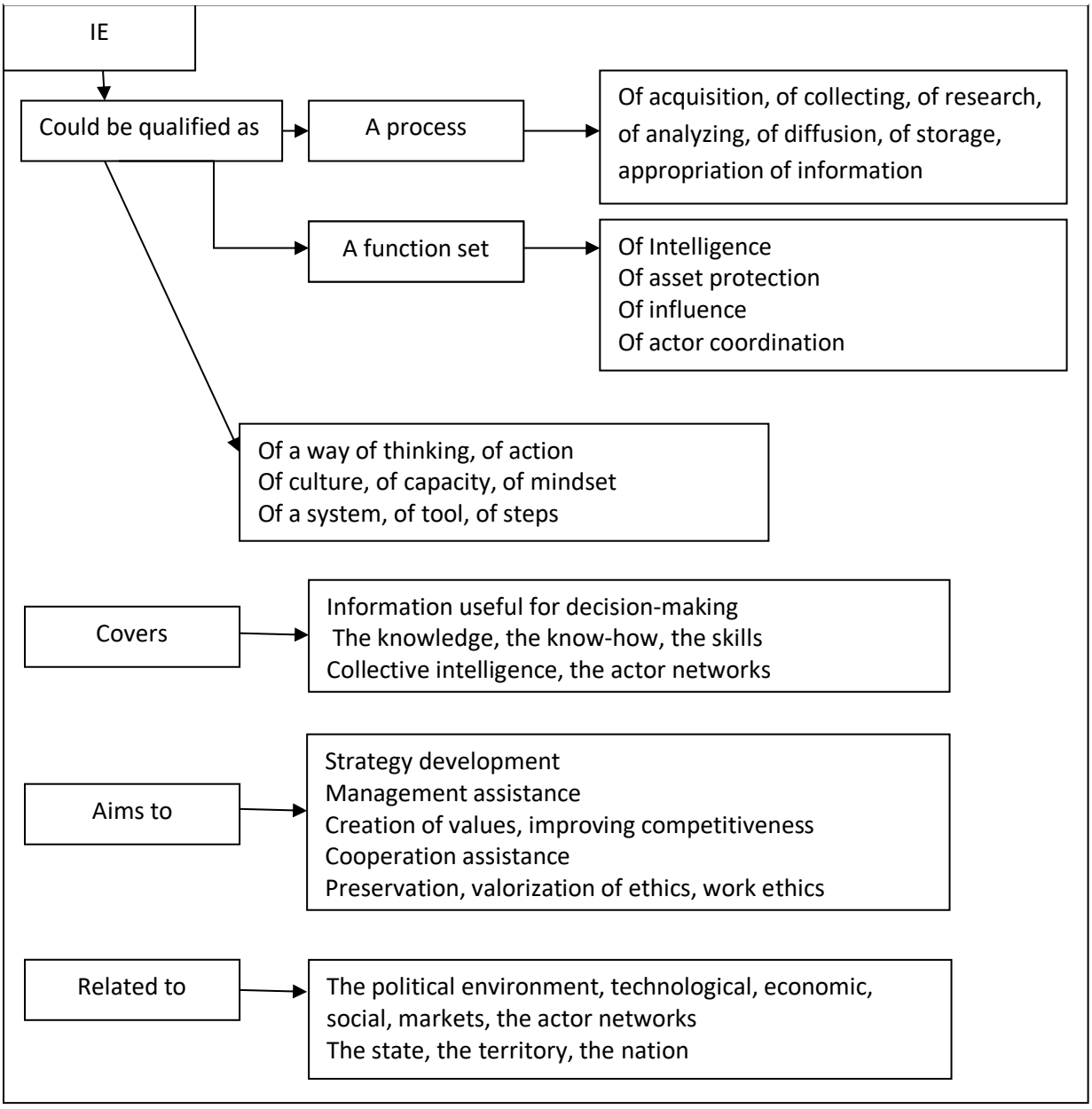
Economic intelligence is defined as the ability to collect, analyzes, develop, disseminate and protect strategic economic information, in order to strengthen

the competitiveness of a State or a company. EI is based on three pillars: strategic intelligence (the search for and analysis of useful information), the protection of tangible and intangible assets, and influence.

We conclude that Business intelligence is the first component of Economic Intelligence (cf. (Salles et al, 2000),(Negash & Gray, 2003), (Afolabi &Thiery, 2005), et (Dhaoui & David,2005) (Salles, 1999),(Negash, 2004),(Afolabi & Thiery, 2005; Dhaoui & David, 2005).

In the following figure, we have compiled the interrelated definitions of economic intelligence and those of EI.

Figure 1.3 definitions of Economic Intelligence and cross definitions of EI



Source (Goria, 2006) p.13.

- **Economic Intelligence and Knowledge Management:**

The evolution of the concept KM started from in the late 1950 according to (Tuomi, 2002/01/01) when this concept emerged on the maps of strategy, it was the next big thing after business process reengineering and total quality management. And with the appearance of the work of (Forrester, 1958) on the theory of growth of Companies, and the next year in 1959 E.T. Penrose

(Penrose, 2009) emphasizes the role of tacit knowledge in decision-making by decision-makers. In 1974 N. Henry (Henry, 1974)proposed for the first time the term "Knowledge Management", and the concept continued to develop over the years. According to KM is described as a systematic process of finding, choosing, organizing, interpreting a presenting information in a way that improves the understanding of employees who are part of a specific center of interest. KM tools help the organization focus on acquiring, storing and using knowledge for activities such as problem solving, internal process improvement, strategic planning (Lebrument, 2012).

Difference between IE and KM:

The combination of effective KM and effective IE amounts to providing the right information, to the right person and at the right time, which means, disseminating appropriate information and/or knowledge within and outside the business, in which the objective and concept, would be to provide meaning for effective decision making. Furthermore, there are fundamental differences between the two processes KM and IE (Rao & Kumar, 2011):

- BI depends on internal and external data sources, data concerning suppliers, employees and customers, etc. however, EI depends on expert employees, communities of interest, practice organization, structured or unstructured market and competition sources.
- BI uses various and very developed technology for operating, like ETL, DW, OLAP, data mining, statistical analysis and dashboards. KM is based on document management, web content management and workflow, e-learning.
- BI is used for processing clear knowledge, and to identify the trends and patterns in structured data to develop new business strategies. In the other hand KM is used to capture, store, organize and distribute organizational knowledge and resources.
- There is a difference between KM and BI, but at in the same time they complement each other in matter of dependences, in fact BI depends on KM to

receive users' feedback and experiences, KM depends on EI techniques to implement the most effective ways and explicit knowledge generated by IE.
Although the integration of EI and KM has many advantages for organizations, several studies showed that the EI system, without due attention to the necessary conditions, is inefficient. If the factors affecting the integration of companies' IE and KM are well identified, better integration strategies can be designed(Rao & Kumar, 2011).

1.2.6. Business Intelligence solutions:

BI solutions provide actionable information in real time in its classification without the constraints of decision-maker location. BI solutions also provide information in the exact form required by multiple stakeholders. The real aim of implementing a BI solution is to increase the speed and contribution of users in the decision-making process. Business Intelligence-based analytics point to core competencies, innovations, applications and repetitions for constant iterative evaluation and review of historical performance data to postulate actionable insights (He, 2014). (BI) solution is software that ingests business data and presents it in user-friendly views such as reports, dashboards, charts and graphs. BI tools enable business users to access different types of data: historical and current, third-party and internal, as well as semi-structured and unstructured data such as social media. Users can analyze this information to better understand business performance. The Business Intelligence (BI) framework builds a data lake or information system (IS) that drives the application that integrates procedure and innovation to drive business improvement with end-customers and key decision-makers (Miah, 2018). It plays a remarkable role in dissecting the business situation and providing key indicators for managers to gain competitive business advantages in order to avoid often uncertain changes within the industrial environment(Burton, Geishecker, Hostmann, Friedman, & Newman, 2006; Howson et al., 2018). The Smart Data Collective ranked BI

solutions according to factors such as real-time data analysis, cost reduction capacity, time savings, business process simplification and productivity.

The main objectives of business intelligence solutions are to enable easy, interactive access to a variety of data, its processing and transformation to create meaningful, valuable information that can help business leaders and analysts make decisions (Turban, Sharda, Aronson, & King, 2008; Wixom, Watson, & Werner, 2011), BI involves a variety of software solutions and technologies, including extract, transform and load (ETL) tools, the data warehouse, OLAP technology, data extraction, reporting applications and an interface that supports user and Web access (Al-Khatib & Al-ghanem, 2021). In the extraction process (ETL), ETL packages extract data from internal and external sources, eliminate data errors, and provide customized data for access and analysis, to be loaded into the data warehouse (Vassiliadis, 2009). The data warehouse is a type of database in which data is collected from different databases in different business units, then organized and validated(Kimball & Ross, 2011). Later, and depending on the OLAP technologies organizations need (which are multidimensional models including relational databases and report writing), data mining will produce business reports on sales, budgeting and even forecasting (Rao & Kumar, 2011). Data mining (DM), which is a fundamental technology that uses a quantitative data analysis tool to identify patterns and rules in data resources and find logical relationships that summarize the data in understandable and useful ways to support organizational business intelligence and management decisions (Al-Qudah, Hamdan, Al-Okaily, & Alhaddad, 2023; Jackson, 2002).

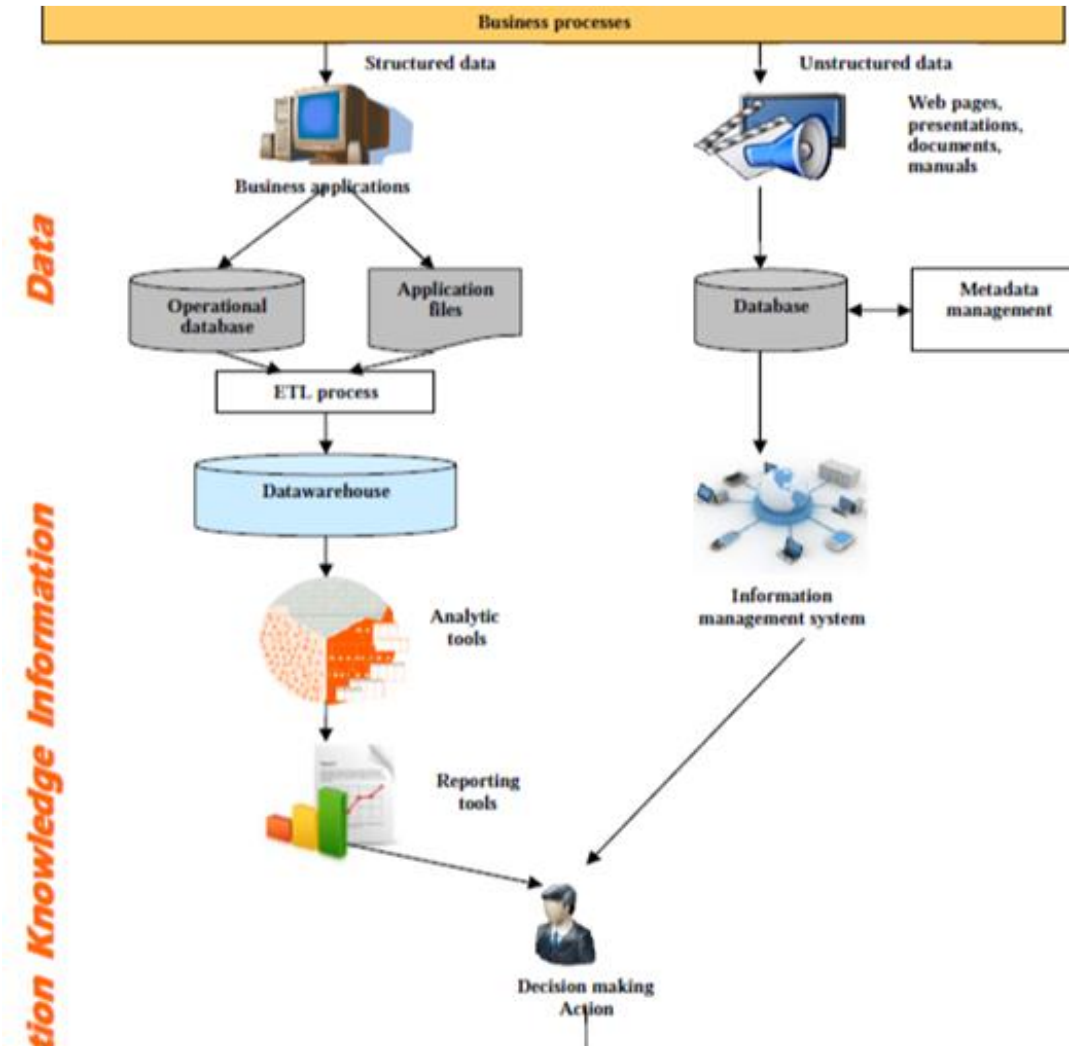
Table 1.10 BI System -making component utilization within the decision process

Business Intelligence System Component	Contribution in Decision-Making
ETL Tools	Used to obtain, adjust and load data from both operational databases and dispersed data sources allowing for the collection of volumes of data (Schink, 2009) (Schink, 2009) . • near real-time information access • uniform data type in which to analyze
Data Warehouses	Used as repository for all data relevant to an organization to support the decision-making process (Matei, 2010) (Matei & Bank, 2010) by: • gathering relevant and context aware data • providing multiple dimensions to data
OLAP Techniques	Used to analyze and report data from huge data sources (Olszak & Ziemba, 2006) (Olszak, Ziemba, & Koohang, 2006) by: • providing user access to data warehouses • creating data models
Data Mining	Used to identify patterns and relationships within a data warehouse

	and creates detailed reports (Hevner & March, 2005) (S. T. March & Hevner, 2007) allowing for: • predictions based on historical data • graphing and calculating to create formulas to analyze data

Source: (Al-Ma'aitah, 2013)

Figure 1.4 BI solution process (Bologa & Bologa, 2011)



Source: (Bologa & Bologa, 2011)

Section three: Innovation

Deriving from the diversity of the main forces between globalization, technology, and demographic factors, the economic environment is changing rapidly. Growth, or at least survival, is inevitable. Companies must respond to innovation and commit to it (Govindarajan & Trimble, 2005).

(Martinez - Costa & Martinz - Lorente,) specify that innovation is considered an essential aspect of the performance of organizations and nations, because the main reason for the importance of innovation is that it allows organizations to react to changes quickly in order to be able to find and discover products and markets. New and also to protect against Unsuitable environment, and within the Resource-Based Framework analysis, innovation is determined as a sustainable competitive advantage as well(Martinez-Costa & Martínez-Lorente, 2008).

(Rowley, et al., 2011) confirms that there is widespread recognition of the increasing importance of innovation for organizations, economies and markets to become more dynamic than ever before. Organizations need innovation in order to respond to changing customer requirements and lifestyles, and in order to take advantage of opportunities Enabled by technology and changing markets, structures and dynamics(Rowley, Baregheh, & Sambrook, 2011). (Zahra and Covin 1994) also suggest that innovation can be considered a lifeline for the survival and growth of organizations(Zahra & Covin, 1994).

Finally, (Bessant et al 2005) add that innovation represents the basic renewal process in any organization. Unless you change what is offered to the world, and the way in which those offers are created and provided, there will be risks that threaten the chances of survival and growth(Bessant, Lamming, Noke, & Phillips, 2005).

1.3.1. Definition of innovation:

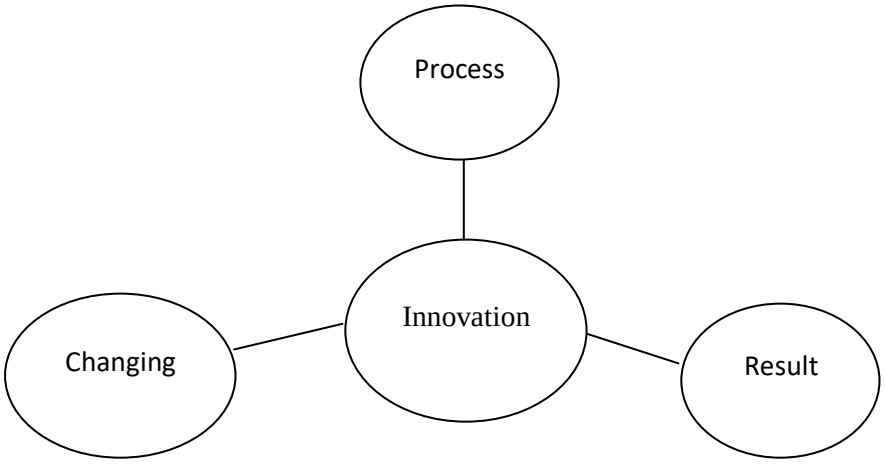
Generally, the concept of «innovation» is complex and multifaceted, and there is no general accepted definition of innovation in science (Siauliai, 1979).

Many authors as (L. A. Rowe & Boise, 1974),(L. A. Rowe & Boise, 1974),(Utterback, 1994),(E. M. Rogers, 1995b),(Utterback & Afuah, 1998),(Fischer, 2001),(Garcia & Calantone, 2002),(McDermott & O'connor, 2002),(Manual, 2004; Pedersen & Dalum, 2004) developed their theoretical models of innovation combining technology and market perspectives. Others suggested that innovation is to generate new idea and implement it into a new product, process or service, in order to increase growth of national economy, increase employment and the creation of new profit(Urabe, Child, & Kagono, 1988).

Innovation is a Latin word derived from Innovare, which means the change and according to (Drucker, 1985: 27) Innovation is an act that gives resources a new capacity to create wealth and economic value. We might say that Schumpeter, is considered as the founder of the theory of innovation(Kogabayev & Maziliauskas, 2017), he defines innovation as an economic impact of technological mutation (Schumpeter, 1982). According to Twiss, innovation is a process extended from the emergence of an idea and its transformation into a product or service, until its commercialization combining technology, economics and management. Innovation main goal is to achieve novelty (Twiss, 1989)(Twiss & Goodridge, 1989).(Afuah, 1998), refers to innovation as a new knowledge integrated in products, process and services(Afuah & Utterback, 1997).

There are three main approaches to the consideration of the term. This classification is presented in the Fig 1.5 below.

Figure 1.6 Approaches to the definition of innovation



Source (Timur, Antanas 2017) : (Kogabayev & Maziliauskas, 2017)

Innovation as a process:

Innovation is defined as the process of bringing about new ideas, methods, products, services, or solutions that have a significant positive impact and value. It involves transforming creative concepts into tangible outcomes that improve efficiency, and effectiveness, or address unmet needs. According to (MacKinnon, 2002) innovation is a process that extends over time, characterized by originality and capacity for verification(MacKinnon, Cumbers, & Chapman, 2002). Torrance, Identifies innovation as a process to identify gaps, imbalances in information, and missing elements (Torrance, 1992).Innovation as a process is directed to solving a problem or achieving a specific goal, and this is done by following a set of processes, such as developing and testing hypotheses, deriving their results and then publishing and exchanging them. We may make adjustments based on the results obtained.

According to Schumpeter (1942), "innovation is a set of changes, unexpected results, and continuous processes, creating the need for systematic innovation of

products, processes, and management practices." He also defines it as the process and result of creating something new.

Innovation as result:

We mean by the result the product, from this standpoint, Rogers (1995) defines innovation as the emergence of a new product stemming from the interaction between the individual and experience(E. M. Rogers, 1995b).

(Pierce and Delbec, 1977) defined innovation as the individual's ability to avoid routine and traditional methods in order to achieve new and uncommon production(Pierce & Delbecq, 1977). Innovation from a production perspective requires the creation of a new production, in order to satisfy an existing or latent need, and is the result of the individual relying on the experience he possesses.

Innovation as changing:

A single innovation may directly affect an entire industry's concept of that product's use by customers, and make a huge change in the habits and the use of that same product, for example the phone invented by Alexander Graham Bell in 1876 was for a long time a tool that allowed communication across great distances, and with the innovation of handheld mobile phone in 1973 the phone industry is continuously changing till now days. In 1999 saw Nokia divulge the 7110, which was the first gadget to exploit WAP. WAP (Wireless Application Protocol) a method for getting data over a mobile wireless network. Now a year later, in 2000, we see the launching of the world's absolute first camera mobile phone, the J-SH04. It was just accessible in Japan yet flagged the beginning of the open's fixation on mobile phone photography. It wasn't until 2002 and the arrival of the Sony Ericsson T68i with a clip-on camera, which grabs the interest of the western markets for a camera phone. Schumpeter declared that "innovation is the process and outcome of creating something new".

Below we will present a set of definitions regarding innovation according to the findings of previous studies in table 1.10.

Table 1.11 a sample of different definitions of Innovation in the existing literature.

Study of	Definition of innovation	Contribution to the literature
Schumpeter(1934)	Creation of new combinations of existing resources	Schumpeter recognized the importance of innovation in the 1930s
the Oslo Manual. OECD(2005)	Implementation of a new or significantly improved product (good/service) or process (method/practice/relationship	International guidelines for proposed definition
Mulgary, G. and Albury, D. (2003)	Innovation is the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes, efficiency, effectiveness or quality	A widening of the definition
National Audit Office (NAO) (2009)	The successful exploitation of new ideas or ones that are adopted from other sectors or organizations'	The UK government's definition of innovation
Confederation of British Industry (2008)	A continuous and dynamic process in which ideas are transformed into value	This definition includes value as a part of innovation
Economic and Social Research Council (ESRC) (2008	The successful introduction of new services, products, processes, business models and ways of working	includes business models and ways of working in the definition
Damanpour, F. and Schneider, M. (2009)	The development (generation) and/or use (adaption) of new ideas or behaviors	This definition includes behaviors as well as ideas
Evers, A., Ewert, B. and Brandsen, T., Eds. (2014)	Innovations are in a significant way new and disruptive towards the	This definition views innovation as affecting the external

	routines and structures prevailing	environment
NESTA (2012)	Innovation is the process by which new ideas turn into practical value in the world	This definition focuses on the practical application of ideas

Source (Taylor and Simon, 2017) adapted by the author (Taylor, 2017)

According to Joseph Schumpeter, innovation occurs when:

- A new good or service is introduced to local market, which consumers are not use to it yet;
- Introduce a new way of production, does not have to be based on a scientifically new discovery, and can also be a new way of treating a product commercially;
- To open a new market in the country that has not been previously entered;
- acquiring of new sources of supply of raw material or semi-finished goods;
- New industry structure such as the creation or destruction of a monopoly position.

1.3.2. Association with innovation:

Innovation is associated with many terms; new product management is linked to innovation because in order to create new and innovative product, teams have to work close together in companies. According to Leenders, R. T., & Dolfsma, W. A. (2016) p128 innovation is a "team sport", "*where individuals work together in teams, teams work together in projects, organizations work together in alliances, and countries work together in international technology agendas*"(Leenders & Dolfsma, 2016).Furthermore, technology is also linked to innovation "*The way in which existing technology is combined in a new product can itself be more or less new*" (Leenders & Dolfsma, 2016).Innovation is also linked with growth, according to (Denicolò & Zanchettin, 2017) persistent growth and the creation of opportunities could be affected by

innovation(Denicolò & Zanchettin, 2017), so in their fight for growth innovation was proved to be one of the best strategies yet deployed by companies. Sardana, 2016 said "*Innovations appears as a key component of growth because it creates new markets space and revenues on the way*"(Sardana, 2016).Innovation is also problem saving, an innovation could be a solution for to a new problem or a new solution for old problem. When you innovate you think outside the box and exploit new resources or use the existent ones in a more effective manner. Huebner &Fitchel, 2015 Declared "*To be problem-solving in nature often leads to innovation and new thinking*"(Huebner & Fichtel, 2015).Finally the most talked about term associated with innovation is creativity, Tienken, 2013 said "*Innovations and creativity is similar in the way of new thinking*" the creative process links creativity and innovation to produce something of value that can be exchanged, developed and exploited commercially. Creativity is defined according to Richard Daft as "*The ability to collect information in a way that leads to the creation of new ideas*"; The Penguin Dictionary of Psychology defines creativity as "*a mental process that leads to solutions, ideas, concepts, artistic and theoretical forms, characterized by uniqueness and modernity*." Creativity is the stage in which new ideas are generated, while innovation is the tangible aspect through implementing the idea and transforming it into a product. As for invention, Robbins & Coutler defines it "*it is aiming to come up with a new idea that is related to technology and has an impact on society".* F.M.Scherer(1967) differentiated between both invention and innovation, where he said that "*invention works on technical effects in generating a new idea, as the tangible variables can be in the form of money or engineers",* while innovation *"achieves an economic impact"* and "*is the allocation of human and material resources for a solution"*(Scherer, 1967).Technical problems and trial and error are the most important elements. The innovation must be marketable, sellable, and reach the final consumer. However, if this condition is not met, it will remain an invention and maintain a patent.

1.3.3. Nature of innovation:

Innovation can occur at several levels. These may be simple improvements, integration of technologies, a change in uses or radical changes.

The Oslo Manual developed by the OECD defines innovation in 4 different areas: product innovations, process innovations, Commercial or marketing innovations and organizational innovations.

Product innovation:

It means the development and commercialization of a new or improved product in order to be more efficient in the services provided to users. Innovation may relate to the concept of the product itself, its technology or its presentation or design. For a product, the novelty or improvement may relate to the technology, or its functional characteristics and use.in other words; you don't have to introduce a new technological element to innovate: combining existing technologies to propose new applications can result in innovation, and even radical innovation. It's important to note that a product is defined as either a good or a service. The economic importance of innovation in services is increasingly recognized (OECD, 2005). Howells and Tether (2004, cited in OECD, 2005) classify them into four groups: goods-related services (transport, logistics, etc.), information-related services, knowledge-based services and personal services (healthcare, etc.). Product innovation is the category best documented in the literature. Its two basic components are invention and market, and innovation is born of the meeting of the two. Invention (of technological or functional characteristics) is insufficient in itself: for it to become an innovation, it must lead to a market, i.e. be commercialized, diffused or integrated into usage. In the early 20th century, Schumpeter (1939) defined innovation as the first commercial use of a product that had never been exploited before. Duchamp (1999) proposes an economic recognition criterion for an invention to

qualify as an innovation "*what validates and justifies innovation is that it sells*"(Duchamp, 1999).

Process innovation:

Process and production innovations concern process improvement manufacturing (Broustail, Frery, 1993). "*Process innovation is aimed more specifically to the very nature of the technological process while production innovation affects the manufacturing operations and their sequence*"(Broustail & Frery, 1993). Process innovation involves the introduction of new methods or significant improvements to existing methods in a company's production and distribution activities. These methods may involve technical, hardware or software resources. Process innovation can also extend to the company's support activities, such as purchasing, accounting, calculation or maintenance.

Organizational innovation:

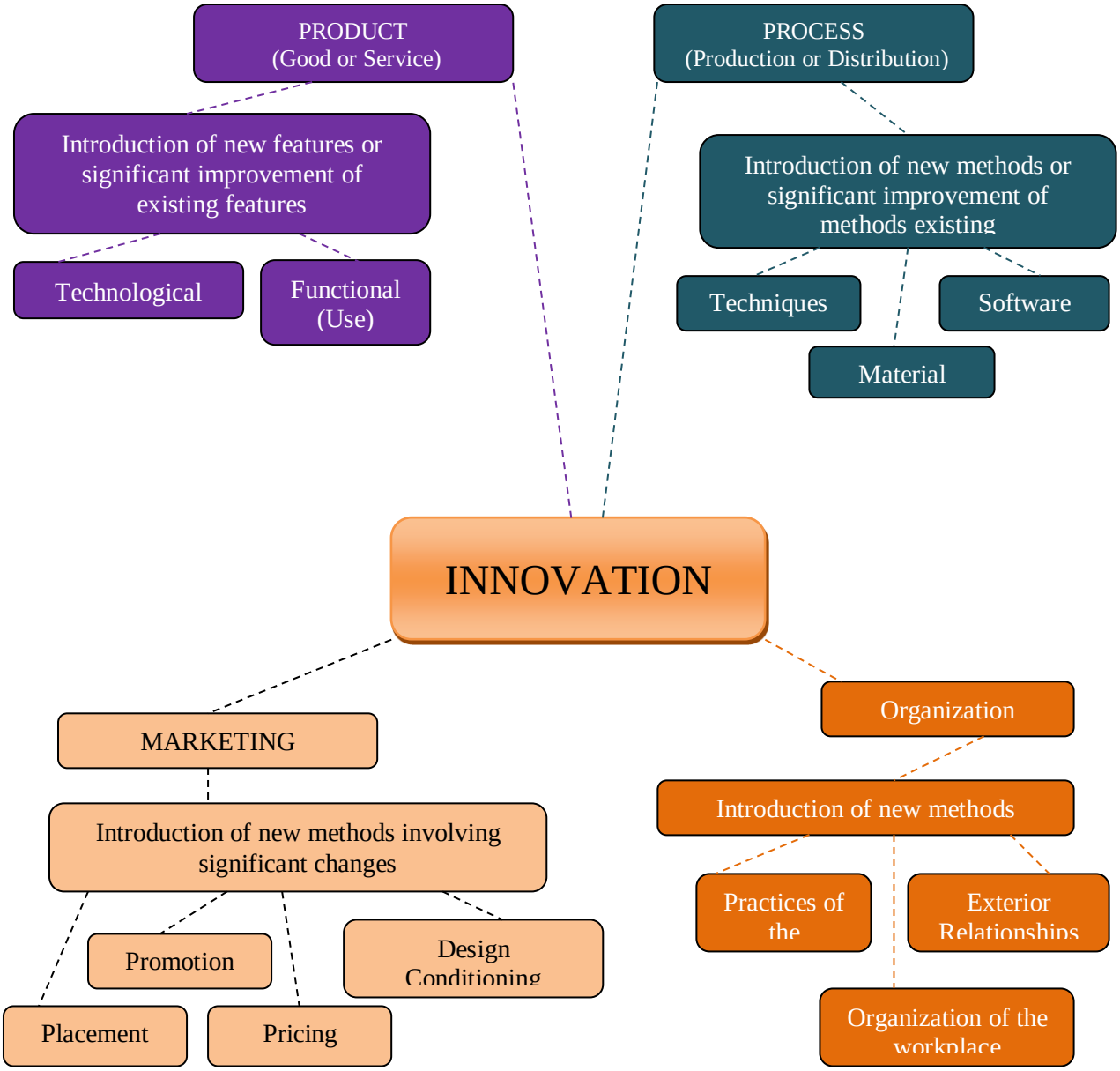
The Companies are regularly forced to rely on new types of organization to respond more effectively to the needs of their markets.it involves rethinking and redesigning the fundamental ways in which an organization creates, delivers, and captures value. It explores new approaches to revenue generation, cost structure, distribution channels, partnerships, customer engagement, or value proposition. Business model innovation can disrupt industries, create new markets, or enable organizations to differentiate themselves from competitors. Organizational innovation is based on a change in business practices, in the organization of the workplace, or in the way external relations are managed. In earlier models of innovation, organizational change was seen as a reaction to technical progress. Today, on the contrary, organizational innovation tends to be seen as a prerequisite for technological innovation (OECD, 2005). The training of employees, the distribution of responsibilities and the structuring of decision-

making, or the integration of partners or customers into company processes are all examples of organizational innovation.

Commercial innovation:

For its part, it aims to create new business methods so that a company can differentiate itself from its competitors with the same product. A marketing innovation is the implementation of a new method that significantly changes product design, packaging, point-of-sale placement, promotion or pricing. For example, a change in the shape or appearance of a product, without altering its technological or functional characteristics, is a marketing innovation. The introduction of online sales in a company that had not previously done so is also a marketing innovation

Figure 1.7 Innovation categories based on definitions in the Oslo Manual (OECD, 2005)



Source: (OECD, 2005)

This division is the one that we find most frequently in the literature but it is important to take into account the fact that innovations are rarely exclusively product, process or organizational but generally combine to varying degrees several of these facets (Durand, Guerra-Vierra, 1996)(Durand & Guerra-Vieira, 1996).

1.3.4. The degrees of innovation:

Innovation is the economic development on the market of a new idea which required the development and/or use of scientific and technical knowledge. The novelty introduced by innovation can be located at the level of this knowledge but also in the way chosen to attempt economic valorization.

This is the reason why it is possible to consider a typology of innovations according to the degree of novelty which is based on two dimensions:

Technological novelty:

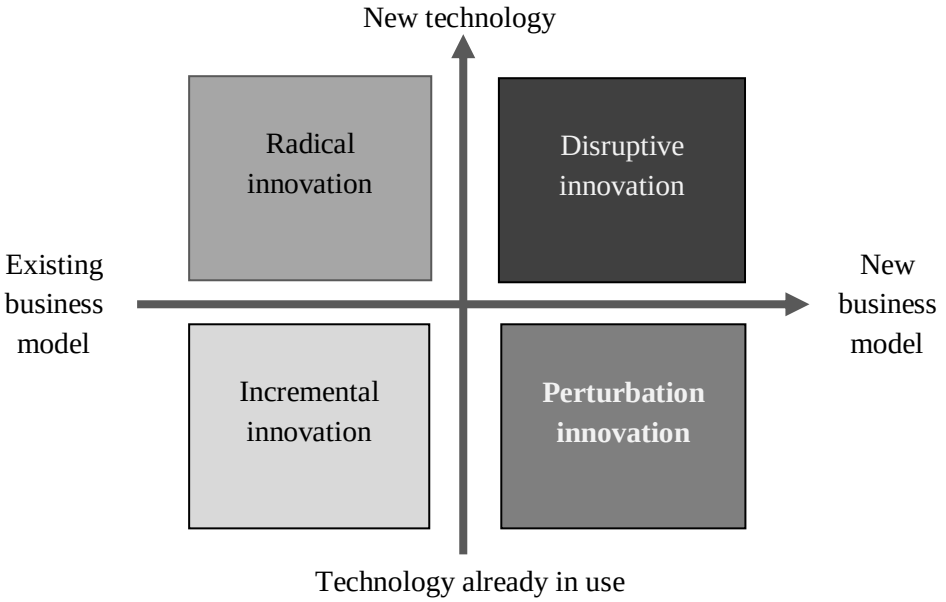
A technology is a complex body of scientific and technical knowledge. It is the mastery of this body of knowledge that enables the design and production of services. In some cases, the company is trying to impose a new technology that it has developed itself or acquired from a partner. In other cases, it may seek to improve technologies already in use.

The business model:

The relationship between the service a company offers, the customers it targets, the way it is organized and the sources of revenue it envisages, constitutes its "business model". Here, too, behind an innovation we may find a business model that has already proved its worth, or one that is radically new. The box below explains exactly what is meant by a business model.

By combining the "technology" and "business model" dimensions, we arrive at four typical types of innovation as demonstrated in the following figure (Fig 1.7):

Figure 1.8 Four types of innovation depending on the intensity of the change caused



Source: (Loilier & Tellier, 2013) p.3

1- Incremental innovation:

(Or progressive) Corresponds to the improvement of a technology already used in the sector without modification of the business model. It consists of developing the product or service without changing its fundamental characteristics. This type of innovation does not seek to disrupt market habits but to offer an improved version of the existing offer. The iPhone since its creation has been a good example of successive advances: format, battery, design, performance, price, etc. This kind of innovation is common; its impact is often modest because it consists of "doing the same thing better". It can nevertheless be very interesting financially and perceived as less risky because it relies on the resources and skills of the company and its expertise. It remains dangerous to focus exclusively on this type of innovation because we run the

risk of being overtaken by a competitor who will take advantage of a new technology to renew offers on the market in question.

2- Radical innovation:

Corresponds to the use of a new technology without changing the business model. Thus, this approach does not respond to an existing problem, but it creates or discovers a new need. The example of radical innovation is the invention of electromagnetic induction cooktops, it offers significant advantages compared to traditional models (gas, electric), particularly in terms of safety (the surface of the plate remains relatively cold) cleaning and efficiency. On the other hand, the business model is generally retained; the cooktops are sold via the same old distribution channels, the customers and the uses are identical.

3- Disruptive innovation:

Corresponds to the use of technologies with a high degree of novelty which is accompanied by a modification of the business model. Major technological changes can indeed enable the development of new business models and make old ones obsolete. This type of innovation always disrupts production methods and existing offerings; it can also induce technical, social and competitive changes. A very well-known example is that of digital photography which developed thanks to the development of photochemical processes which consist of exposing a sensitive film to light then developing it and making its print on paper. Giants like Kodak have developed business models around the sale and development of film. It was then necessary to have a dense network of stores to sell the films, collect them and return them to customers after development, film manufacturing factories, development centers, R&D laboratories to design films that are always more efficient, and key skills in chemistry. With the advent of digital, film disappeared, business in shops, factories and development centers rapidly declined, and chemistry skills were no longer useful.

4- Perturbation innovation:

Consists of a modification of the business model through the use of already existing technologies. This type of innovation can be surprising, and yet we have become aware in recent years that a change in business model does not necessarily imply new technologies. The free daily press provides an example of this type of innovation. The famous post-it provides an example of this type of innovation. After the discovery of glue with low adhesive power which is nevertheless sufficient to stick a piece of paper, a researcher in the R&D department of the company 3M (Minnesota Mining Manufacturing) uses small pieces of paper to mark the pages of his booklet psalms, but as his method did not work because his bookmarks kept falling off, he had the idea of using glue to make a piece of paper that sticks and takes off at will, without leaving a trace.

1.3.5. Different ways to access innovation:

Companies have several possible strategies for innovation, depending on the context in which they operate and their innovation policy.

From an invention:

Exploiting an invention born in a research laboratory is an important route to innovation. Research makes an essential contribution to innovation, as it generates a flow of technological concepts and constantly renews the technical skills.

Based on an idea from another business sector:

A company can innovate by taking an idea from another industry and adapting it for use in its own production processes or market.

From the search for new markets:

The search for new, unexploited markets is one of the ways in which innovation can generate particularly substantial income. Innovation can also involve introducing a novel approach to a business in order to create new markets, such as internet commerce.

From cooperation agreements with other companies:

Coopetition in the semiconductor industry, alliances and partnerships represent a privileged mode of access to innovation. These cooperative agreements enable the sharing of resources and risks, as well as potential access to new markets.

From license:

Acquiring a license from an innovator gives a company access to patent-protected technology. This approach has the advantage of being fast, inexpensive (depending on the duration of the license and the royalties charged) and, above all, low-risk.

Through external growth:

This involves acquiring an innovative company. External growth by acquisition or shareholding is certainly the quickest approach, but the risks of integration can sometimes be high.

1.3.6. The Benefits of Innovation in Business:

Effectiveness, novelty, and automation are some of the main characteristics of innovation. These unique characteristics help in evoking several benefits for businesses, which we have enlisted below;

1. Solves complex business problems:

Knowing the answer to what product management life cycle is cannot help managers or executives solve complex business problems. Moreover, the uncertainties and complex business situations can make things worse for them. Therefore, to judiciously and effectively solve complex business problems, it is imperative to use innovative ideas. Leaders must use external (online data, literary works, etc.) and internal sources to develop innovative ideas to solve complex business problems.

2. Increases productivity:

One of the benefits of innovation in business is the increase in productivity of individuals, processes, and business models, among others. Simply put, innovation presents new ideas to business leaders to increase efficiency with minimum resources. Furthermore, reducing business and other risks.

3. Brings uniqueness and novelty to business process:

Business processes have been the same for more than a few decades. However, with the introduction of innovation in business, there has been a disruption that is believed to be caused due to novelty, creativity, and uniqueness. That is also helping in making the business stand out from the rest and vicariously contributing to increased revenue and market share.

4. Gives a competitive advantage:

Thinking innovatively or creatively can help managers and executives develop unique marketing campaigns to help them stand out. Also, formulate promotional and advertising strategies that will help in increasing market share and revenue, giving the company a competitive advantage.

5. Reduces cost and increases revenue:

As mentioned above, one of the biggest advantages of innovation is that it helps increase revenue and market shares. Subsequently, leading to a reduction in cost.

6. A possible monopoly advantage:

When it comes to a product innovation protected by a patent, the company can claim to have an operating monopoly for the duration of the patent, namely 20 years with possible renewal, if the annuities are paid. With this dominant position, the firm is able to set prices higher than those that would be possible in a competitive market and therefore benefits from a rent.

7. Creating value:

The multiplication of R&D services proves it, innovating means first of all demonstrating to its customers and its shareholders that the company is proactive and that it is ahead of the competition by creating value through innovation.

8. Succeed in exports:

Innovation is essential to stand out in exports. It provides flexibility to adapt to new markets, cultural differences and new needs. Innovating therefore means being attentive to export demands, adapting and thus increasing your export capacity through an offering of innovative products.

9. Anticipate:

Innovating means taking the initiative to offer your customers a new, well-designed product without waiting for the customer to express a request that is sometimes imprecise or poorly defined. Anticipating means offering a viable product to customers, taking into account their needs but also all the

technological, production, cost and after-sales service requirements linked to it, a parameter that will not necessarily have been integrated by the customer at the start. Anticipating therefore accelerates the innovation process. A parameter that will not necessarily have been integrated by the customer at the start. Anticipating therefore accelerates the innovation process.

10. Mobilize your employees:

The commitment to innovate allows you to keep your employees mobilized by keeping their motivation high, by offering them training opportunities. For employees, being able to bring new ideas, participate in the innovation process, be part of an innovative company, recognized by the competition and customers, reinforces the factors of interest and slows down mobility(Darchen & Tremblay, 2008).

1.3.7. Factors facilitating or hindering innovation:

There are several factors that facilitate innovation but there are also others that slow it down, this is noted for the entire process, and depending on the situation and the way in which companies implement it, several Factors that are considered to be levers of innovation can easily become obstacles and vice versa. Among the levers of innovation, according to the OECD, we can cite the following(Co-operation & Development, 1997):

A. Information: several internal or external sources of information are used, according to several OECD surveys judging that the list presented below are relevant sources;

- Internal sources within the company or group:
  - Internal R&D activities
  - Marketing
  - Production

  - Other internal sources.
- External sources/commercial sources:
  - Competitors
  - Acquisition of incorporated technology
  - Acquisition of unincorporated technology
  - Clients
  - Consulting companies
  - Suppliers of equipment, materials, components and software.

B. research institutions:

- Higher education institutions
- Public research institutes
- Private research institutes.

C. Generally accessible information:

- Patent publications
- Conferences, meetings and professional journals
- Fairs and exhibitions.

On the other hand and according to the OECD survey (Courlet, Pecqueur, & Soulage, 1993) finds that several elements are considered relevant in blocking innovation activity:

A. Economic factors:

- Risks perceived as excessive
- Costs too high
- Lack of appropriate sources of financing
- Excessive length of return time for investment in innovation.

B. Firm-specific factors:

- Insufficient innovation potential (R&D, design studies, etc.)
- Lack of qualified personnel

- Lack of information about technology
- Lack of information on the markets
- Difficult-to-control innovation spending
- Resistance to changes in the firm
- Insufficient availability of external services
- Lack of possibilities for cooperation.

C. Other reasons:

- Lack of technological possibilities
- Lack of adequate infrastructure
- No need to innovate because of previous innovations
- Weak protection of property rights
- Legislation, norms, regulations, standards, taxation
- Lack of customer interest in new products and processes.
-

Organizational characteristics and environmental factors influencing the adoption of innovation practices:

Innovation can be so hard to adopt in SMEs due to many characteristics, here we establish some of the main factors influencing the adoption of innovation practices, divided to structural determinants; Inter-organizational and environmental determinants.

Structural determinants:

One of the main characteristics is undoubtedly the small size of the SMEs which can be both strength and a weakness factor .Indeed, the limitations of SMEs are generally linked to insufficient human, financial and IT resources. To meet these challenges, SMEs are turning to open innovation models and collaborate with other companies, especially larger ones with more resources to develop their projects, making them more attractive In particular, SMEs may find it difficult

to finance innovation .The relatively small number of employees gives the SME an informal character favoring the adjustment of processes and a rapid reaction to change. This ability to adapt is an advantage for accelerating the innovation process, particularly with regard to absorptive capacity (defined as the ability to detect value, assimilate and apply new knowledge), the high absorptive capacity of SMEs significantly increases their innovation capacity (Presenza et al., 2016).

And the proportion of employees there has a positive and significant correlation with SME performance. SMEs are generally less bureaucratic and more flexible in decision-making than large companies. The decision-making process is usually centralized at the manager level that is responsible for many aspects of the business and most decisions relating to the management system.

In most cases, the lack of time devoted to strategic decision-making leads the manager to maintain a short-term vision of his company's strategy. This lack of time can be accentuated by administrative burdens linked to collaborations or Grants (Van de Vrande et al., 2009; Yoon et al., 2016), or to time-consuming daily tasks that are nevertheless necessary to ensure sustainability. of the company (Igartua, Garrigos, & Hervas-Oliver, 2010; Knudsen & Mortensen, 2011; Savitskaya et al., 2010; Van de Vrande et al., 2009; Verbano et al., 2015).

Ideas being one of the main sources of innovation (Boly, Morel, & Renaud, 2003) and the potential for innovation being an essential element in this approach, SMEs generally rely on their own initiatives when looking for new methods of innovation, and are sometimes faced with a loss of know-how.
Intelligence plays a significant role in an approach of innovation, since it makes it possible to identify the knowledge to be assimilated and the potential partnerships to be achieved.

Table 1.12 Structural determinants linked to the adoption of innovation in SMEs

Determinants	Definition	References
Size of the company	Number of employees in the company	(Van de Vrande et al., 2009; van Hemert et al., 2013;Vanhaverbeke, 2017; Verbano et al., 2015; Vrgovic et al., 2012; Wynarczyk et al., 2013)
Level of innovation	Quantity of innovations offered to the market	(Pustovrh et al., 2017; Stanisławski & Lisowska,2015; van Hemert et al., 2013; Xiaobao et al., 2013)
Funding	Number of approaches used to finance innovation projects	(Dahlander & Gann, 2010; Gellynck & Kühne,2010; Sağ et al., 2016; Van de Vrande et al., 2009; Xiaobao et al., 2013
Integration of knowledge	Integration of external knowledge into internal knowledge capital	(Parida et al., 2012; Sağ et al., 2016; Spithoven et al., 2011; Suh & Kim, 2012; Tomlinson & Fai, 2013; Van de Vrande et al., 2009; West & Gallagher, 2006; Xiaobao et al., 2013; Zhang & Chen, 2014)
Intelligence	Presence of monitoring activities allowing strategic information to be collected to anticipate developments and innovations	(Bigliardi & Galati, 2016; Chesbrough & Crowther, 2006; Dodgson et al., 2006; F. Huang & Rice, 2009; Sağ et al., 2016)
Internal R&D	R&D activities carried out internally to increase knowledge for new applications	(Marangos & Warren, 2017; Narula, 2004; Van de Vrande et al., 2009; van Hemert et al., 2013; Weil et al., 2010; West & Gallagher, 2006; Yoon et al., 2016; Zeng et al., 2010)
Operational expertise	Presence of technical expertise	(Bianchi et al., 2010; Henttonen & Lehtimäki, 2017; Rahman & Ramos, 2010)
Lack of resources	Lack of human, financial or material resources to carry out activities	(Bianchi et al., 2010; Bigliardi & Galati, 2016, 2018; Gassmann, 2006)
Loss of know-how	Leakage of skills due to the departure of an employee or the outsourcing of an	(Bigliardi & Galati, 2016; Enkel et al., 2009, 2005; S. Lee et al., 2010)

	activity	
Managerial complexity	Complex link between governance, production and marketing	(Bianchi et al., 2011; Bigliardi & Galati, 2016; Chesbrough & Crowther, 2006; Chiaroni et al., 2010; Dodgson et al., 2006)
Administrative burdens	Complex or difficult procedures linked to innovation processes (funding request, etc.)	(Bigliardi & Galati, 2016; Van de Vrande et al., 2009; Yoon et al., 2016)
Time-consuming daily tasks	Frequent activities requiring significant time (validation request, reporting, administrative tasks, etc.)	(Bigliardi & Galati, 2016; Enkel et al., 2009; Igartua et al., 2010; Knudsen & Mortensen, 2011)
Employee involvement	Involvement of employees in the innovation process	(Chesbrough, 2006b; Chesbrough & Crowther, 2006; Manzini et al., 2017)

Source: (Pillon, 2021) P104,105

Extra-organizational determinants:

This proximity is also revealed at the user level, since SMEs seek to integrate users to improve their innovation process. However, too much dependence on the customer reduces the company's performance in terms of innovation.

Table 1.13 Extra-organizational characteristics linked to the adoption of innovation in SMEs

Determinants	Definition	References
Customer dependency	Sales generated mainly by a single customer	(Bigliardi & Galati, 2016; Elmquist et al., 2009; Enkel et al.,2005; Van de Vrande et al., 2009; Verbano et al., 2015)
Proximity to the user	Proximity to end users	(Bogers et al., 2017; Christensen et al., 2005; Gassmann,2006; Gassmann et al., 2010)
Integration of external actors	Integrating ideas from outside the company into the innovation process	(Ahn et al., 2015; Bianchi et al., 2011; Bigliardi & Galati, 2018; Bjerke & Johansson, 2015; Bogers et al., 2018)

Source: (Pillon, 2021) P107

Environmental determinants:

In this sense, the geographical territory and its governance play a significant role in SMEs' open innovation approaches (Oughton et al., 2013). The relationship between the company and its immediate environment structures the industrial cooperation processes that enable the creation of new resources. For example, when it comes to acquiring new knowledge, high-tech companies are more likely to involve users in the innovation process, while also collaborating with other entities. Companies in the textile and food sectors, on the other hand, are rather reluctant to collaborate with other structures, and would only appeal to consumers. As another example, sectors where knowledge seems to be difficult to access, such as machine-tool manufacturers, would carry out more activity related to intellectual property (licensing-in and licensing-out) and knowledge acquisition (Bigliardi & Galati, 2016).

Table 1.14 Environmental characteristics related to the adoption of innovation in SMEs

Determinants	Definition	References
Activity sector	Main activity	(Andries & Faems, 2013; Bianchi et al., 2011; Brunswicker &Vanhaverbeke, 2011)
Territorial proximity	Common issues between the company and the territory	(Bjerke & Johansson, 2015; Idrissia et al., 2012)
Dissemination of knowledge	Environment where knowledge is easily accessible	(Bogers et al., 2018)
Territorial context	Territory governance system	(Brunswicker & Vanhaverbeke, 2011; Hossain & Kauranen, 2016)

Source: (Pillon, 2021) P109 adapted

Section four: Business intelligence and innovation: two related concepts

Business Intelligence, also called business analytics, provides tools and techniques to turn large, disparate datasets into useful information. These tools use various data points from the organization to uncover insights and assist in making evidence-based decisions. When executed properly, it helps decision makers run a data-driven enterprise. This way it ensures everyone uses the same data and insights. By leveraging BI, businesses can identify trends, Optimize operations, Enhance customer experiences, Mitigate risks, and finally drive innovation.

1.4.1. Relation between Business Intelligence and innovation:

(Caron-Fasan, 2008) Affirmed that the companies that are most successful in introducing new products to their markets are those that have a monitoring activity that is neither focused nor narrow but which, on the contrary, constantly modifies and adapts to the environment. They are also those that use external sources of information and have a high frequency of monitoring of competitors and consumers of their sector.

BI and innovation dynamics are interconnected concepts that significantly shape the modern business landscape. Innovation is the processes through which organizations collaborate with external partners (customers, suppliers, and competitors), to develop and implement innovative solutions (Bertello et al., 2023; Yun et al., 2020). The relationship between BI and innovation is mutually beneficial, as they can enhance each other's effectiveness and impact. Especially, BI provides organizations with valuable insights derived from data analysis. By leveraging BI tools and techniques, companies can comprehensively understand market trends, customer preferences, and emerging opportunities (Hassani and Al Halbusi, 2023). These insights can guide the innovation process by identifying areas where external collaboration is most likely to yield innovative solutions. Through BI, organizations can identify

potential partners, analyze their capabilities, and assess the feasibility of innovation initiatives. On the other hand, open innovation relies on accessing and integrating external knowledge into an organization's innovation processes (El Maalouf and Bahemia, 2023; Chaurasia et al., 2020).Moreover, BI allows organizations to measure the outcomes and impact of open innovation initiatives (Mortezaei et al., 2022). By collecting and analyzing data on the performance of collaborative projects, organizations can evaluate the effectiveness of their open innovation strategies. BI can provide insights into the success metrics, such as return on investment (ROI), time-to-market, or customer satisfaction. These insights help organizations optimize their open innovation efforts, identify best practices, and make data-driven adjustments(Hmoud, Al-Adwan, Horani, Yaseen, & Al Zoubi, 2023). Continuous monitoring therefore goes hand in hand to stimulate creativity in a learning organization context. Thus, strategic monitoring provides information that has been synthesized, analyzed, evaluated and contextualized, and which is useful for action. It allows us to move from information to intelligence, and to develop an organization's creativity, innovation and desire for change.

In general, it is possible to distinguish two stages in the innovation process of a company: creation (invention, new organization, etc.) and appropriation of the innovation both by the innovators and by future users. .Each of these milestones has a different approach to information management.

Intelligence and creation phase:

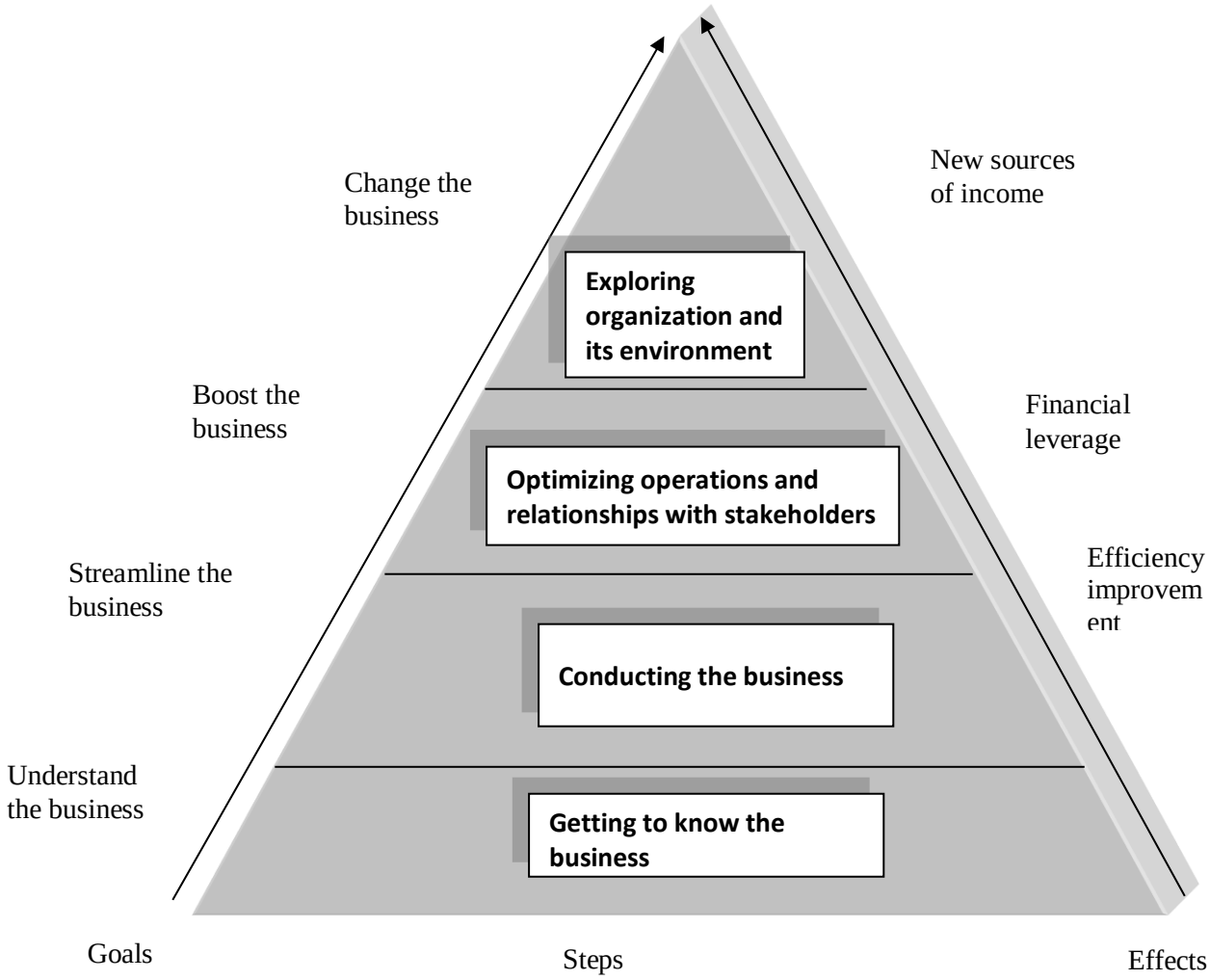
In the creation phase, it is fundamental to capture as much relevant information as possible in order to optimize innovation.Firm performance is enhanced when there are synergies among the elements of a system. Complementary factors of a system of mutually enhancing elements operate in such a way that doing more of one thing increases the returns of doing more of another (Huang and Liu2005). (Dibrell, Davis, & Craig, 2008) Found in their study that product and process innovations exhibited strong linkages with IT; IT mediated the

innovation to firm performance direct relationship; and was positively related to performance. Based on these findings, managers should be more willing to invest in IT; however, managers must also be cognizant of the necessity to create systems and processes that most effectively optimize IT usage.

Strategic monitoring refers to the search for information and its analysis based on constant vigilance and permanent monitoring of the environment of the company in which it is deployed. In this ocean of information, it therefore becomes very difficult, without adequate organization, to find and sort relevant information, a source of innovation. In order to collect this information and seize opportunities for innovation, the company has every interest in adopting a strategic monitoring approach, that is to say both technological and competitive.

Many authors are of the opinion that BI represents a new generation of decision support systems aimed at transforming specific data into information and knowledge. Their goal is to increase the efficiency of decision making at all levels of management, improve business processes, relations with stakeholders, and achieve organizational success as shown in the next figure (Olszak, 2022) :

Figure 1.9 Business Intelligence in reinforcing organization's management.



Source (Olszak, 2022) p, 1757

Whatever the sector of activity, innovation constitutes the key to the sustainability and development of a company in a globalized market, where the competitiveness of all players is particularly keen. Stimulating innovation requires a marketing, technological and regulatory monitoring approach. This monitoring will make it possible to answer critical questions for the manager:

- What are the emerging market expectations?
- What are the emerging technologies in our sector?
- What technologies used in other areas or sectors can advantageously replace our current technologies?

- What technologies could be the basis of new products, new packaging, new calves manufacturing process or distribution?
- What impact could emerging technologies have on our competitors or on the arrival of new entrants?
- What technological, commercial and regulations concern our products and services?
- Which companies master the key technologies identified for possible partnerships or acquisitions?

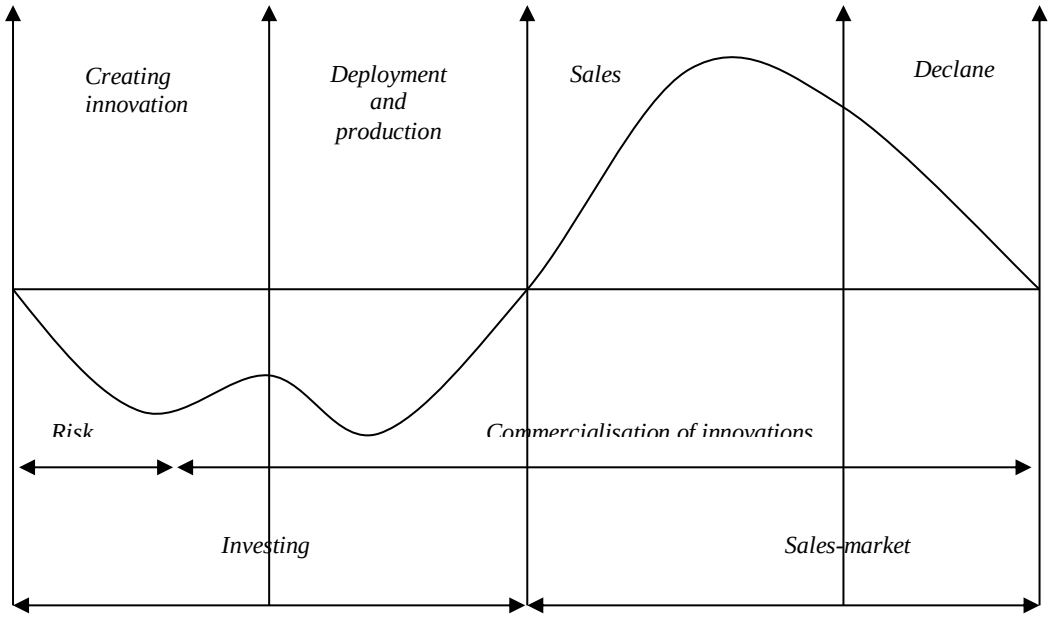
The innovator is in a state of mind of constructive dissatisfaction: he is never satisfied with the best he has obtained; he is constantly on the lookout for what will allow him to go even further in satisfying customers or market expectations. If he doesn't do it, his competitors will. When it comes to innovation, there are never acquired situations. The most aggressive industrial property policies can do nothing, in the long term, against the pressure for innovation. The role of Business Intelligence is therefore at the forefront of this approach, to enlighten decision-makers who must take care not to clumsily disclose their own competitive advantages.

1.4.2. Business Intelligence and life cycle of innovation product:

The life cycle of innovation product (Fig 1.9) consists of a development cycle (investment) and a market cycle (sales). The market cycle covers product entry time, growth, maturity and declining sale. The life cycle stages of the innovative product and its characteristics are different. For individual companies, they may vary depending on the company's specific goals, resources and competitive environment(Dimitrov, Purgic, Tomov, & Todorova, 2018; Tomov, 2017). At any given time, companies must maintain a dynamic balance between opportunities and reality, to take the production of old products in a timely manner, to maintain the maximum volume of manufacturing of those products that provide high efficiency and to carry out the necessary research and

engineering developments for the creation and introduction of new products in manufacturing.

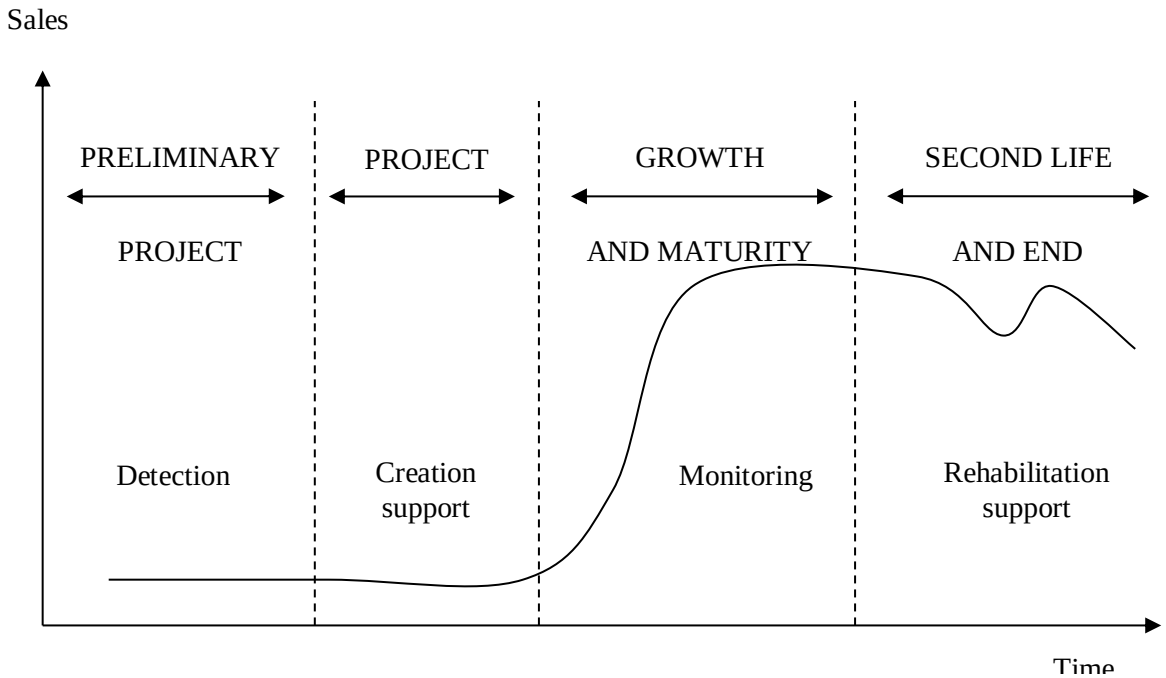
Figure 1.10 Life cycle of innovational product



Souce:(Damianov, 2019)

In his study (Galland, 2005), explained the role of Business Intelligence at each stage of the product innovation's life cycle (Fig 1.10), when Business Intelligence takes place during the four phases of the innovation's life. First of all, the Intelligence process will have the role of detecting opportunities and supporting the maturation phase of ideas. Then, its mission will be to support the birth of the product, from the prototyping stage to industrialization. Once the product is marketed, Intelligence will place its action in observing the competitive environment. Finally, when sales enter a decline phase, the Intelligence process will intervene to support the transformation of the product so that it can continue to be marketed in a new form and without too significant additional investment.

Figure 1.11 Business Intelligence and life cycle of innovation product



Source:(Galland, 2005), p.107, adapted

Furthermore, (Galland, 2005) established a classification of different sources of information used in the each of the Intelligence phases as demonstrated in the following table (table1.14) , it is to note that: (1) Information consisting of websites, publications scientists, patents, etc. (2) Information consisting of market studies, reverse-engineering, etc.

Table 1.15 Sources of information for innovation.

Information sources	Detection	Support creation	Monitoring	Support rehabilitation
Internal R&D	✓	✓		✓
Internal Marketing	✓	✓	✓	✓
Competitors (1)	✓	✓	✓	✓
Customers (1)	✓	✓	✓	✓
Suppliers (1)		✓		✓
Universities / Research Institutes (1)	✓	✓		✓
Consulting companies (2)	✓	✓	✓	✓
Journalistic	✓	✓	✓	✓

Source: (Galland, 2005), P 108, adapted.

1.4.3. Business Intelligence practices in an innovation context:

Companies do not do “Intelligence” but specific types of intelligence oriented towards competitors, customers, technology…etc. In their study(Fasquelle & Caron-Fasan, 2018a) found that competitive type intelligence, normative, market and marketing are carried out respectively to monitor competitors in their innovation projects, anticipate new standards, explore new markets sometimes completely at odds with what is already done and understand the needs of consumers and future trends.in another hand it was found that crowdfunding intelligence is strongly linked to innovation and very specific, this type of intelligence is either attached to an Open Innovation type innovation process; either is very linked to the creativity phase of an innovation process. Finally, in a more marginal way, companies practice intelligence oriented towards uses. This type of intelligence, very marginal around ten years ago (Caron-Fasan, 2008) has developed and continues to develop with the arrival of new innovation methods such as design thinking. This type of method requires in its first phase a thorough understanding of the actors and their contexts. Thus, this requires an important phase of collecting information focused on the uses, experiences and feelings of individuals (consumers and citizens), all this is detailed in the following table

Table 1.16 Intelligence mobilized to fuel the innovation process

Intelligence type	Missions linked to innovation
Competitive Intelligence	Identify what a competitor is working on and decide whether or not to counter it with a more effective and differentiating innovation. The company may want to be the first on the market. It may also anticipate the launch of a competing innovation similar to the one it is developing and decide to launch its innovation quickly behind its competitor's to take advantage of the halo effect. Monitor the launch of an innovation and evaluate its market uptake in relation to competing innovations. Identify potential competitors from other markets.

Intelligence crowdfunding	Identify a potential partner. Stimulate creativity by monitoring trends. Help prepare a creativity session.
Normative Intelligence	Anticipate tomorrow's standards to offer products in line with future normative regulations.
Market Intelligence	Explore your market and related markets to develop new ideas. Identify future partners. Market intelligence can help the company to identify a non-competitive market with which it is not yet familiar. Intelligence will therefore provide knowledge about the new market and potentially associated consumers.
Technological and scientific Intelligence	Detect a new technology, assess its degree of maturity and feasibility, and decide whether or not to launch an innovation project. Find a technological solution to a problem: remove a technological lock. Identify technologies mastered by competitors. Detect new techniques and methods associated with the company's businesses and sector of activity.
Marketing Intelligence	Understand consumers and their relationship with products, understand their expectations, obstacles and the way they use a product, so we can propose the product of tomorrow. Anticipating trends by observing early adopters. Teenagers are often the forerunners of what will be used tomorrow.
Intelligence usage	Anticipate future uses. Feed the "observation" phase of Design Thinking. The aim is to feed the Design Thinking innovation process with field observations.

Source: (Fasquelle & Caron-Fasan, 2018b).P 13,14. Adapted

It is to note that another type of intelligence stands out, patent-oriented Intelligence : Even if many companies still perceive patents solely in terms of protecting inventions (thereby neglecting their informative aspect), they are the primary medium in which new technological and scientific information is published. Patents are a powerful stimulus to the search for innovative solutions. Because they often record technological innovation before any other communication medium, patents are potentially a formidable tool for

intelligence and innovation. Patent information becomes accessible to all. With the advent of Web 2.0, where interfaces enable Internet users to interact both with the content of pages and with each other, patent information is becoming increasingly available and easy to use. Patent office's generally offer the possibility of searching for patent information on the Internet, making it possible to obtain patent information anywhere and at any time(Mbongui-Kialo, 2013).

Section five: Absorptive Capacity:

The literature shows that there is a link between absorptive capacity and innovation. Indeed, absorptive capacity contributes to improving innovative capacity (Cohen & Levinthal, 1990) and innovation performance within the firm (Andreeva & Kianto, 2011); (Bayarçelik, Taşel, & Apak, 2014); (Lichtenthaler, 2016).

Other studies pointed out that absorptive capacity has been viewed as moderator of many factors of innovation performance (Bellamy, Ghosh, & Hora, 2014; Moilanen, Østbye, & Woll, 2014) reported that absorptive capacity has a positive influence when used to moderate the relationship between Competitive intelligence and innovation.

Absorptive capacity enables firms to acquire and identify information and knowledge, encouraging the creation of new information which affects entrepreneurial success and encouraging the renewal of products or their key technologies to a more efficient level to manage both the employees and the process of stimulating creativity (Feng, Zhang, Liu, Zhang, & Han, 2018); (Agostini, Nosella, & Filippini, 2017). (Zhang & Wang, 2017)pointed out, inclusion of mediators variable and/or boundary conditions via mediators in theory development and validating have been noted as an important way to move research forward and make substantial theoretical contributions. In the

context of Business Intelligence and innovation, absorptive capacity can play an important role in affecting success of the innovation, growing number of studies have shown that AC could play a significant role in enhancing innovation (Najafi Tavani, Sharifi, & S. Ismail, 2013); (Aljanabi, 2018); (Tseng, Chang Pai, & Hung, 2011).

1.5.1. Definition of absorptive capacity:

Absorptive capacity was first developed in microeconomics. It referred to an economy's capacity to use and absorb external information and resources (Adler, 1965). The importance of absorption capacity has been growing ever since (Cohen & Levinthal, 1990);The capability to realize the quality of external knowledge followed by the assimilation, translation, and application of that knowledge for commercial requirements is called absorptive capacity (AC)(Abualoush, 2022; Otair, Abualoush, Obeidat, & Bataineh, 2022). (Cohen & Levinthal, 1990)stated and introduced AC as the capability to assimilate, acquire and then use external knowledge for commercial ends, which can became as an important capability for enterprises to innovate by increasing manufacturing flexibility or improving new products (Najafi Tavani et al., 2013); (Reza Saeedi, Dadfar, & Brege, 2014); (Belso-Martínez, Expósito-Langa, & Tomás-Miquel, 2016; Liu, Zhao, & Zhao, 2018).

Very little research proposes to redefine or extend this definition (Lane, Koka, & Pathak, 2002).Among these rare works, we will mention the significant contributions of (Lane & Lubatkin, 1998) and (Zahra & George, 2002). Criticizing Cohen and Levinthal's (1990) definition, which seems to suggest that an organization has a constant capacity to learn from one organization or another, (Lane & Lubatkin, 1998) introduce the concept of "relative absorptive capacity".

AC is also defined as the ability followed up the creation of knowledge in order to create and/or improve a company’s ability to sustain and maintain

competitive advantages (Ali, Ali, Al-Maimani, & Park, 2018). However, the most known definition of AC is the one sated by (Zahra & George, 2002) who defined absorptive capacity as a dynamic capability that influences the nature and maintenance of a company's competitive advantage.

1.5.2. The dimensions of AC:

Although absorptive capacity was developed with three dimensions, a majority of authors today refer to Zahra and George's (2002) four dimensions: acquisition, assimilation, transformation and exploitation of knowledge.

1- Acquisition: refers to «a company's ability to identify and acquire external knowledge that is vital to its business» (Zahra and George, 2002, p. 189).

These authors propose an alternative to Cohen and Levinthal (1990), who had designated the first dimension of AC as «recognizing the value of new external knowledge». (Todorova & Durisin, 2007) have opted for the reintroduction of «recognizing value» as a prerequisite for acquiring knowledge

Indeed, the literature on learning and innovation has demonstrated the crucial role of «recognizing value» in driving business in dynamic environments (Henderson & Clark, 1990). A large body of research also emphasizes that motivation to share knowledge is essential (Minbaeva & Michailova, 2004); (Todorova & Durisin, 2007); (Flatten, Greve, & Brettel, 2011).

2- Assimilation: This dimension refers to «the company's routines and processes for analyzing, interpreting and understanding knowledge from external sources» (Zahra and George, 2002, p. 189). The ability to assimilate knowledge primarily involves interpretation, comprehension and learning. These enable a company to circumvent certain difficulties linked to the acquisition of new external knowledge, notably by enabling it to understand external ideas that are far

removed from its own knowledge base. Thus, this dimension is based primarily on the confrontation of external and internal knowledge, and relies on interactions between the sending and receiving organizations.

3-Transformation: "Transformation highlights a company's ability to develop and refine routines that facilitate the combination of existing knowledge with newly assimilated knowledge" (Zahra and George, 2002, p.190).This dimension consists of activities relating to the internalization of new knowledge. At this stage, external knowledge is enriched with new knowledge, partly suppressed (e.g. forgotten or "set aside" for later use) or simply interpreted in a different way. The role of the bissociation process in transforming the character of knowledge is therefore critical. The organization has to evaluate two apparently incongruous sets of information and combine them to create a new "integrative" scheme. By reorganizing or even changing the company's existing knowledge structures (Zahra and George, 2002). Transformation can lead an organization to develop new skills. This third dimension of AC is characterized by the themes of recodification, rethinking and integration.

4- Exploitation: Cohen and Levinthal (1990) define exploitation as the ability of employees to apply new external knowledge for business purposes. Taking a more holistic approach and focusing more on learning aspects, Zahra and George (2002, p. 190) propose that "exploitation as an organizational capability is based on the routines that enable the firm to refine, extend and exploit existing skills or create new ones by integrating acquired and transformed knowledge into the production process". It takes the form of all the processes and routines that underpin the integration of new knowledge into products and services, systems, processes, knowledge or new organizational forms (Spender, 1996).

Zahra and George (2002) also propose two other distinct complementary dimensions, grouping the first two dimensions into potential absorption capacity (PACAP) and the last two into realized absorption capacity (RACAP).

Organizations developing potential absorption capacity are capable of continually renewing their knowledge bases. On the other hand, organizations that focus on their actual absorption capacity can make short-term profits, at the risk of falling into the competence trap; this phenomenon occurs when an organization has developed such expertise that it no longer perceives the limits of its achievements and cannot adapt to changes in the environment.

Based on the model by Zahra and George (2002), Todorova and Durisin (2007) revisit the role of knowledge transformation, in their view, this dimension is not the logical next step after knowledge assimilation, but both evolve "in a recursive loop". Drawing on learning theories, they propose that the knowledge an organization undertakes to absorb "moves back and forth between the processes of assimilation and transformation, before being incorporated into the organizational knowledge bases and ready to be exploited"(Todorova and Durisin, 2007, p. 779). In other words, they emphasize the dynamic nature of the process, recognizing the existence of important feedback loops between these two dimensions. The process of absorption therefore remains surprisingly poorly understood, and the boundaries between the different dimensions of absorptive capacity are not all that clear-cut (Vera & Crossan, 2003). In the end, the literature takes little account of the complexity of the construct: a particularly marked observation when it comes to operationalizing absorption capacity.

1.5.3. The positive relationship between AC and innovation:

The roots of absorptive capacity lie in the literature on organizational learning. Cohen and Levinthal (1989) point out that "absorptive capacity is an important part of a firm's ability to create new knowledge" (p. 570).

In particular, the literature has demonstrated the positive relationship between absorptive capacity and innovation performance (Cohen and Levinthal, 1990) (Tsai, 2001), and the literature agrees that AC is one of the main determinants of innovation (Dosi, 1988); (Lee, 2004).

Absorption capacity contributes to innovation through its links with exploration and exploitation. Drawing on (Grant, 1996) three characteristics of knowledge integration, (Van den Bosch, Volberda, & De Boer, 1999), p. 552) suggest that exploration and exploitation rely on three dimensions of AC: efficiency, breadth and flexibility of knowledge absorption:

- Knowledge absorption efficiency refers to the ability of companies to identify, assimilate and exploit knowledge from a perspective based on costs and economies of scale;
- The extent of knowledge absorption refers to the breadth of knowledge exploited by the company;
- Flexible knowledge absorption refers to the extent to which the company accesses additional knowledge and reconfigures existing knowledge.

While innovation and learning are positively related to absorptive capacity, the literature highlights the multiple organizational outcomes of AC (Van Den Bosch, Van Wijk, & Volberda, 2003)summarized in the following table:

Table 1.17 Organizational results of absorption capacity

Examples of organizational results	References
Innovation performance ; exploration/exploitation ; new product development	Cohen and Levinthal (1990) ; Tsai (2001) ; Van Wijk and al. (2001) ; Stock and al. (2001)
Shaping expectations; reactive/proactive training strategy	Cohen and Levinthal (1990); Volberda (1998); Van den Bosch et al (1999)
Organizational adaptation; coevolution; strategic renewal	Lewin and Volberda (1999); Lewin, Long and Caroll (1999); Volberda and al. (2001)
Best practice transfer and knowledge flows organizational	Szulanski (1996); Gupta and Govindarajan (2000)

Creation of new wealth ; entrepreneurial wealth; competitive advantage; financial performance	Lewin and al (1999); Deeds (2001); Zahra and George (2001) ; Tsai (2001)
Knowledge transfer ; organizational learning in performance of alliances and joint ventures.	(Ahuja, 2000) ; Kim (1998) ; Koza and Lewin (1998) ; Lane and Lubatkin (1998) ; Lyles and Salk (1996) ; Mowery et al. (1996)
Diversity	Kumar and Seth (2001)

Source: (Van Den Bosch et al., 2003), p. 47).

Conclusion of chapter one:

In this theoretical chapter, we have touched on the importance of information within an organization. It represents data that has been processed to achieve a specific objective or for a specific use in decision-making. This information becomes valuable once it has been analyzed, interpreted or compiled into a meaningful form that can be circulated, recorded, published and distributed in a formal or informal format. This information fuels the various systems within an organization, particularly the Business Intelligence system.

As seen in section two of this chapter, the term "Business Intelligence" (BI) refers to the technologies, applications and practices used to collect, integrate, analyze and present information. The main objective of BI is to support informed decision-making in various fields, such as sales, marketing and finance, and even support innovation.

Innovation in another hand is an essential lever for long-term growth, not only to cope with the current crisis, but also to stand out from competitors, adapt to market needs and continue to win over customers.

However, the impact of BI on innovation is not widely addressed in the literature. Few studies seek to identify this positive impact through empirical research. In section four we went thought some of the studies that addressed the link between the two subjects, and that's when we discovered a mediator variable called "Absorptive Capacity", and so we dedicated section five to identify AC and its dimensions, and finally show the positive relation between AC and innovation.

Chapter two:

Previous studies on Business intelligence and innovation

Introduction of chapter two:

This chapter is divided into four sections. In section one, we expand on the surrounding and related aspects of BI. To do this, we first define the BI process, and then review the different models of this process set out by various researchers in the literature. We also identify the actors involved in the BI process.

In Section Two, we will identify the various innovation models and demonstrate the stages of the innovation process. We will also define what a national innovation system is.

Section three will touch on the literature review of BI and innovation, as well as a special review of studies that shed light on the link between the two subjects. The literature review focuses on studies conducted in Algeria; however, this does not exclude other research and studies that have served as references for this work.

Finally, in section four, we proceed with an analysis of AC literature. As it is a relatively new subject, we will present the latest AC research conducted in this field. To conclude this chapter, we will demonstrate the different AC models in order to identify our own research model.

Chapter two: Previous studies on Business intelligence and innovation

Section one: Business intelligence as a process:

Every business decision has an impact on the future, but some companies navigate these currents with remarkable precision. Consider the example of a retailer who spots an unexpected surge in seasonal products across multiple stores. They adjust their inventory weeks ahead of their competitors and capture market share by being the first to meet emerging customer demand. The ability to transform the complex interplay of market shifts, customer behaviors and operational patterns into a clear vision of what is possible has become the hallmark of industry leaders. At its core, business intelligence combines foresight with decisive action.

2.1.1. The process of Business Intelligence:

The BI process corresponds to the steps which lead to the production of intelligent products by the intelligence service and their use by the client. A process is a set of logically interrelated steps that produce a specific result, and which involve different actors. There are multitudes of monitoring process models, always cyclical: at the end of the process, it restarts at the first stage(Pellissier & Nenzhelele, 2013). The steps that constitute the intelligence process are generally similar from one model to another, but each component is more or less detailed (Bergeron & Hiller, 2002).

Indeed, several BI models have been highlighted over the years in the literature, in a first step, we present our review of the intelligence process models behind the selection of five main models.

2.1.2. Review of BI process models:

We identified thirty-eight models 20 in government, professional and scientific literature. Coming from management sciences, information sciences or computer science, they mainly come from the United States and Canada, but also from France, from South Africa, Great Britain, Brazil, China, Morocco and Tunisia. All the models identified focused on at least one of the components of BI.

For a large majority of the 38 models identified, the methodology used by the authors to develop their monitoring process is very rarely explained. When it is, the methodology consists of a literature review, a qualitative study based on interviews or a quantitative study by survey. Alternatively, it was possible to infer that the models were designed based on the authors' professional experience as practitioners, consultants, or researchers. The models do not seem to have a "strong typicality" (Caron-Fasan & Lesca, 2006) , that is to say that a model of competitive intelligence or monitoring of the environment could be applied to BI. For example, Choo's model (2002)(Choo, 2002) on environmental monitoring strongly inspired (Bouthillier & Shearer, 2003) in the development of their model relating to competitive intelligence. The typicality or representativeness of BI processes should nevertheless be the subject of future research (Caron-Fasan & Lesca, 2006).

Classic model of the "intelligence cycle":

The classic model (Fig 2.1) is known as the "intelligence cycle" (Bruno Martinet & Ribault, 1989), "information cycle" (Bulinge, 2013; Guechtouli, 2013) or "intelligence cycle"(B. Gilad, Gilad, & Amacom, 1988). Coming from the military domain, the intelligence cycle has been developed and adapted by several authors for different types of Intelligence(Bouthillier & Shearer, 2003; B. Gilad et al., 1988; McGonagle & Vella, 1999) , and in particular for BI (Balmisse & Meingan, 2008; Bulinge, 2013; Deschamps & Moinet, 2017; Bruno Martinet & Ribault, 1989) .

The "intelligence cycle" has four stages:

1-The first stage consist of the expression of needs corresponds to the delimitation of the field of research(Guechtouli, 2013) , that is to say the choice of keywords and the delimitation of the perimeter of BI which serves to establish objectives (which can thus be re-evaluated at the end of the cycle). It is

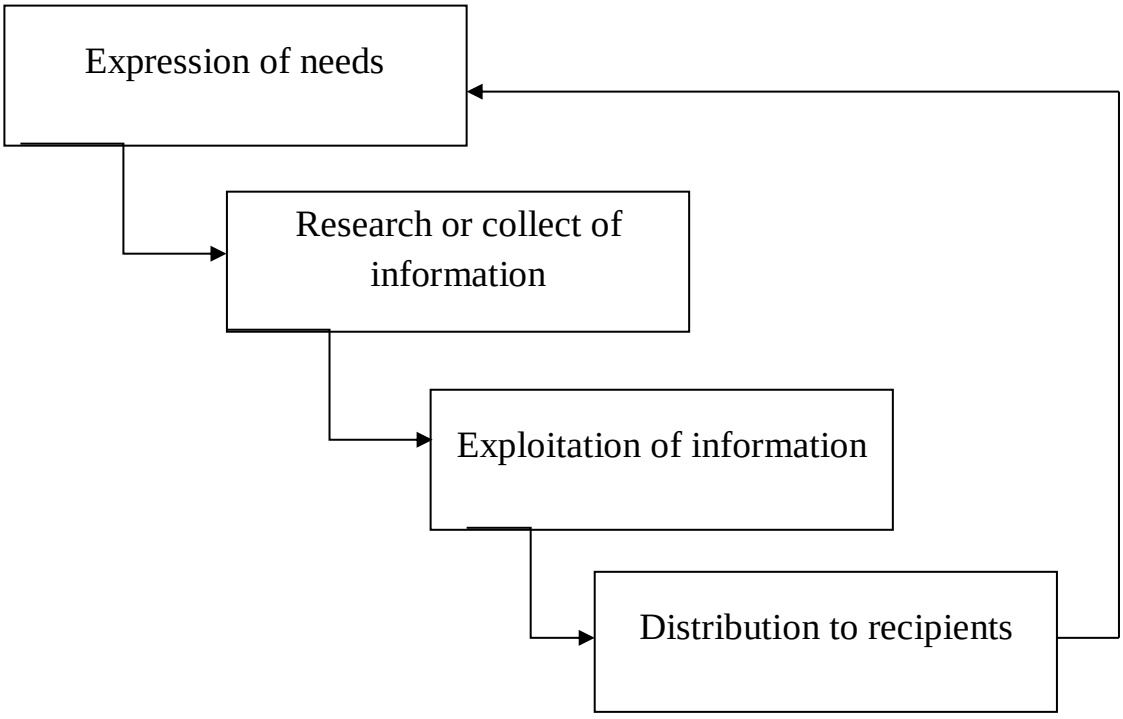
materialized in a "research plan" (Bulinge, 2013, p. 105)(Hermel, 2001) . Defining needs is a crucial step that can be carried out from a strategic analysis.

2- Information collection: is to the search for information on primary or secondary sources, formal or informal, free or paid, nevertheless always publicly available and collected in an ethical and legal manner. This search for information should implement means that are both technological and human.

3- The exploitation of information (verification, processing, analysis, synthesis), is the heart of intelligence, generally time-consuming and difficult to automate, serves to evaluate, analyze, interpret and synthesize information collected(Hermel, 2001)

4- Dissemination to recipients consists of transmitting the information used to the people concerned. A feedback loop leads to reassessing the needs of BI after the distribution to recipients.

Figure 2.1 Classic model of the "intelligence cycle" (Martinet and Ribault, 1989; Guechtouli, 2013)



Source: (Guechtouli, 2013); (Bruno Martinet & Ribault, 1989).

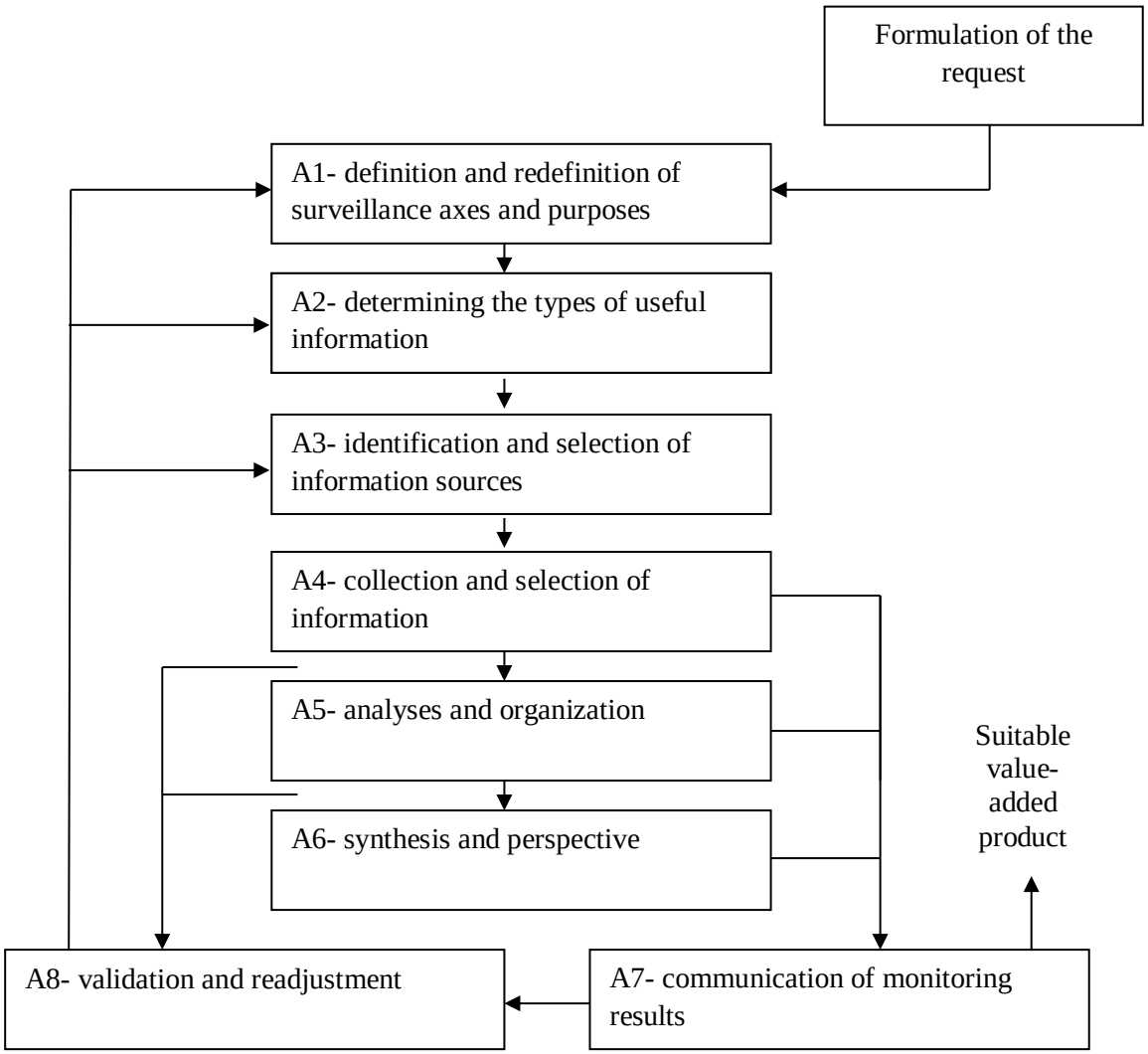
Widely used by companies since the 1980s for managers, and at the origin of several BI process models. This model is now criticized, It would no longer serve the needs of BI' customers(McGonagle, 2007) because it would be too simplistic. Indeed, it would not take into account the complexity of organizations (Bulinge*, 2006).

Afnor "monitoring process" model (1998):

The Afnor model (AFNOR, 1998) (Fig 2.2)offers a standardized approach to the BI process. In order to specify the roles of the client (user) and the service provider (monitor) the Afnor model used the XP X50-053 standard[1]. It was developed by practitioners and researchers in information sciences and management sciences. Eight Steps are defined to implement a BI process: (1) definition or redefinition of monitoring axes; (2) determining the types of useful information; (3) identification and selection of information sources; (4) collection and selection of information; (5) analysis and organization; (6) synthesis and perspective; (7) communication of the results of the monitoring; (8) validation and readjustment of the process and needs.

[1] XP X50-053 standard: is a former French experimental standard (issued by AFNOR in 1998 and canceled in 2020) that defined the guidelines for **competitive intelligence and environmental scanning services**.
It established common terminology, client-provider relationships, and the steps for setting up active information surveillance systems.

Figure 2.2Model of the "monitoring process"



Source: (AFNOR, 1998)

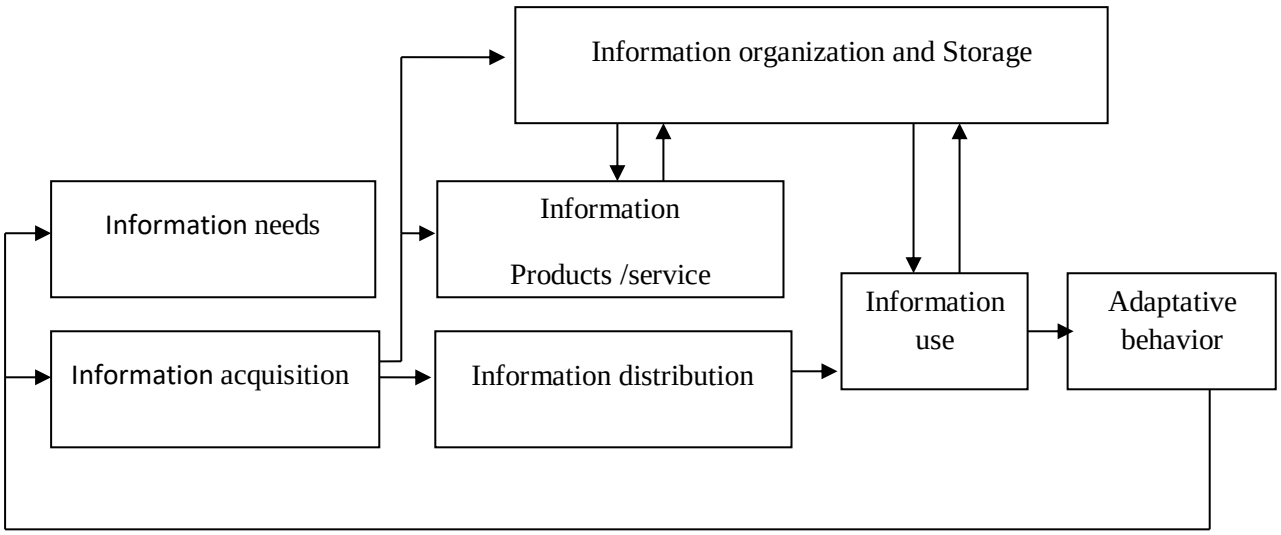
Compared to the classic model of the intelligence cycle, The Afnor model (1998) presents four specific characteristics. The need expression stage of the classic model is split into three stages which are more detailed since they include definition and redefinition of surveillance axes and purposes, determining the types of useful information. This distinction specifies three essential tasks when starting a monitoring process. The "identification and selection of information sources" stage is distinct from the "definition of the axes surveillance" and "information collection", generally, the source selection

stage is part of either the expression of needs (model classic), or information collection (other models). The validation and readjustment of information collection is done at the level of the first three stages of the monitoring process. Indeed, if the information collected is not satisfactory, the monitor must redefine the areas of surveillance. He may also choose to redetermine information types. He can also return to the stage of selecting information sources. Likewise, during the "analysis and organization" stage, the monitor must also validate and readjust the first three stages of expressing the need. The feedback is therefore more frequent in this model. It is entirely possible to communicate the results of its monitoring directly after the collection and selection of information, without going through the stages of "analysis and organization" or "synthesis and perspective". This is then a question of "selective dissemination of information".

Model « Information management in environmental scanning » (Choo, 2002):

The "Information management in environmental scanning" model by Choo (Choo, 2002) (Fig 2.3) makes a major contribution to understanding of a monitoring process. It covers environmental monitoring and presents six steps:
(1) identification of information needs (identification of users and understanding of their use of information); (2) collection of information; (3) organization and storage of information (file system or centralized database, and organized information of way to be easily found and shared); (4) product development and distribution.

Figure 2.3 . Information management in environnemental



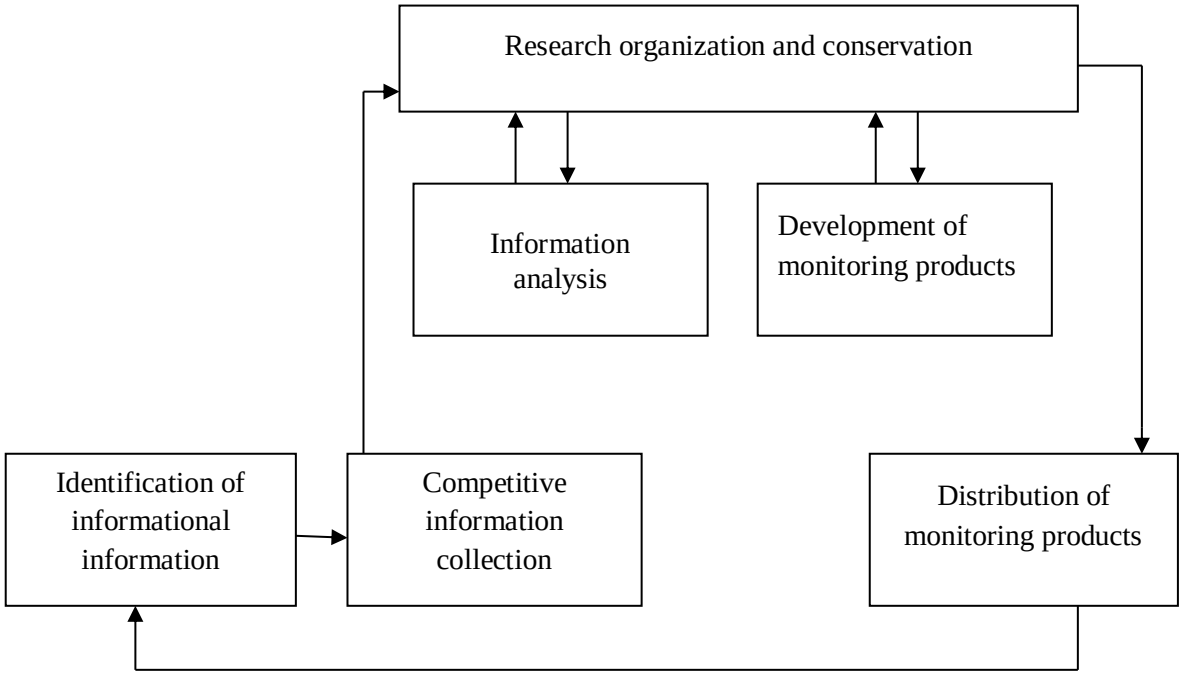
Source (Choo, 2002)

At the end of the process, the user (the client) “adapts his behavior” before the monitor proceeds to define new needs or redefine current needs, or even before the monitor starts to collect again information on previous needs. In addition, the information is used by “a network of internal experts, a project team to analyze the strategic problems ». Therefore, information utilization is a step clearly highlighted by (Choo, 2002). There is a back and forth between the stage of “organization and conservation of information” and that of “development and distribution of information products”, or even that of “use of information”. Indeed, feedback is necessary between these different stages. The development and distribution of information products and the use of information require the ability to retrieve information stored in a database or file system. More realistic, this modeling presents a less linear process than the classic model.

The "Information-processing model of competitive intelligence" (Bouthillier and Shearer, 2003):

The model of (Bouthillier & Shearer, 2003) , entitled "information-processing model of competitive intelligence" (Fig2.4) was developed from the model of (Choo, 2002), for Competitive Intelligence. This model makes it possible to clarify the role of the watchman (Jin & Bouthillier, 2008) . (Bouthillier & Shearer, 2003) propose a six-step model: (1) identification of information needs; (2) collection of competitive information; (3) organization, conservation and research; (4) information analysis; (5) development of monitoring products; (6) distribution of monitoring products.

Figure 2.4 « Information-processing model of competitive intelligence »



Source: Bouthillier et Shearer (2003).

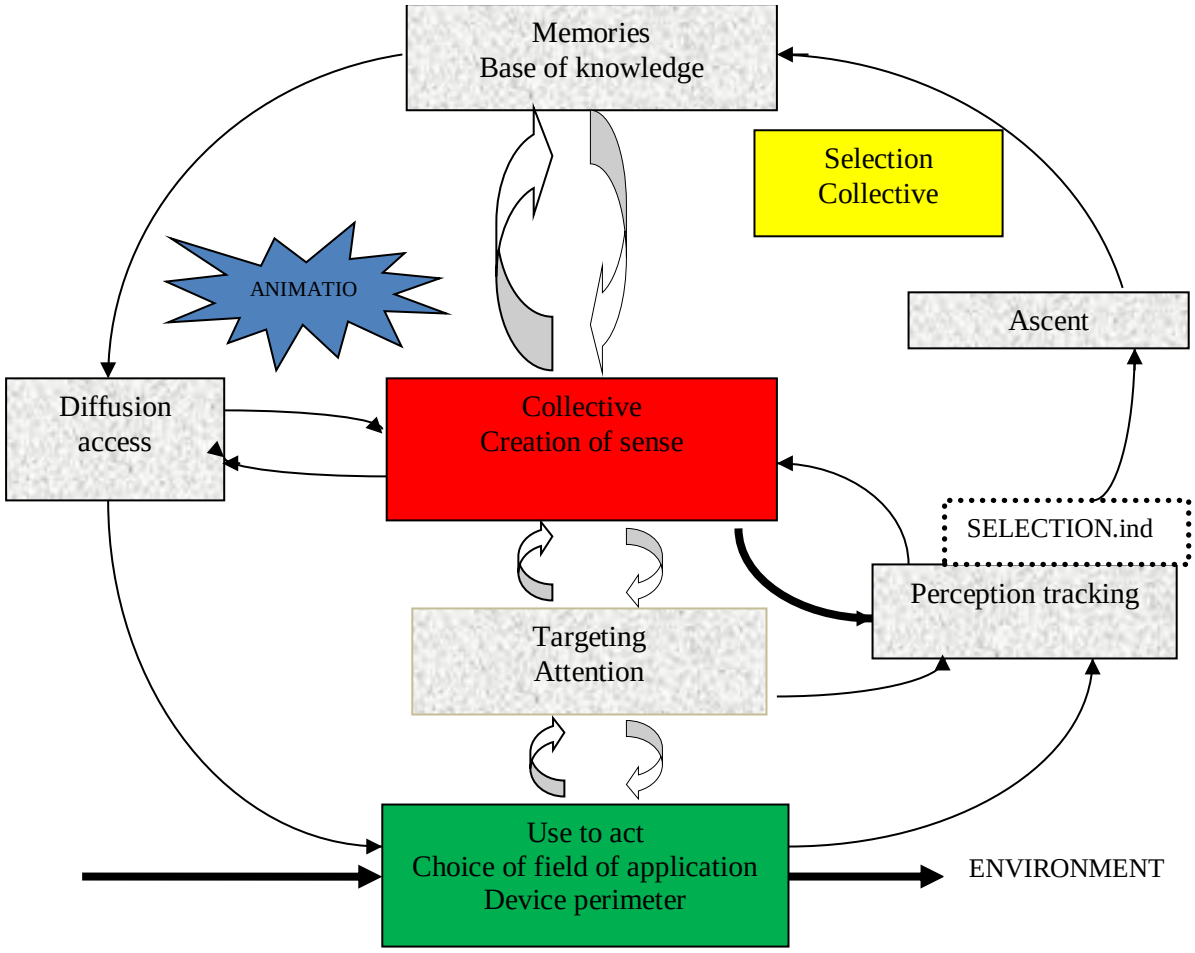
The authors explain a stage which is implicit in the other models presented: the "development of monitoring products". This explanation is interesting because presenting information in different formats is one of the roles of the monitoring person, who carries out this task based on his understanding of the information consumption habits of the monitoring clients. Thus, the same information can be presented on different media (email, monitoring bulletin, thematic file, blog, bibliographic reference database, etc.) depending on the way in which the information is used by monitoring clients. In addition, this step requires a lot of time and energy on the part of the monitoring person. Also, they divide the information exploitation stage of the classic monitoring cycle into three stages: (1) the organization, conservation and recovery of information,(2) information analysis, and (3) development of monitoring products. The "information organization" stage is carried out in parallel with the "analysis" and "development of monitoring products". This stage takes the form of back and forth between the processing of information (organization, conservation and recovery) and the analysis and development of monitoring products.

L.E.SCAanning method Lesca (2003):

The L.E.SCAnning method was designed, carried out and validated to progressively take into account all the characteristics presented above (anticipation, types of anticipatory information, collective creation of meaning and collective interpretation of the information to be selected, broad use of tacit knowledge of participants in the VAS-IC system, etc.). This method includes around ten steps.

The figure visualizes the Conceptual Model of the method, the heart of the method, the Collective Creation of Sense, is symbolically placed at the center of the figure.

Figure 2.5 L.E.SCAanning method



Source: Lesca (2003)

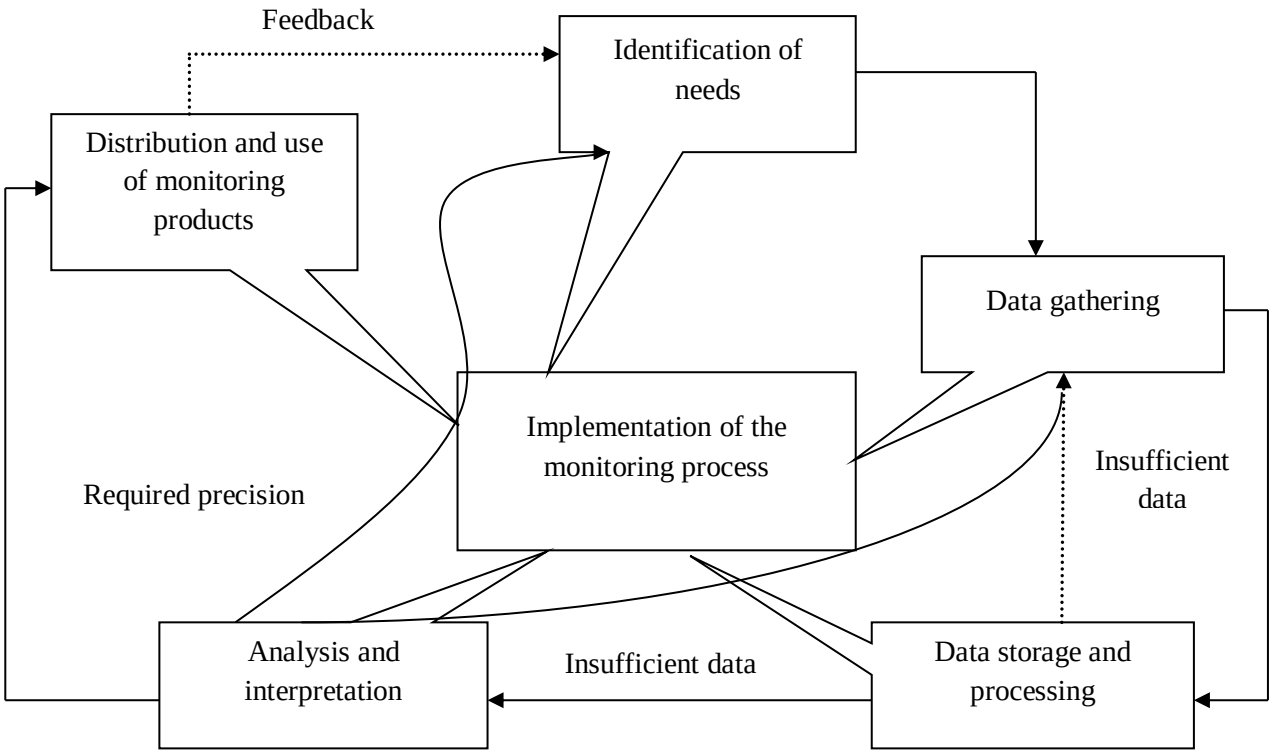
The figure can be presented starting from any entry point, since it represents a system with feedback loops. The numerous arrows in the figure visualize the fact that the operating process of the VAS-IC system is also a collective learning process whose project and/or result is the production of new organizational knowledge. The practice of BI cannot be improvised. Its implementation, operation and sustainability require a precise and complete method. The L.E.SCAnning method meets this need. General objective of the L.E.SCAnning method: To enable the company to set up, operate and sustain a Anticipatory Strategic Monitoring and Collective Intelligence system adapted to its particularities. Answer his question “How to do it?” ».

The process starts from “Use to act”, this step aims to choose which activities of the company or which process must be reinforced by anticipatory strategic BI Collectives. “Collective creation of sense” is a collective operation during which knowledge and added value are created by the participants in collective work sessions. It is part of Collective Intelligence. Its fundamental objective is to transform weak signals into major forces for decision-making. This is why it is centrally located. “Targeting”, information used for collective meaning creation must be captured or tracked. Targeting must be a collective operation
focusing their attention as a priority. ”Perception tracking”, this process aims to capture, the active search for information or weak signals in the company environment. However, the difference in this step is that the environment and the information channels are already targeted, you just need to track down the appropriate information. “Selection”, the information tracked outside the company is generally numerous and a large part of it is useless and harmful to decision-making. This is why it must be selected and treated. In the L.E.SCAnning method, the selection is done in two phases, firstly an individual selection, carried out by each of the trackers, then a collective selection which will be made as a group for appropriate decision-making. “Memories”, refers to all databases where information is stored and updated as well as informal memories such as knowledge acquired by individuals. “Ascent” it is the operation of transmitting the information collected, from the trackers to the potential users of the information. “Diffusion” it is the operation of transmitting the information collected, from the trackers to the potential users of the information. “Animation”, Here is a theme that has not been discussed before. It is an operation where the human factor plays a central and decisive role. So the device must be run by one or more people. One of the tasks is measuring the performance of the VAS-IC device.

The "Intelligence process" model (Dumas, 2005):

(Dumas, 2005) model was based on the literature of (Jaworski & Wee, 1993) and (Choo, 2002), Dumas (2005) places the monitoring client "manager" at the heart of the monitoring process (Fig 2.6) . The implementation of Dumas' monitoring process (2005) goes through five stages: (1) identification of needs; (2) data collection; (3) data storage and processing; (4) analysis and interpretation; (5) dissemination and use of the intelligence's products.

Figure 2.6 Dumas' "watch process" model



Source: (Dumas, 2005)

Not only is the entire cycle iterative, but also each step is linked to a previous step. For example, if data is missing or if clarification is required during the analysis and interpretation of data, it is necessary to return, respectively, to data collection or identification of needs. Likewise, feedback loops occur if the data are insufficient during the information collection and analysis stages. Must have

a good understanding of the client's needs which evolve over time. At the stage of "storage and data processing", sorting is used to overcome the overabundance of information and to easily find the information collected to use it when needed. The phase of transforming data into useful information in ready-to-use information; in value-added information; or even in intelligence.

At this stage, the monitor provides the data to "experts/analysts who will try to make sense of this mass of fragmentary information which, taken individually, is of little significance in relation to the strategic or tactical needs of the company. The analyst's highlighting is interesting: his expertise distinguishes him from the watchman, whose role is essentially to collect, organize and disseminate.

It shows the need for collaboration between the monitor, the analyst and the monitoring client. Several customers from the monitoring before could have different profiles. The same information could therefore be broadcast on several broadcast channels and at frequencies different in order to reach different users.

In the following table we summarize the previous models of BI processes.

Table 2.1 Models of BI processes

Models / Steps	Cycle of information (Martinet and Ribault, 1989; Bulinge, 2013)	Afnor (1998)	Choo (2002)	Bouthillier et Shearer (2003)	Dumas (2005)
Assessment /reassessment of needs	Expression of needs	Definition / redefinition of axes of monitoring and purposes	Information needs	identification of CI needs	identification of needs
		Determining useful types of information			
Identification of sources of information		Identification and selection of information sources			
Collection of the information	Collection of information	Collection and selection of information	Acquisition of information	Acquisition of competitive information	Collection of data
Organization of the information	Information exploitation	Analysis and Organization	Information organization and storage	Organization, storage, and retrieval	Storage and treatment of data
Analyze of information and development products of			Dissemination	Analysis of information	Analysis and interpretation of data
		Summary and implementation in perspective		Development of CI products	
Dissemination of Intelligence products	Dissemination of information	Communication of Intelligence results		Distribution of CI products	Dissemination and use of Intelligence products
		Validation and readjustment			
Use of Intelligence products			Information use		
			Adapted behavior		

Source: set by the researcher

2.1.3. The actors of Business Intelligence process:

In the 1970s, monitoring processes began to be formalized in companies with the appearance of "monitoring cells": those commonly called "monitors" constitute staff – full-time – charged by the management of BI and assigned to a particular department of the company (often strategy, marketing or R&D), (Hannon, 1997).

In fact, given the number of sources of information that exist for a company (published information, information collected via customers, suppliers, sales, etc.) the task of collecting information seems overwhelming or even impossible if it is entrusted to one or two people in the company (T. Gilad & Gilad, 1986).

Indeed, human cognitive abilities being naturally limited (Simon, 1986), these people would quickly be overwhelmed by the quantity of information to process. Furthermore, (Benjamin Gilad, 1989) notes that, often, companies that only assign a single analyst to tasks of collection, analysis and dissemination of monitoring information encounter difficulties in convincing managers to use the results of the monitoring process and to gain credibility and relevance .

Regarding monitoring information.(H. Lesca, 1994) thus specifies that intelligent and attentive listening to the environment can only be the concern of the entire company and not only of some of its members.

In this context, H.A. Simon (1959, p. 273)(Association, Society, & Simon, 1966) suggests through his theory of limited rationality that "every human organism lives in an environment that produces millions of bits of new information every second, but the bottleneck of the perceptual apparatus certainly does not admit more 1000 bits per second and probably less. Consequently, working collectively in this context could make it possible to overcome this type of constraints.

In the case of a monitoring system, this would amount to individually and then collectively giving meaning to what the monitoring system perceives: the actors interpret each information that they perceive and integrate it into their cognitive

process, “this construction of meaning is both an individual and collective process” (Marciniak, 2005). Exchanged and communicated, these individual interpretations enter into a collective process of creation of meaning and can be enriched to bring added value to the organization. Furthermore, the actors are largely helped in this perspective by ICT which allows better communication and facilitates the transfer information. Thus, it seems that the interactions have become broader following the evolution of technologies and all existing supports to facilitate communication, exchanges of information as well as interactions.

Furthermore, according to the theory of informational wealth(Daft & Lengel, 1986) informal information or “information of field origin” (Caron-Fasan & Lesca, 2003) from informal sources (rumors, informal discussions, etc.) is estimated “richer” than formal information coming from formal sources (press, websites, trade fairs, etc.).Informal information constitutes an important part of monitoring information, and can come from sources as improbable as an innocuous conversation or a hallway noise.

Typology of monitoring actors:

This is not a question of listing all the actors belonging to the monitoring network but of identifying the different categories of actors actively participating in the monitoring process. We will be particularly interested in the classification of actors through their different professions in order to understand their roles within the framework of a BI system. We can identify three categories of human actors (David & Sidhom, 2005).

1. **The decisions-makers:**

Strongly anchored in the strategic environment, decision-makers are social actors who capture and process information in order to resolve decision-making problems that are both interdependent and intertemporal (Knauf, 2005)

(David & Sidhom, 2005) thus defines the decision-maker as one who is able “to identify and pose the decision-making problem, to be resolved in terms of issue,

risk or threat which weighs on his company". These are the "key decision-makers" (Miller, 1999) who move the company forward. These individuals are the users of BI products and services.

2. The monitors/trackers:

Watchers/trackers are actors responsible for collecting, analyzing and disseminating information in order to make the internal and external environment more intelligible (Kislin, 2005; Knauf, 2005).

Based on the literature trackers relies on two tracking attitudes, broken down into two groups.

The first tracking attitude is proactive tracking ("viewing") where the actors do not have any particular problem but seek to detect critical changes as quickly as possible for the sustainability of the organization. Two types of tracking are identified for these trackers:

- "undirected viewing": trackers who come across relevant information in the course of their day-to-day activities, without it stemming from a predefined need.
- "conditioned viewing": the individual during his readings, his travels, his meetings, focuses his attention and filters the information according to certain specific areas of interest. The objective here is to evaluate the development and impact on the organization of the data extracted from the targeted fields.

If the information collected carries important implications for the company, the tracker adopts a new behavior: (research). This second tracking attitude is a reactive attitude of seeking information in order to respond to a specific problem. It is subdivided into two groups as follows:

- Informal search: limited and poorly structured, this research allows the tracker to acquire information to deepen his knowledge and understanding of a particular subject.

- Formal search: here the information sought is precise because it seeks to respond to a particular problem.

According to (H. Lesca, 2003) these different types of tracking require different types of trackers:

- Sedentary trackers, they are full-time trackers, whose job is to track information full-time and are often in contact with formalized sources of information (databases, newspapers, etc.). They are called professional trackers; they belong to an internal structure (Intelligence/watch unit) or external structure (a subcontracting) to the company.
- Field trackers, for whom tracking is an activity ancillary to their profession, they are in contact with external sources of information (customers, suppliers, competitors, etc.) and mainly focus on informal information. They are part-time trackers. They can be divided into two groups: designated trackers (formally designated by the company) and voluntary trackers (or trackers informal).
- Potential trackers, they are actors potentially having monitoring information but who are not formally part of the monitoring system. We will classify these different categories in the following table.

Table 2.2 Typology of BI intelligence information trackers

	Full-time trackers		Part-time trackers		Potential trackers
			designated	volunteers	
Status	Internal	External	Internal	Internal	Internal
Intelligence activity	Exclusive	Exclusive	Shared	Shared	Occasional
Status	Formal	Formal	Formal	Informal	Informal

Source: (Guechtouli, 2014)

3. **The IS designer**:

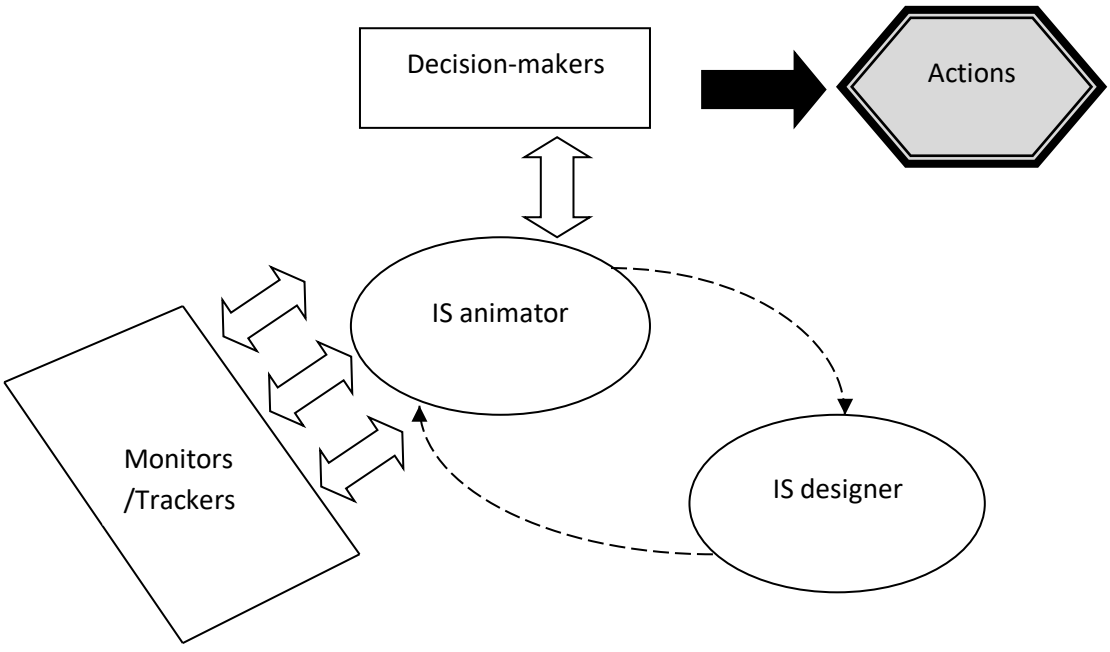
He designs the information system on which monitoring is based (the SIVS), a system which must provide support for all of the organization's monitoring activities (information research, collection, interpretation, dissemination, etc.).

The SIVS designer can be considered an important actor as it is primarily concerned by the issues of information collection and issues of protection of information assets (Sidhom, 2009). Furthermore, (Knauf, 2005) links this category to a fourth category: the IS animator.

4. **The IS animator:**

The role of the animator is to coordinate, supervise and control all stages of the process and to ensure the monitoring of operations. According to Lesca 2003 the animator is in charge of "giving a soul" to the monitoring system, "whose engine is essentially human, and to the organizational and technical system which supports it"(AFNOR, 1998). In addition, the animator is responsible for optimizing the operation of the monitoring system with a view to perpetuating it (Kriaa-Medhaffer, 2006).

Figure 2.7 The different actors in the business intelligence system



Source: (Guechtouli, 2014)

The previous categories are not fixed; each actor can wear “several hats”. Thus, a designer can be a tracker; a decision-maker can be an animator and a tracker, etc. There are no real borders.

The skills of the actors of a monitoring network:

In order to carry out their work, actors of a monitoring network therefore need a certain number of skills and knowledge or even “expertise”. Defining these skills is an important step. According to Gilad (Benjamin Gilad, 1995): “Intelligence works when a company develops a key competency (“a core competency”) to understand the competition, this skill allows you to take on challenges, open closed cultures to external perspectives, formulate unconventional strategies that amaze competitors, and discover opportunities that everyone else ignores”.

Amos et Knauf, 2004,(Knauf & David, 2004), define competence as “a set of abilities necessary for the exercise of a professional activity and the mastery of required behaviors ».

The skills of decision-makers:

Le décideur doit avoir certaines compétences, il doit notamment selon Amos et Knauf,(Knauf & David, 2004) :

- Know the environment in which they work: in the sense that they are expected to be able to master and understand their sector of activity;
- Detect risks and threats to your business or service: you must be alert and pay attention to anything that could affect them;
- Know the stakes: by knowing the consequences of these decisions and the repercussions at the level of your business or service.

Tracker skills:

Trackers need technical skills in order to accomplish their tasks but they also need a certain number of human skills. a tracker must have skills to be able to (Knauf & David, 2004):

- Identify and evaluate sources of information and monitor them;
- Select the sources best suited to the demand;
- Extract information occasionally or periodically – Control the information collected.
- Process information intellectually: analyze the content – Put information into more elaborate form in the form of a summary, bibliography, overview of press, etc.

The skills of animator:

The animator is sometimes called infomediary (fusion between information and intermediary). The latter is defined as "a supervisor, responsible for ensuring the consistency of the system, to lead human resources and coordinate actions carried out via the IE process"(Knauf & David, 2004). He must have:

- A communicator profile;
- A profile of pedagogue;
- A mediator/negotiator profile (send messages to managers);
- Un profil de compétences techniques en accord avec son rôle.

These different actors interact in a continuous dynamic. Decision-makers/managers raise issues and formulate requests in accordance with their strategies and preferences. Trackers search for information, analyze it, synthesize it and interpret (sometimes jointly with other actors in the monitoring system) to extract added value and facilitate strategic decision-making. The host is here to coordinate and bring this dynamic to life (Guechtouli, 2014).

Section two: innovation as a process:

A well-defined innovation process is crucial for companies to remain competitive and achieve sustainable growth. Although the specifics may differ between industries, the most effective innovation operating models have several things in common: they are structured and repeatable, and they fit the conditions.

2.2.1. Different models of innovation processes:

Studying innovation through the prism of processes is useful for understanding how product and/or service innovations develop (E. Rogers, 2003) . In a study devoted to identifying the success factors of industrial innovation, (Rothwell, 1992) highlighted 5 generations of innovation processes.

Table 2.3 Rothwell's 5 generations of innovation processes (1992)

First generation	Second generation	Third generation	Fourth generation	Fifth generation	Sixth generation
1950 - 1965	1950 - 1970	1970 - 1980	1980 - 1990	1990 - 2000	2000 - Today
Technology-Push	Market-Pull	Interactive Model	Integrated Model	System integration and Networking Model	Open innovation model

Source: (Rothwell, 1992)

First-generation processes:

According to (Rothwell, 1992) ; 1994 the first generation, Technology-Push, corresponds to the period 1950-1965. As shown in (Fig 2.8.) the process is linear and sequential, with R&D activity dominating and driving the development of innovation, which is then commercialized on a market. This generation saw the birth of the "technology - push" model. This type of process can be summed up as follows: science discovers, industry applies and man follows

Figure 2.8 The Rothwell (1994) Technology-Push process



Source N°: (Rothwell, 1994), p8.

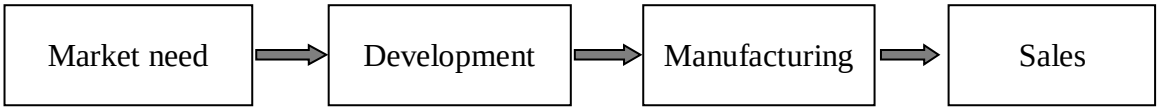
In this generation, business intelligence makes no contribution whatsoever to the innovation process. This is because the practice has yet to be developed in either the academic or business worlds.

Criticism of this type of sequential process by economists such as (Kline & Rosenberg, 2010) and (Myers & Marquis, 1969) marked the birth of the second generation. In fact the empirical study by (Myers & Marquis, 1969) also calls into question the Technology-Push process. Their empirical research with a hundred companies from 5 different industries highlights the importance of the market and consumer needs. According to their research, 21% of companies innovate because they perceive a technical opportunity; 53% innovate in response to the market, competitive pressure or another external factor; and 26% innovate because of an internal change (administration...etc.). (Myers & Marquis, 1969) proposed a new process known as Market-Pull, also known as Need-Pull.

The second-generation processes:

Second-generation processes (Fig 2.9) are linear and sequential, with an emphasis on marketing. The market is no longer a "receptacle for the fruits of R&D" but a source of ideas for R&D activities. Second-generation processes begin with the identification of market opportunities that trigger investment by the company to meet an unsatisfied or latent need (Nemet, 2009) . This model was dominant until the early 1970s.

Figure 2.9 Rothwell's Market-Pull process (1994)

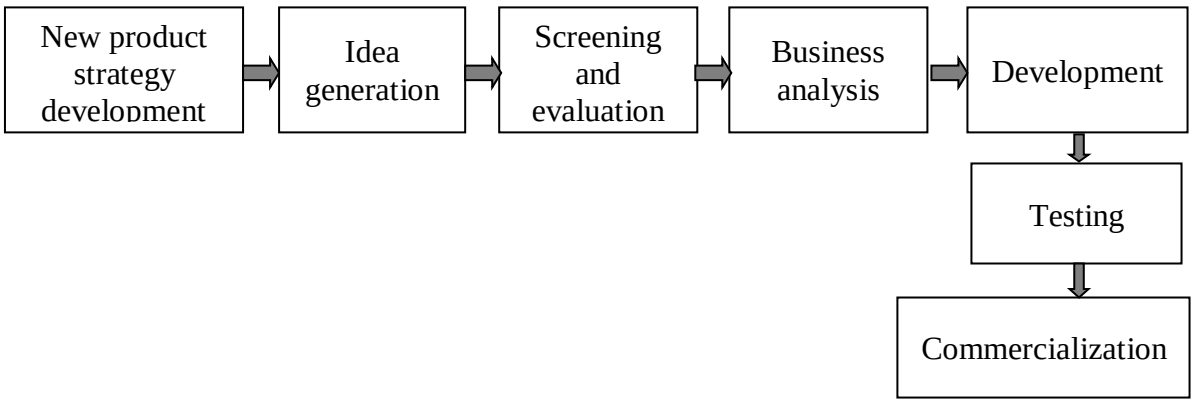


Source :(Rothwell, 1994), p9.

- **Booz, Allen and Hamilton, 1968:**

Through case studies by (A. Booz, 1982); (Allen, 1968), they showed that successful innovators had one thing in common: the adoption of a rigorous innovation management process, including a rigorous, step-by-step approval process and regular measurement of a number of critical factors such as the time and money allocated to developing an innovation (A. Booz, 1982). So they developed a 7-step process called BAH process (Fig 2.10) to minimize the risk of failure.

Figure 2.10 New product management by Booz, Allen and Hamilton, 1982



Source : (Booz, Allen, & Hamilton, 1982).

The first step is to define a strategy for a new product. Idea generation then encourages employees to imagine products that meet, or have the potential to meet, the objectives defined in the previous phase. Each idea is then analyzed to determine its potential for market success.

On the other hand, the costs associated with these ideas increase, as they need to be tested, prototyped... and so on. Ideas with interesting market potential move on to the market analysis phase, when the company draws up a business plan. Selected ideas, then move on to the development phase.

These ideas may evolve and be modified. The project team may, for example, realize that a feature is missing or not necessary, or that the initial material is not suitable and so on. The products are then tested before being marketed. During the marketing phase, it is important for the organization to monitor the reactions of current and potential competitors.

- **Myers & Marquis, 1969**

(Myers & Marquis, 1969) modeled an innovation process (Fig 2.11) through an empirical study of a hundred companies from 5 different industries. Their process is composed of 5 steps (Fig 2.11).

Figure 2.11 The process of Myers and Marquis, 1969



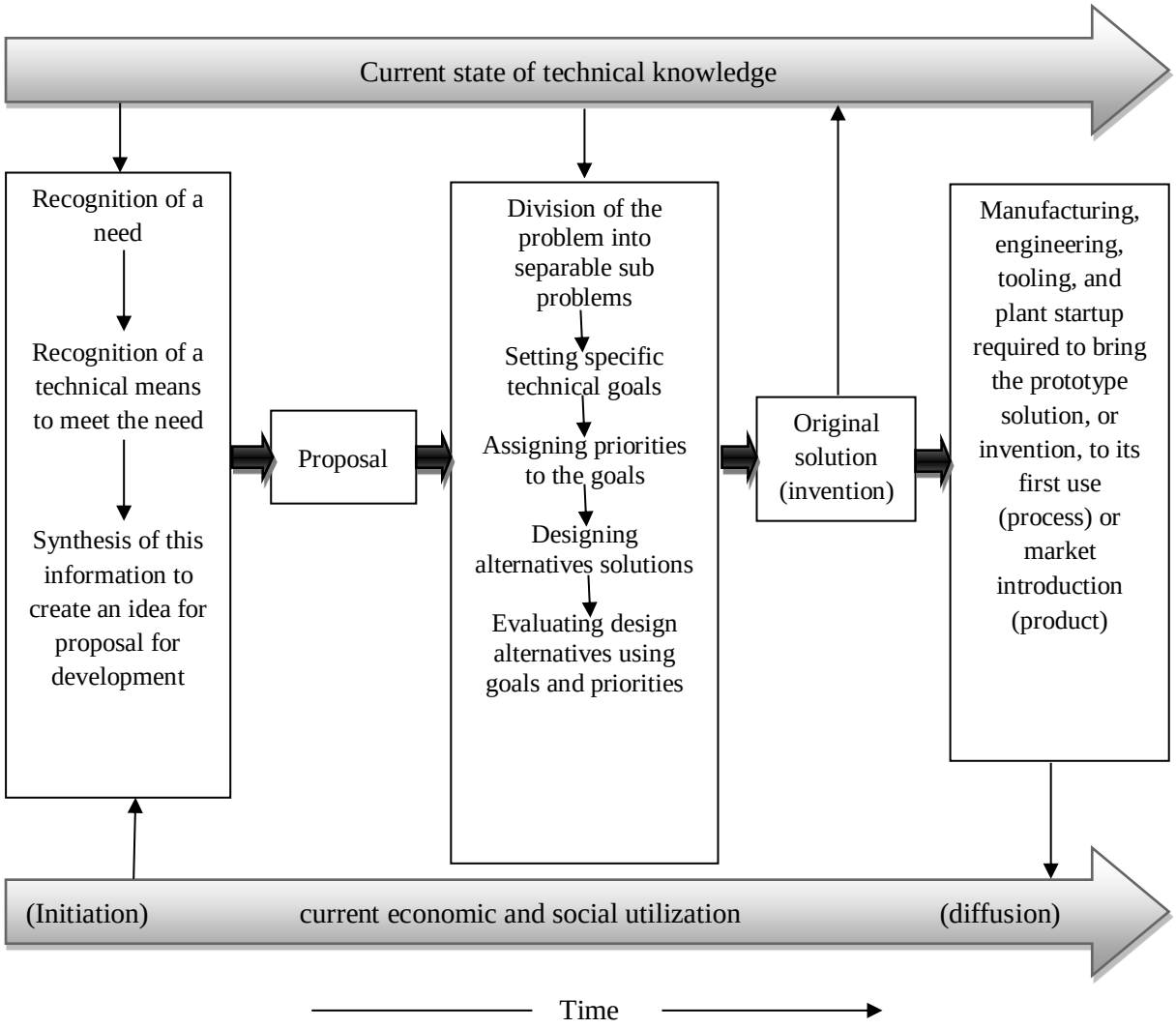
Source: (Myers & Marquis, 1969), p4.

The first step is to recognize market demand and the technological feasibility of an innovation. The fusion of these two parameters leads to the generation of ideas. These ideas are then the subject of R&D activities aimed at finding a solution to the problem identified in the first stage. The solution is then found - the invention - and commercialized - the innovation.

❖ Utterback, 1971

Drawing on the writings of (Myers & Marquis, 1969) according to which "...keep in mind that innovation is not really a second action, but a global process linked to sub-processes. It's not just the conception of a new idea, nor the invention of a new device, nor the development of a new market. The process is all these elements acting in an integrated way towards a common goal, namely technological change". (p.28-37). Utterback proposed in 1971, the process of technical innovation (Fig 2.12).

Figure 2.12 The process of technical innovation, Utterback, 1971



Source : (Utterback, 1971), p 78.

The first stage is idea generation, and consists in recognizing a need and a technical means of meeting that need. By combining these two pieces of information, an idea is developed into a proposal.

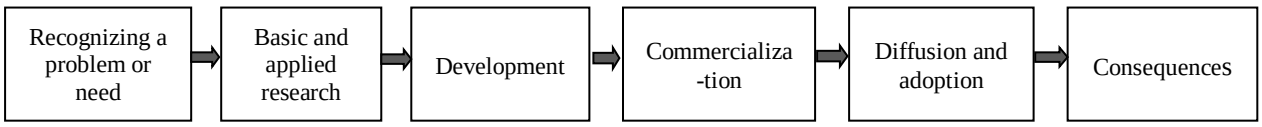
The second stage is problem solving. The organization uses technical knowledge to fuel this phase. The problem is divided into sub-problems, and technical objectives are defined and prioritized. The output of this stage is an invention (original solution), which in turn feeds the state of technical knowledge in the environment.

Finally, the invention moves on to the implementation and dissemination phase. It is then manufactured, prototyped and introduced on the market.

- **Rogers, 1995**

(E. M. Rogers, 1995a) elaborates on the innovation process, pointing out that certain phases may not appear, or may appear at a different time (Fig 2.13). Nevertheless, the notion of stages in the innovation development process is useful for understanding how innovations are constructed.

Figure 2.13 The Rogers Innovation Process, 1995



Source N°:(E. M. Rogers, 1995a).

This second generation of innovation processes has also been criticized. Firstly, on a methodological level, since it is difficult to define empirically what demand, expectations or needs are (Mowery & Rosenberg, 1979). The process is also criticized for limiting the emergence and development of radical innovations in favor of incremental ones (Mowery & Rosenberg, 1979). It is true that it is difficult to imagine a fundamentally new and original innovation based

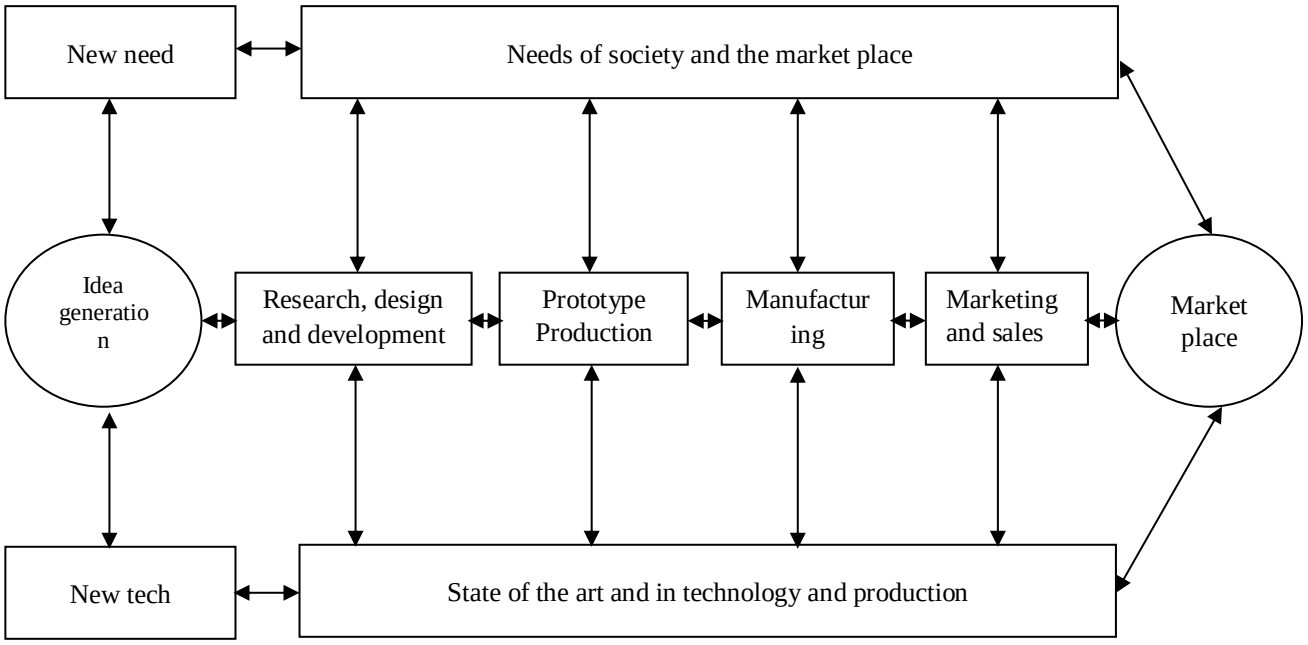
on consumer demands, as Henry Ford testifies: “If I had asked people what they wanted, they would have told me faster horses”. Finally, second-generation processes are criticized for a company's lack of capabilities to truly identify needs in the face of consumers with infinite needs. In the other hand Monitoring is used to analyze the development potential of ideas in order to select those to be developed (Booz et al., 1982). Intelligence comes into play in the final stage of the innovation process, and that is marketing. At this stage, the role of Intelligence is to monitor the reactions of current and potential competitors (Booz et al., 1982).

- **Third-generation processes:**

The first- and second-generation innovation processes received many critics. (Nemet, 2009) writes “Science and technology-push fails to account for market conditions, while demand-pull ignores technological capabilities” (p.701). However, some authors show that the coupling of Technology-Push and Market-Pull processes seems relevant, since they can interact and exist simultaneously (Fasquelle, 2018; Mowery & Rosenberg, 1979). The third generation of innovation processes, the *Interactive Model*, is also sequential.

The model for this generation is called the “coupling model” in figure (2.14), and combines the two previous models. The coupling model includes the needs expressed by the market and the new possibilities developed by R&D. It emphasizes the link between the different functions in a linear manner, one activity after the other.

Figure 2.14 The "Coupling" Model of Innovation



Source: (Rothwell, 1994), p 10

(Zegveld & Rothwell, 1985) describe this process as "the convergence of technological capabilities and market needs in the innovative structure of the firm." (p.222).The practice of business intelligence finds its place in this generation at the start of, and throughout, the innovation process. In fact, like the second generation, business intelligence contributes at the start of the innovation process to the identification of market needs and the technologies to meet them. The vertical arrows pointing to market needs and the technological state of the art show that the innovation process needs intelligence information at every stage. Intelligence provides the information needed to steer the project towards the market in the best possible conditions.

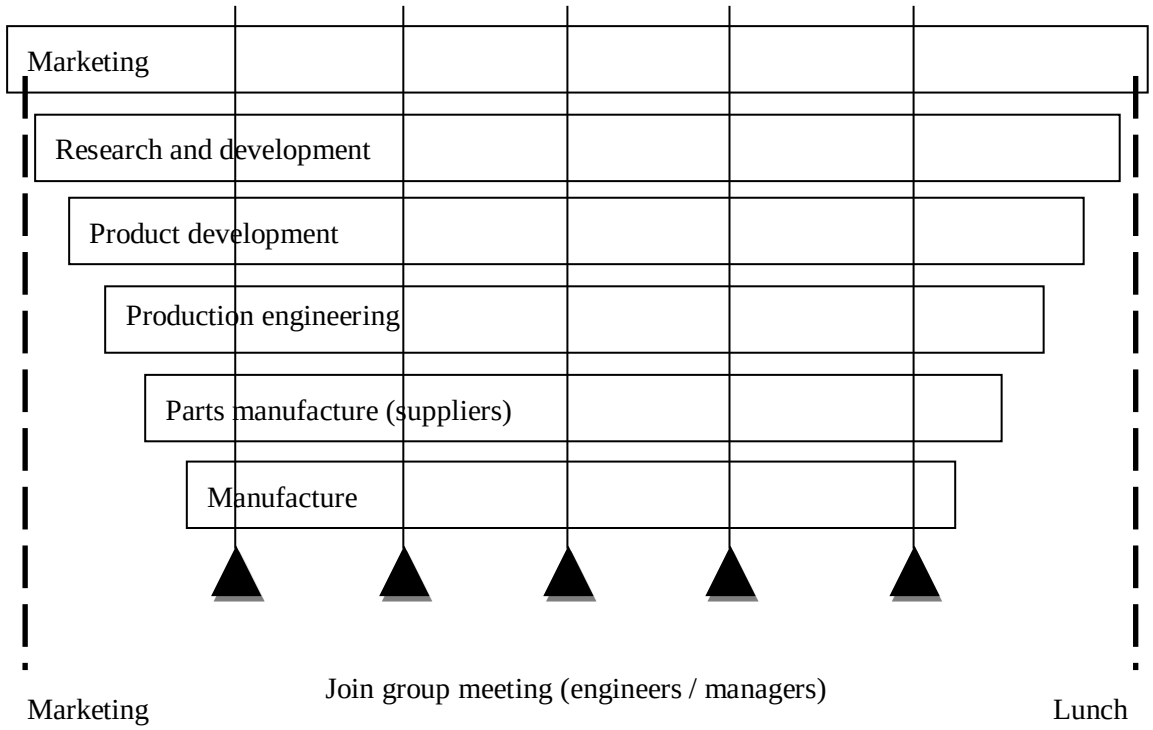
The third generation of innovation processes has met with great success in the corporate world. In the 70s, the economic context was difficult, with two oil crises, high inflation and saturated demand (Rothwell, 1994). In the early '80s,

as the economic situation improved, companies' strategies changed: they took a particular interest in technology and developed technology-oriented innovation strategies; the emergence of information technology product manufacturing also prompted companies to take an interest in new production strategies; and finally, companies became interested in strategic alliances likely to help them develop their network. The race to innovate is driving companies to shorten product lifecycles and innovate faster, by implementing a time-based strategy.

- **Fourth-generation processes:**

This generation's model is called the "Integrated Model", and differs from the first three in that it is presented as an integrated system, departing from the previous linear logic of innovation processes. This model focuses on the internal characteristics of the process, and incorporates the external environment (customers, suppliers, etc.) into a network of interactions. For this model, all activities take place at the same time. Information exchange is at the heart of this system, as shown in (Fig 2.15).

Figure 2.15 The "integrated" Model of Innovation



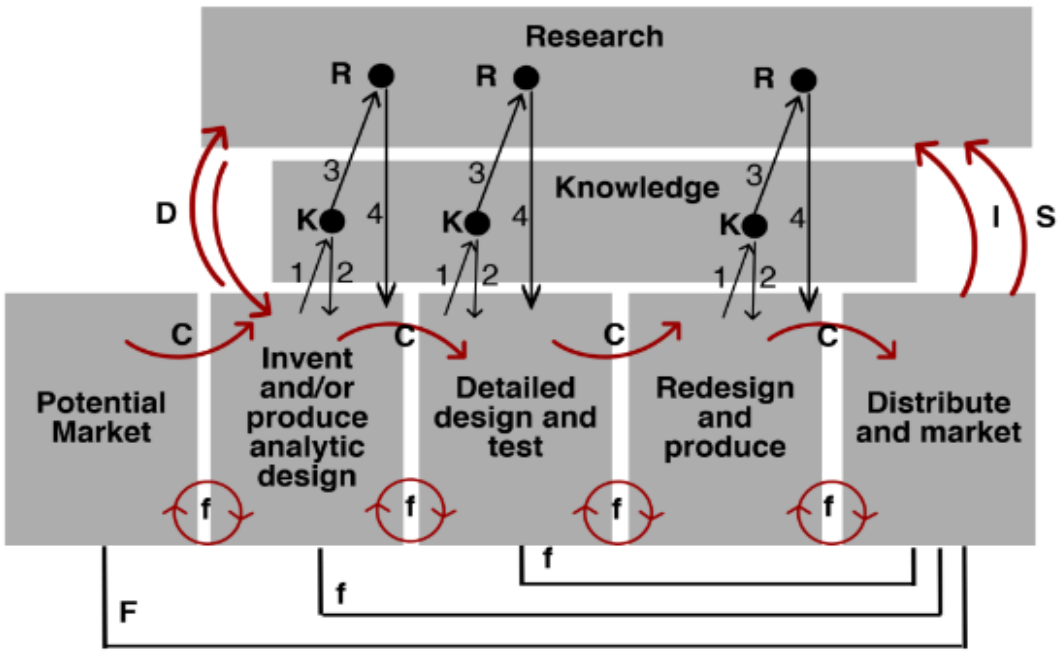
Source: (Graves, 1994), p 220

The contribution of intelligence to this type of process is also twofold: at the start of the innovation process, when it helps identify opportunities and build the innovation architecture (Wheelwright & Clark, 1992); and at the end of the process, to gather market feedback and possibly improve the product.

❖ Kline & Rosenberg, 1986

(Kline & Rosenberg, 1986) constructed the "Chain-linked Model" (Fig 2.16). Its distinctive feature is that it is not a step-by-step process. As it is made up of different interactions likely to provide information, the process can be modified and adapted to the context.

Figure 2.16 Kline and Rosenberg's Chain-linked Model (1986)



Source: (Kline & Rosenberg, 1986)

1. The heart of the innovation process represented by the arrows "c.". This path remains internal to the company.
2. The arrows marked "f" represent a second path. These arrows represent the from the market at previous stages, as well as in the phase itself. These

are fairly short feedback loops. The arrow marked "F" is a longer feedback loop that collects information from the market to detect new opportunities.

3. The third route is marked by the arrow "K". It represents the back-and-forth between the internal innovation process and the "stock of accumulated knowledge". This route occurs when there is a technological lock. In this case, engineers draw on the stock of knowledge, whether internal or external. If no solution is selected, then engineers engage in R&D activity. This is why R&D is no longer upstream of the innovation process, but runs in parallel with it.
4. The fourth path is marked by the "D" arrow. It appears between the research dimension and design analysis. This path appears when research is at the origin of an innovation.
5. The fifth itinerary is represented by the "I" arrow. It links innovation and research. In other words, innovation leads to scientific discovery.

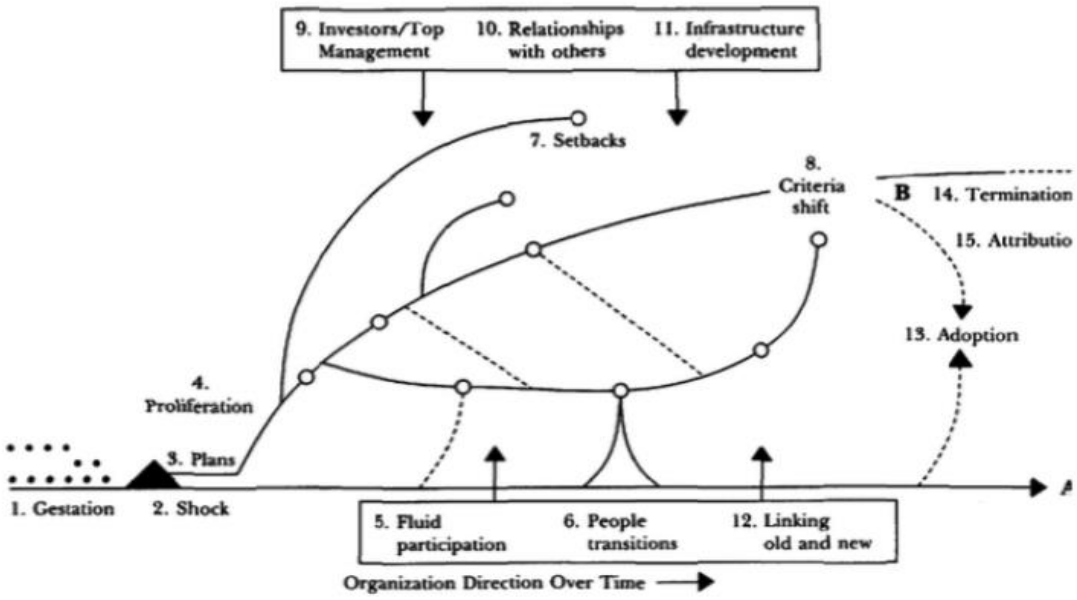
Van de Ven & Schroeder, 2000

Research teams from the Minnesota Innovation Research Program (MIRP), headed by Van de Ven, have been studying innovation process modeling for several years. They have developed a 3-stage model shown in Table 2.4 The process (Fig 2.17) is in the form of "fireworks" (Detert, Schroeder, & Mauriel, 2000).

Table 2.4 The MIRP model

Initiation	Development	Implementation
1. Gestation	4. Proliferation	11. Integrating the new with the old
2. Resource Requirement	5. Setback	12. Attributions about innovation success and failure
3. Shocks	6. Diverging and changing success criteria	
	7. Fluid participation of Personnel	
	8. Involvement of investors and top managers	
	9. Relationship building	
	10. Creation of social infrastructure to support innovation	

Figure 2.17 The "Firework" innovation process according to Schroeder et al (2000)



Source: (Detert et al., 2000)

Other models were also developed in the fourth generation of innovation such as (Takeuchi & Nonaka, 1986); (Wheelwright & Clark, 1992). However, (Rothwell, 1994) criticizes fourth-generation models, explaining that while they are well suited to small innovation projects and incremental innovations, they are ill-suited to radical innovation and major technology development.

- **The fifth-generation processes:**

The fifth generation was born in the 90s and lasted until the 2000s. It is known as the "Systems integration and networking model" (SIN). This decade was marked by a race to innovate that was even more intense than the previous one. (Rothwell, 1994) explains that it is essential for a company to become a "fast innovator" in order to gain a competitive advantage. Faster innovation may mean higher development costs, but it also means faster profits. However, for this rule to apply, companies need to build strong vertical and horizontal links with the players in their environment. In other words, the company's first priority is to create a network.

This is the emergence of the fifth generation.

(Rothwell, 1994) describes the 5th generation model as a parallel information management process. Indeed, fifth-generation processes involve the accumulation of know-how and information about actors in the company's external network throughout the innovation process.

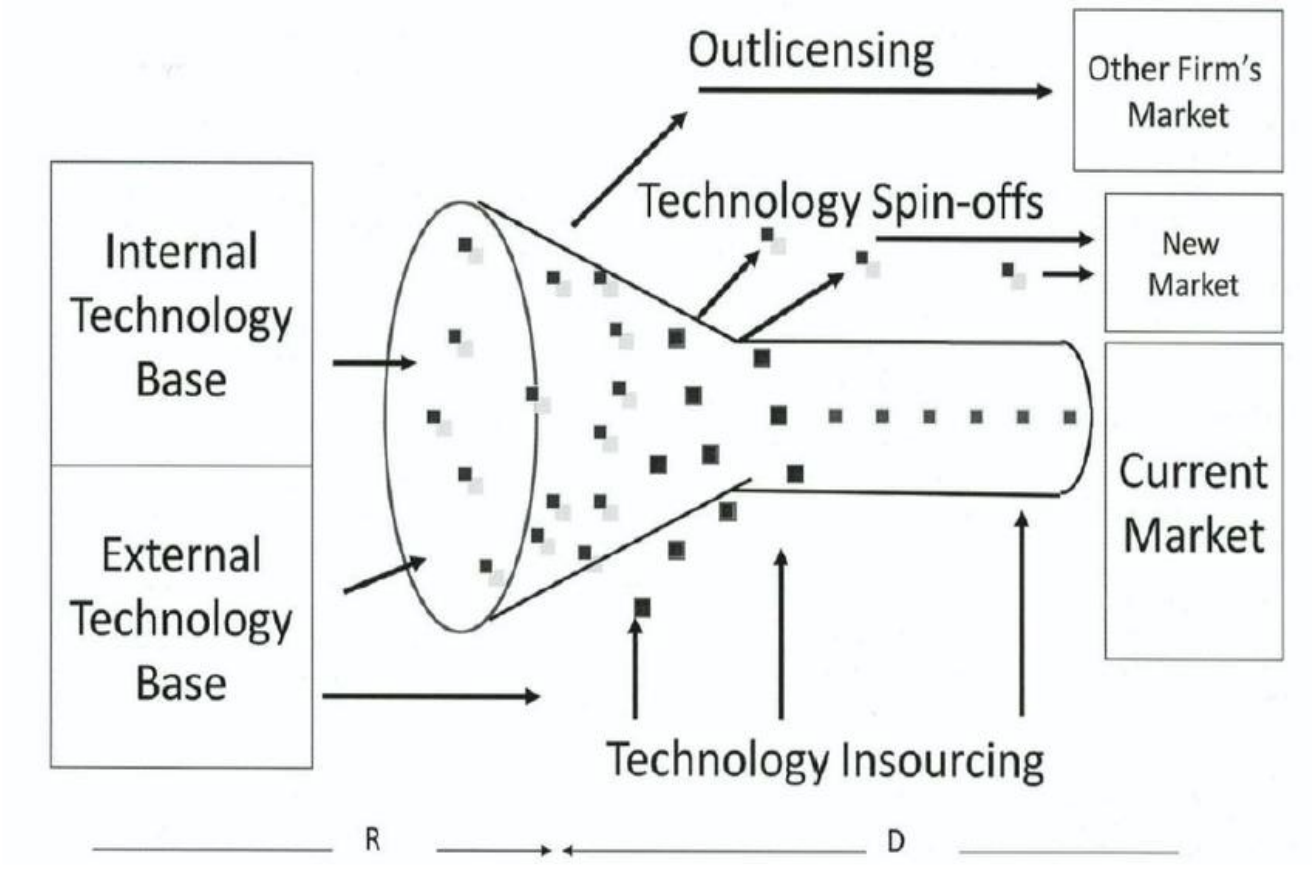
He adds that informal information plays a key role in the success of innovation. The architecture of fifth-generation processes therefore requires the company to manage a substantial volume of information throughout the process, and also informal information. Business intelligence is highly developed in this period, accompanying the innovation process. To our knowledge, there is little literature and few authors who have developed a 5th generation process.

❖ The sixth generation processes:

The sixth-generation process was launched in the early 2000s. It is characterized by the work of (H. W. Chesbrough, 2006), This generation's model is called "open innovation". It is characterized by openness to the outside environment, with the company calling on ideas and expertise from outside its own walls, including customers; universities, government and private laboratories; competitors; other countries (Von Hippel, 2007a, 2007b).

It also makes its ideas/patents profitable outside its own market by offering them to other companies, institutions...as shown in figure (2.18). (H. W. Chesbrough, 2006) describes open innovation in one sentence: "Open innovation is the use of intentional inputs and outputs of knowledge to accelerate internal innovation and expand markets for the external use of innovation, respectively" (p.1).

Figure 2.18 The Open Innovation process by Chesbrough et al (2006)



Source: (H. Chesbrough, 2012), p.23

Opening up to the environment to innovate is not a new idea. Already, (Cohen & Levinthal, 1990) explained that R&D has two sides: one internal and one external. This configuration refers to the absorptive capacity of a company, which invests in internal research while using external technologies.

The role of the business model is also crucial in an open innovation context, since it structures the way in which the company will create and capture value from a market. If a company decides to innovate through an open innovation process, it needs to adapt its business model to enable it to exchange with its environment and capture external ideas, technologies and knowledge.

In this type of process, the intelligence activity is relevant, as it enables companies to scan their environment for new ideas and technologies on the one hand, and the opportunities presented on the market through anticipatory intelligence on the other.

These six generations illustrate the growing importance of business intelligence in the innovation process, due to the ongoing turbulence of the business environment and the high level of risk involved. It's in companies' interests to use intelligence to fuel their innovation process and reduce the uncertainty and risk that go with it.

In our study we adopt the sixth generation process, because it’s the most open to the importance of Business In intelligence contribution into the innovation process especially the model proposed by (H. W. Chesbrough, 2006).

2.2.2. The different stages in the innovation process:

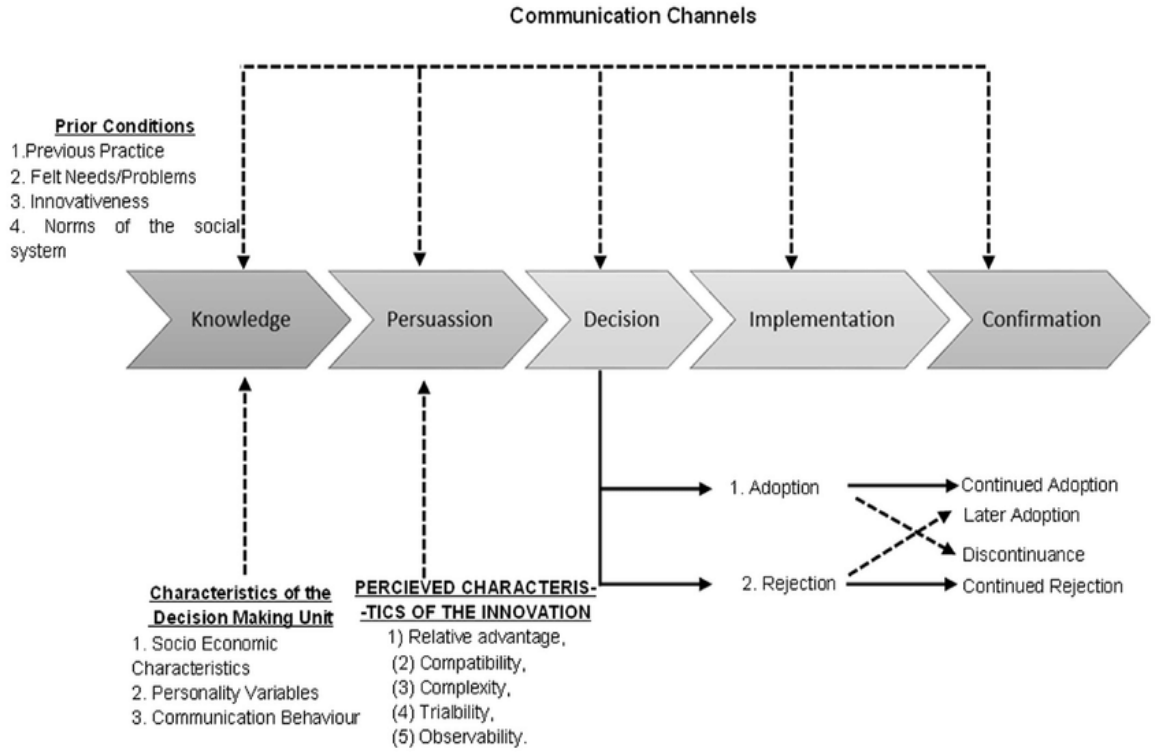
(Beal, Rogers, & Bohlen, 1957) had proposed five stages though which an innovation passes before an individual takes it into use:

1. The awareness stage: at this stage an individual gets to know about the being of an innovation.

2. The interest stage: at this stage the individual starts collecting specific data and information about the innovation.
3. The evaluation stage: at this stage the individual ascertains or fixes the value or worth of an innovation and decides whether to try it or not.
4. The trial stage: at this stage a person takes the innovation into experimental use or applies it on a smaller scale.
5. The adoption stage: At this stage the innovation is taken into continual full scale use and is given a favorable approval by the society members.

(E. M. Rogers & Williams, 1983) however proposed an additional and improved model for studying the stages of adoption which he called Innovation-Decision Process Model (Fig 2.19).

Figure 2.19 The "Firework" innovation process according to Schroeder et al (2000)



Source: (E. M. Rogers & Williams, 1983), P-165.

2.2.3. National innovation system:

The national innovation system is a relatively new concept, linking the interactions between public and private firms, universities and government agencies to facilitate the production of science and technology within national borders. Over the years many researchers tried to give a definition to this new concept, in the following table we gathered the most important definitions.

Table 2.5 National Innovation System Definitions

Author	Year	Definition to NIS
Freeman	1987/ 1988	A network of organizations in the public and private sectors where there are activities and interactions that import, modify and diffuse new technologies
Lundvall	1992	The elements and relationships that interact in the production, dissemination and use of new and economically useful knowledge and are located or rooted within the borders of the national state.
Nelson and Rosenberg	1993	A set of institutional interactions that determine the innovative performance of national institutions.
Edquist and Lundvall	1993	The national innovation system is formed by the institutions and economic structures that influence the rate and direction of technological change in society.
Noisi et al	1993	A national innovation system is a system of interaction of private and public companies (small or large), universities and government agencies that aim to produce science and technology within national borders. The interactions between these units may be technical, commercial, legal, social or financial. The goal of this interaction is to develop, protect, finance or regulate new science and technology.
Patel and Pavitt	1994	A national innovation system is the national institutions, incentive bases and competencies that determine the rate and direction of technological learning or the size and composition of change activities in a country.
Metcalfe	1995	It is a group of distinct institutions that contribute jointly and individually to the development and dissemination of new technologies that provide the framework within which governments form and set policies to influence the innovation process. As such, it is a system of interconnected institutions for the creation, storage and

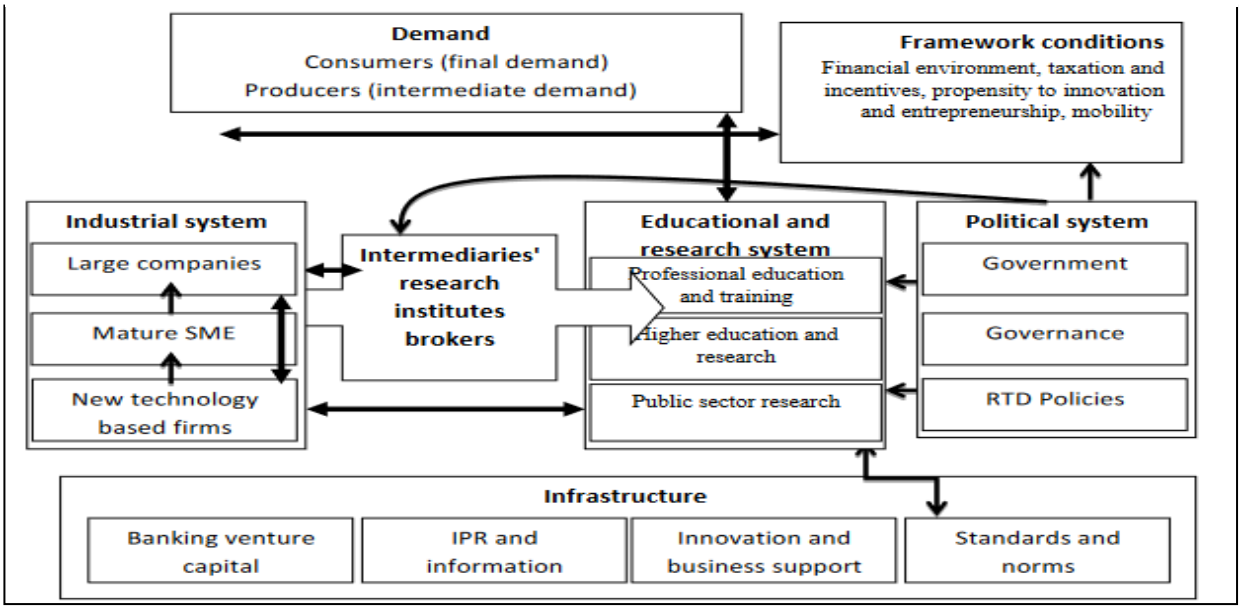
		transfer of knowledge, skills and technical works that define a new technology.
OCDE	1997	The flow of technology and information among people, enterprises and institutions which is key to the innovative process on the national level.

Source : (2018 ,عمراني & قراري), p 224, adapted

Institutional actors and interactive learning:

Early work on the NIS concept set out to first identify the institutions and system interactions that characterize economically successful countries are (1) governments and related agencies supporting innovation through regulation, standard setting, public-private partnerships, and funding of basic research, (2) sectors and industries comprised of firms which generate commercial innovations through experimentation, R&D, and product improvement, (3) universities which conduct basic research and train a technical and scientific workforce, and (4) other public and private organizations that engage in education oriented activities (Patel & Pavitt, 1994).

Figure 2.20 National Innovation System model

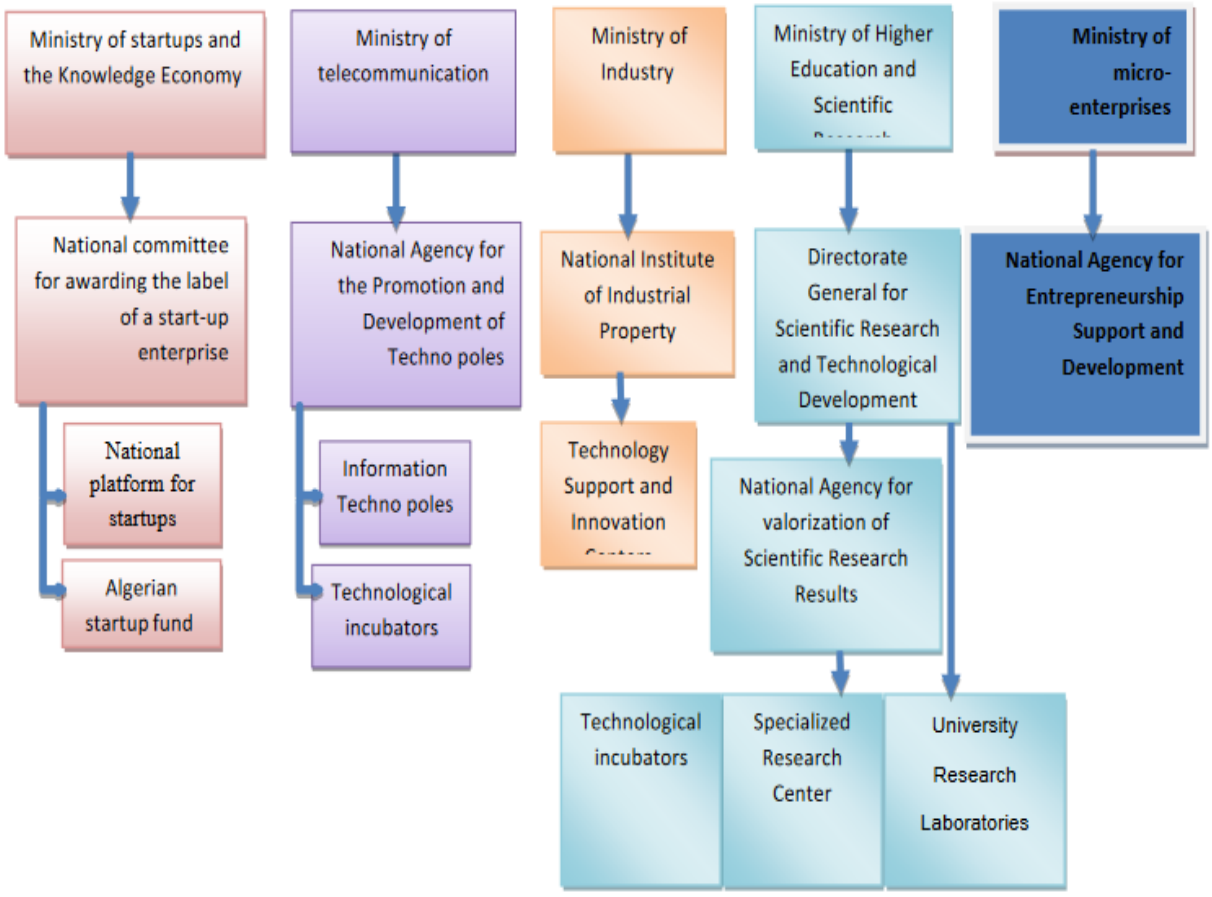


Source: O' Doherty and Arnold (2003) cited by:(Polenakovik & Pinto, 2010), P.122.

Algeria's National innovation system:

(Beddek, 1993) was the first to attempt to apply the national innovation system concept to Algeria. In her study, she reviews the evolution of the Algerian national research system between 1973 and 1990, noting the difficulties between the research and development system and the production system. Further research by (Djeflat, 2006) identifies the technology support system in the case of Algerian SMEs as an alternative route to building a national innovation system, revealing that this approach appears compromised by deficiencies in internal organizations such as staff knowledge, technology watch, market knowledge and management style, as well as the absence of an adequate institutional environment to promote R&D and innovation activity.

Figure 2.21 Public Institutions supporting innovation in Algeria



Source: (Adel, 2022), P.645.

Section three: Literature review on business intelligence and innovation among Algerian companies

A literature review provides an overview of previously published works on a given topic. Its main purpose is to demonstrate the existing body of knowledge in a given field of research. It is also used to identify the main methodologies and research, and to showcase the relationships between previous studies or theories. Furthermore, a literature review is conducted to identify the key ideas, conclusions, and theories, and to highlight the similarities and differences.

2.3.1. Various studies on Business intelligence in Algerian companies:

The study of sihamdi and belaachi (2022) This study aimed to identify the role of Business Intelligence in improving the quality of decisions by analyzing the relationship between the areas of BI (technological vigilance, commercial vigilance, competitive vigilance, social vigilance) and raising the quality of decisions, considering that BI is one of the contemporary methods aimed at monitoring and managing information, which is an inevitable necessity for all Algerian economic institutions, especially in current dynamic competitive situations that require the organization to become flexible and constantly adapted to the developments of its internal and external macro-environment. To achieve the objectives of the study, the questionnaire was used as the main tool to collect data on the variables of the study, and the path analysis method was used to analyze the data, factor analysis and hypothesis testing, and the study found that there is an impact and correlation relationship between the different areas of BI and the quality of decisions taken (Sihamdi, 2022). Another study by saadeddine (2023), this study aims to shed light on the concept of strategic vigilance, which has become an important means of achieving competitive advantage. An important means of achieving competitive advantage for the institution, and also aims to highlight the reality of the application of strategic vigilance in the Algerian service institution. It also aims to highlight the reality

of the application of strategic vigilance in the Algerian service institution, and a random sample of banks was selected in the Wilaya of M'sila (سعد الدين & حبيبة 2023) . The study produced a set of results, the most important of which is that strategic vigilance is a continuous process of proactively gathering and analyzing information, important for decision-making and gaining competitive advantage of importance in making decisions and gaining competitive advantage. The study also concluded that that the service organization adopts strategic vigilance in its technological, competitive and commercial dimensions.

The study of belbassir and ibn barika (2018), the objective of this study is to explore the relationship and influence between the Business intelligence through its dimensions (technological, competitive, commercial, and environmental) and the basic elements of the competitive advantages (quality, cost, innovation, responding to customer needs). The problem of the work was identified in several problematic questions for this purpose a model was formulated for it, the hypotheses were subjected to a series of tests to ascertain their validity, and the study adopted the questionnaire as a means of obtaining the data and used the analytical descriptive method as its methodology. It was used also to support and reinforce the concepts of its variables, The SPSS program was adopted in the extraction of results. The study reached a set of conclusions that confirm the significance of all the correlation relationships and the influence indicated by the hypotheses of the study, It concluded the emphasis on the importance of intelligence in boosting and developing competitive advantages in small and medium industries, Accordingly, a number of proposals were presented and the most prominent one was the deepening of the awareness of the role and importance of strategic business intelligence in facing the challenges of the competitive environment and its effective contribution to the development of competitive advantages through its positive impact on its essential elements (خليدة & الوهاب, 2018) . The study of Keroune and Ghadbane (2020) that came to address the issue of establishing an effective and integrated Intelligence system

in Algerian organizations. “François Brouard” came up with a model that contributes to the diagnosis of business intelligence in the organization, which helps it to know and realize what it has and what it lacks or the gap between what the system should be and what it is in the organization to correct the matter and close the gap, and the study targeted the industrial complex Amouri in Biskra to present it as a model on the extent to which Algerian organizations adopt the business intelligence system, and the study concluded that the organization is vigilant from a technological, competitive and commercial point of view to a good degree while its intelligence in the environmental point of view is moderate. In terms of technological, competitive and commercial to a good degree, while its intelligence in terms of the environment is moderate. Intelligence is practiced informally by collecting the information needed by the departments and interests of the institution spontaneously and without planning, as for the culture of intelligence, it was found that it is not known to the members of the organization, and this was shown by the surprise of the respondents about this term when it was put to them, as the study showed that the organization has the necessary resources and capabilities to adopt a business intelligence system with all its requirements, but it has not yet been exploited(2020 ,غضبان & قرون) .

In their study Ghendour and Taybi (2022), aims to show how business intelligence contributes to the management and protection of organizational reputation and to investigate how organizations adopt business intelligence systems to protect organizational reputation from various threats and crises that threaten its stability and market position. The study concluded by confirming the role of business intelligence in improving the reputation of the organization by collecting sufficient information about its environment and predicting the various risks and crises that surround it, in addition, Algerian organizations should adopt the business intelligence system and work on its application, as well as using foreign expertise as a pioneer in the field of intelligence in order to

train and develop local competencies. The study of Sahnoun and Bekhouche (2023), showed that Algerian companies have the potential to expand internationally, given the country's wealth, skilled workforce and low labor costs. However, the Algerian economy is essentially based on oil revenues, despite the Algerian government's efforts to support national production and market local products beyond its borders, there for Companies are increasingly faced with the dilemma of internationalization. They need to be attuned to their environment, picking up on strong and weak signals that will enable them to anticipate and act on events via business intelligence, more specifically strategic intelligence, in order to detect obstacles and obstacles in the environment, and seize opportunities and threats at the right moment. The research focuses on the role of business intelligence in the internationalization of companies, through a descriptive study emphasizing the fundamental role of strategic intelligence in the internationalization process. As results, at the risk of losing many opportunities and facing competition in their own markets, companies need to prospect foreign markets. To succeed internationally, a company must carefully study its internal strengths and weaknesses, as well as the opportunities and threats in its external environment. The choice of the form of internationalization is determined by the strategy to be adopted. The latter is the result of a market study, which must take into account the various risks that could compromise the company's very existence, as well as the opportunities that could open up new development prospects. To achieve this, strategic intelligence detects weak signals emanating from the environment, processes them and disseminates them in order to make appropriate decisions. Strategic intelligence enables decision-makers to position themselves in relation to a global/target market, and to provide them with the stakes involved in internationalization, leading to the decision to go international or not(Imène & Fella, 2023). Another study by Bendiabellah and Djennas (2015), the aim of this work is to study the concept of Business Intelligence and the possibilities for

raising awareness among the economic agents concerned by this system - largely linked to a culture of nationhood - of the competitive advantages gained by adopting a managerial approach. The empirical part of the study is aimed at raising awareness among companies (particularly Algerian SMEs) of the importance of using information in decision-making, and in particular of mastering strategic information. The study, which examines business intelligence, its components and types, both in a theoretical and practical framework, is based on a sample of 350 Algerian companies operating in various sectors. the different ways in which intelligence systems and business intelligence systems are designed from one company to the next, which has a direct influence on the way people behave and use information, and on the development of strategic intelligence and business intelligence practices. In the effort to understand best practices in strategic watch and business intelligence, the cultural dimensions of strategic information engineering have not been taken into account by our managers. The result has been failure. Indeed, the introduction of a strategic intelligence approach implies a change in ways of thinking, values and behaviors, all of which are benchmarks of national culture in general and corporate culture in particular. For, as we have seen, strategic intelligence is not only a set of attributes and tools, but also, and above all, a model of information culture in which long-term investment, collective will, self-abstraction and team spirit are essential cultural conditions. It goes without saying that, in order to integrate this cultural model of strategic intelligence, an evolution of the macro-cultural paradigm and the micro-cultural paradigm must take place, as the two are inseparable(Bendiabellah & Djennas, 2015) .

The study of Bessouh and Seddiki (2022), The main aim of the present research is to examine the different practices of business intelligence and its effects on the innovation process. In this context, a qualitative study was carried out among executives at Entreprise Nationale des Industries Electroniques (ENIE), with the aim of examining the degree of interest and importance the company attaches to

this new managerial tool, and also to identify its effects on the innovation process. The study showed that business intelligence can make a significant positive contribution to the innovation process. The study concluded that today's corporate executives and decision-makers are faced with an increasingly uncertain and complex environment, particularly affected by globalization through the accelerating movement and exchange of goods and services, capital and innovative technologies. This has forced them to innovate and make decisions quickly. What's more, information has become amply accessible, everywhere and at any time, in a variety of forms, representing an enormous challenge for today's business. As a result, all decision-makers need to be able to keep a close eye on the environment, in order to better anticipate the decisions they need to make. The results of this study suggest that monitoring does exist at Entreprise Nationale des Industries Electroniques (ENIE - Sidi Bel Abbes), but remains in an embryonic state. Nevertheless, it should be pointed out that this company has installed a fairly conventional watch system based on traditional methods and devices. It's easy to see that the company is more concerned with gathering important information that will enable it to meet new needs. Moreover, the existence of a research and development (R&D) unit within the company proves that ENIE aims to strengthen innovation and develop new products and services in order to ensure its survival and sustainability. It has been shown that ENIE attaches great importance to the concept of innovation in order to vary its product range and face up to the fierce competition on the electronics market(Bessouh & Seddiki, 2022). Finnaly, a study by Ghomrani and Bouroubi (2022), This article looks at the informational behavior of Algerian companies, and the strategic intelligence process, from the search for information to its interpretation, in order to gain a global vision of the company's environment, To this end, a case study illustration has been developed within the SOPT company. The results of the research are drawn from a qualitative study of SOPT's key executives. The results of this study defined Strategic intelligence

as a collective practice requiring the participation of stakeholders at all levels. A project of this kind requires the appointment of a coordinator who will be responsible for organizing and centralizing the information generated by the monitoring activity.

The critical factors required to set up a business intelligence process, which they have defined as follows:

- Human resources factors: skills, training, motivation...
- Material and immaterial factors: communication tools, information storage and distribution, internal database, etc.
- Organizational factors: centralization, formalization, process organization, etc.

In fact, there are no universal rules for organizing intelligence activities, as each company, depending on its sector of activity, environment, size and management style, has its own set of rules(Narimene & Mustapha) .

2.3.2. Various studies on Innovation in Algerian companies:

Many researchers were carried out through the years, trying to understand the state of innovation within the Algerian economy, and more precisely Algerian companies. Here we cite some of these researchers, which attempted to address various aspects of innovation.

The study of (Meryem AMGHAR & Hassaine - Kazi Tani, 2018), The two researchers set out to develop a theoretical foundation for innovation by looking at the various scientific articles that dealt with this topic in previous studies, so they started by defining a definition of innovation, The concept of innovation has been the subject of intense literary attention in recent years, with many authors agreeing that innovation is considered to be the action of innovating, i.e. introducing something new in terms of usage, custom, belief or scientific system. One of the most important characteristics of innovation is that it is seen as a process. Indeed, Schumpeter, one of the most renowned economists on

innovation, defines innovation as a process. A process that has undergone considerable development, six generations of innovation processes have emerged. Based on a review of the innovation literature and the work of a number of authors, they have summarized each model, identifying its options and objectives. They concluded that Innovation is a concrete process that is planned, adapted to market needs and carried out by different players. It is considered the most appropriate way to achieve strategic objectives, improve competitiveness and differentiate from competitors by creating value.

Another study by (KARAR, 2014), this article reviews the state of the art in innovation and its management at the company level. In fact, most studies consider innovation to be the process of transforming ideas into new or improved products, according to various classifications relating to levels of novelty (radical or incremental), the object of innovation (products, services or processes), and its extension to partial and total innovation (business model). Furthermore, all researchers agree on the strategic importance of innovation for value creation, whether inside or outside the company, for strengthening its competitiveness by developing its distinction through costs and competition according to the rules in place, or through increasing the value offered and creating new rules of the game enabling it to expand its market share. Innovation is the fruit of an extremely complicated process. It requires the company to manage the many internal and external variables that interact with each other (resources, knowledge, creativity and technology, etc.). Company management must coordinate these variables and build complementary, multi-disciplinary work teams in order to achieve the necessary interaction between the knowledge and skills of the different levels of the company. He also states that innovation process calls for the mobilization of different corporate functions, complementarity between them, and collaboration with different partners (research centers, suppliers or competitors, etc.) in order to meet the various challenges of managing innovation. At the end of their work (TRAKI &

BOUKRIF, 2015), applied to the case of the agri-food sector in the wilaya of Bejaia, the researchers came to the conclusion that Algerian companies are lagging far behind in terms of innovation activity. Even if we note the existence of innovation potential in the case of a few private companies (Cevital, Danone and Tchin lait - Candia). The innovations encountered are not due to managerial practices specifically dedicated to innovation, nor are they the fruit of a learning organization. Instead, they are the result of dynamic routines and individual efforts (executive, manager or boss). We can understand that Algerian companies remain trapped in their traditional management style, with little interest in innovation and new technologies. Generally speaking, private entrepreneurs have no long-term vision and little interest in the environment in which they operate, which is why they don't see the need to innovate in their activities. They need to review and renew their management and methods if they want to innovate their offerings, in order to maintain their market share and cope with changes in the environment. To sum up, they highlight the urgent need for Algerian public authorities to intervene in the field of innovation. In this respect, it is essential to encourage companies to develop research laboratories, and to work in partnership with research institutes, national and foreign universities, and financial organizations. To achieve this, an innovation policy must be clearly defined, in harmony with scientific research policy. In his study (KHENNICHE, 2016), highlighted the fact that innovation also requires leaders who are demanding of their teams, but who are prepared to support them. So we need to look at the qualities of transformational leaders and how they support the innovation process. He adds leaders also take part in changes and fight against dysfunction that disrupts smooth operation, thus establishing a participative management process that favors communication and the human dimension, and improving the organization's quality system. The leader is considered to be one of the essential components in the innovation process. However, leadership is not just about the leader, since he or she cannot achieve

results alone. Together, leadership and management are trying to steer companies towards an interactive innovation strategy, which requires the company to establish new relationships with its environment and even suppliers (notably crowdsourcing or open outsourcing, which is the use of the creativity, intelligence and know-how of a large number of people, on a subcontracting basis, to carry out certain tasks traditionally performed by an employee or contractor) or with customers and/or other collaborators, in order to build up a genuine innovation network. One of the latest topics discussed in term of innovation is Green Innovation, in their study (جودي & جودي, 2021) researchers aimed to clarify the role of investing in green innovation in order to achieve sustainable development, by defining the conceptual framework of green innovation and sustainable development, and then building a network of relationships between green innovation in its dimensions (product innovation, process innovation, organizational innovation) and sustainable development. This study reached a basic conclusion that companies' investment in green innovation contributes to achieving sustainable development, as this innovation contributes to the production of environmentally friendly products that meet the needs of their consumers, and this innovation enables them to reduce the energy and cost of operating operations, and that these operations contribute to reducing the negative effects of the environment, especially environmental pollution that was caused by non-green operations.

The study of (عمراني & قراري, 2018), attempted to study the structure of the national innovation system in Algeria in order to disseminate modern technologies on the basis of certain economic indicators. We have studied the theoretical foundations of the system and the development of its conceptual approach, which plays a role in the economy in particular and the macro-economy in general in Algeria. Analyze the applied work of the NIS, which shows the existing relationship through the study of NIS evaluation indicators, and used previous studies including this field to achieve or show the role played

by the system and its diffusion structure. of modern technology and through the study will show the role of technological innovation and newsletters in pushing countries to achieve scientific excellence and technology in various fields on the one hand and can be considered as well as the standards adopted for the analysis of the national innovation system in any country. And the most important is that this study showed that public initiatives to support research, development and innovation seem to be on the rise in recent years, a true sign of the desire to move toward a development-oriented economic model. Another study focused on technological innovation led by (Guechari, Grichi, & Meghazi Larafi, 2022) who tried to identify the importance of technological innovation and the risks associated with it, and for that they adopted the descriptive approach to list the most important aspects and concepts related to technological innovation, and the analytical approach to analyze and show the risks and the degree of risk related to this innovation. They also add that the technological innovation plays a major role in featuring the company performance, and reinforcing its competitive capacity through:

- Stimulating the demand especially in the markets.
- Stimulating the offer and creating new resources of income.
- Attracting customers and getting their satisfaction through presenting effective and developed products.
- Finding new opportunities for industrial companies to sell in new markets.
- Maintaining the survival and the continuity of industrial companies.

(kessas, gouri, & BENACHENHOU, 2021), focused in their study on the relationship between knowledge creation and innovation, the study confirms no significant relationship between knowledge creation and innovation, depending on SONELGAZ's field of activity and monopolistic position.

Another study conducted by(Metaiche, Hadri, & Tahir, 2016) in the aim of measuring the innovation activities of Algerian firms through. The applicability of the definitions and methodologies set out in the OECD Oslo Manual.

Enterprise's innovativeness relies on several characteristics of the enterprise itself such as the enterprise size, employees skillfulness, internal activities, R&D activity, and R&D intensity as well as other environmental features and factor. In addition to technological and financial resources, Innovation requires further knowledge and resources such as expert know-how in a lot of areas such as management, production, the Innovation process, intellectual property rights, marketing, and cooperation skills and so on. In case of Algeria shows us that Innovative activities are almost totally held by governments and public sectors in these countries while in developed countries those activities rely to a massive part on private sectors contribution. (Mancer, 2021), tried in his article to deal with innovation and the Algerian company. Adopting a descriptive and analytical approach, it establishes a diagnosis of the existing situation, from which it attempts to provide explanatory elements for the underperformance of Algerian companies in terms of innovation, and to elucidate the main constraints at the origin of the passive behavior of companies in innovation. He considers that Algerian companies' weak commitment to innovation is justified by their low capacity to innovate, a consequence not only of their limited resources for innovation, but also of the characteristics of the environment in which they operate. This situation weakens companies' willingness to innovate, leading them to adopt choices that do not consider innovation as the dominant variable in the competitiveness equation.

Finally, the study of (sedkaoui & Benaichouba, 2022) , the objective of this study is to analyze the role of the use of digital technologies in promoting an open innovation approach through a field study on a sample of 68 industrial enterprises in Algeria, as well as to identify the technologies that support this approach. The results of the study show that digital tools can facilitate innovation activities, focusing on their use as a strategy to respond to companies' needs, optimize the innovation process, and ensure sustainability. Sharing knowledge with external partners supports the innovative orientation of Algerian

manufacturing organizations. The results also suggest that some digital tools will support open innovation.

2.3.3. Literature review of Business intelligence impact on innovation in Algerian enterprises:

It is important to highlight the studies that investigated the impact of business intelligence on innovation, which were conducted in Algerian organizations in order to know the pattern of these practices in light of the Algerian economy and its specific nature.

(MOHELLEBI, 2015), limited her study to the potential impact of technological intelligence applied under a cluster policy on innovation within an economic organization.

Results of the study amplified that:

- national innovation systems based on the triple helix model, in which interactions between the various players (industry, universities and the state) help to improve the situation of each and the quality of their exchanges.
- The central idea is that innovation is not just what companies try to achieve in isolated ways, but also concerns interactions between companies and, more broadly, the socio-economic and technological institutional context in which they operate. This is the development model for innovative clusters, otherwise known as intelligence clusters.

Finally, this article allows us to understand the importance of the role of the government in the development of intelligence practices in Algerian companies and the success of the development of innovative clusters.

The study of (هتهـات & سـعيدات 2017), that shed the light on innovation management within the company, as a managerial process resulting from the adoption of innovative ideas, which makes business intelligence an essential

pillar of this operation as a modern tool for managing and tracking information. The study concluded with a set of findings, most notably:

- The company's innovation process is fueled by the products of intelligence, i.e. the information and knowledge that emerge from the collective sense-making process.
- The most successful companies in innovation management show a strong correlation between "innovative strategy" and the frequency with which business intelligence is applied (2017 سعيدات & هتهات), p.241.

Over all, the authors found that what differentiate an innovative company from a non-innovative one in the modern age, above all, are its use of information and communication technologies, and the modernization of its intelligence system to enable it to innovate, in parallel with sudden fluctuations in the environment in which it operates.

A case study conducted by (Meriem, Hassaine, & MALIKI) with Three Algerian telephone operators : (Ooredoo, Djezzy & Moblis) located in the city of Tlemcen, through a survey on the use and the processing of information within their company, and whether this is applied to the launch of an innovation process.

According to the authors, their study gives an initial idea of the impact of business intelligence on the act of innovation within a company. Indeed, there are many ways for decision-makers to access information in real time, such as Intelligence.

Business intelligence, information systems and communication technology are among the best ways of gathering the data needed to help you innovate.

Furthermore, the results of the survey showed that the fact of having an adequate means does not necessarily allow for systematic innovative action in return. This may be due to a number of external factors. For example, the consumer, who is

not loyal and not very demanding does not encourage operators to stimulate innovation.

The study of (مسلتي & بونويرة 2022) that aimed to determine the impact of marketing intelligence and its role in fostering marketing innovation. In order to collect data, a sample of 50 employees of ORSIM (an economic organization specialized in the manufacture of screws and bolts) was surveyed and the retrieved data was processed using the Statistical Package for the Social Sciences (SPSS) program (25).Findings of the study confirmed that there is a statistically significant effect of marketing intelligence on marketing innovation in all its dimensions. Also, there is an impact of marketing intelligence on pricing innovation as the first degree, followed by distribution innovation and product innovation, and lastly the impact on the dimension of promotion innovation.

Article written by (عظـامو & قداش 2022), where the study conducted by the two authors aimed to identify the role that technological intelligence plays as one of the dimensions of business intelligence and as an important strategic factor in promoting technological innovation in Condor's electronics and home appliances production organization in Borg Bouaririg, through a survey that was later analyzed using the Statistical Package for the Social Sciences (SPSS) program.

The research showed the following findings:

The study showed a positive influence relationship between technological intelligence and product innovation as one of the indicators of technological innovation.

There is a very high level of correlation between technological intelligence and product innovation as one of the indicators of technological innovation.

Finally, the effective use of technological intelligence plays an important role in promoting and supporting the process of technological innovation.

Another article by (Otmani, 2023), that focused on the importance of technological intelligence for innovation dynamic. This study was based on

literature approach the researcher set a model in which he shows the impact of technological intelligence on innovation. Furthermore the researcher amplified that technological intelligence can provide invaluable impetus to the quest for innovation, particularly through active intelligence, which takes the form of a dedicated intelligence structure in which the role of each player is clearly defined, as opposed to passive intelligence, which is carried out without any structure at all. Technological intelligence can be the prerogative of all company departments, which can provide the company with information likely to trigger the innovation process. Finally, statistics show that Algerian companies do not fare well in terms of innovation in the rankings of various specialized organizations, which is why it is so important for Algerian companies to adopt technological intelligence activities in order to boost their innovation process.

Table 2.6 summary of the previous studies

Author(s)	Year	Objective	Methodology	Context / Sample	Main Findings
Saadeddine	**2023**	To assess strategic vigilance practices in service firms. (banks).	empirical survey implied	Banks in M'sila	Strategic vigilance is a proactive, continuous process vital for decision-making and competitive advantage.
Sahnoun & Bekhouche	**2023**	To analyze BI's role in facilitating international expansion.	Descriptive study	Algerian companies	BI detects "weak signals" in foreign markets, helping firms navigate risks and decide on international positioning.
Bessouh & Seddiki	**2022**	To evaluate BI practices and their impact on innovation.	Qualitative study (interviews with executives at ENIE).	ENIE company (Sidi Bel Abbes)	BI makes a significant positive contribution to innovation; however, monitoring remains in an "embryonic state".
Ghendour & Taybi	**2022**	To explore BI's role in protecting organizational reputation.	Qualitative analysis.	Algerian organizations	BI safeguards stability by predicting environmental crises and collecting data to manage organizational reputation.
Ghomrani & Bouroubi	**2022**	To analyze the informational behavior of	Qualitative case study	SOPT company	Strategic intelligence requires centralized coordination; its

		Algerian companies and their strategic intelligence process			effectiveness depends on specific organizational and human factors
Sihamdi & Belaachi	**2022**	To identify how BI areas influence decision-making quality.	Path analysis and factor analysis of questionnaire data.	Algerian economic institutions	Significant impact and correlation exist between BI areas and the quality of decisions.
Keroune & Ghadbane	**2020**	To diagnose the effectiveness of BI systems in industrial settings	Uses a diagnostic model (attributed to François Brouard); empirical analysis	Amouri Industrial Complex (Biskra)	Firms show good technological/commercial vigilance but lack a formal "culture" of intelligence, leaving resources underutilized
Belbassir & Ibn Barika	**2018**	To explore the influence of BI dimensions on quality, cost, innovation, and customer response.	Descriptive-analytical (SPSS).	SMEs	The study confirmed significant positive relationships between BI dimensions and competitive advantage elements, particularly quality, cost, innovation, and responsiveness to customer needs.
Bendiabellah & Djennas	**2015**	To study BI awareness and strategic information mastery.	Survey research	350 Algerian companies	Effective BI requires a cultural shift toward collective will and long-term investment, which is currently lacking.

Studies on Innovation in Algerian Companies

Author(s)	Year	Objective	Methodology	Context / Sample	Main Findings
Sedkaoui & Benaichouba	**2022**	To analyze the role of digital technologies in promoting an open innovation approach.	Field study	68 industrial firms	Digital technologies optimize innovation processes and facilitate knowledge sharing with external partners.
Guechari, Grichi & Meghazi Larafi	**2022**	To identify the importance of technological innovation and its	Descriptive & analytical	Industrial firms	Innovation drives performance by stimulating market demand and creating new revenue streams.

		associated risks.			
Joudi & Joudi	**2021**	To link green innovation to sustainable development.	Conceptual network building	General organizational context	Green innovation contributes to sustainable development by reducing costs, improving environmental performance, and producing eco-friendly products
Kessas, Gouri & Benachenhou	**2021**	To study the relationship between knowledge creation and innovation	Empirical study	SONELGAZ	No significant relationship was found between knowledge creation and innovation due to the monopolistic position and field of activity of the company
Mancer	**2021**	To diagnose underperformance in innovation.	Descriptive and analytical approach	Algerian companies	Algerian firms show weak innovation commitment due to limited resources and an unfavorable business environment
Amghar & Hassaine-Kazi Tani	**2018**	To develop a theoretical foundation for understanding innovation and innovation processes	Literature review	General	Innovation is a planned strategic process adapted to market needs that improves competitiveness and creates value.
Omrani & Krari	**2018**	To study the structure of the national innovation system in Algeria and its role in spreading modern technologies	Theoretical and applied analysis	Algerian NIS	Public initiatives supporting innovation and research are increasing, indicating movement toward a development-oriented economic model
Khenniche	**2016**	To examine leadership's role in the innovation process	Conceptual analysis	Firms	Leadership supports innovation processes through participative management, communication, and the development of collaborative innovation

					networks.
Metaiche, Hadri & Tahir	**2016**	To measure innovation using OECD standards.	Empirical analysis	Algerian firms	Innovation in Algeria depends largely on government support, while private sector participation remains limited
Traki & Boukrif	**2015**	To evaluate the state of innovation within the agri-food sector in the wilaya of Bejaia.	Case study	Agri-food companies in Bejaia	Firms lag behind because innovation relies on individual efforts rather than structured managerial practices
Karar	**2014**	To review innovation management at the corporate level	Conceptual review	General	Innovation creates value and strengthens competitiveness

Studies on BI and Innovation Relationship

Author(s)	Year	Objective	Methodology	Context / Sample	Main Findings
Otmani	**2023**	To focus on the importance of technological intelligence for innovation dynamics	Literature-based analytical approach	Algerian companies (general)	technological intelligence provides strategic information that stimulates innovation, and Algerian firms need to strengthen intelligence practices to improve innovation performance.
Meslati & Bounouira	**2022**	To determine marketing intelligence's impact on innovation	Survey, SPSS analysis	50 employees at ORSIM	Marketing intelligence significantly impacts innovation, specifically regarding pricing and distribution strategies
Azzamou & Kaddache	**2022**	To link technological intelligence to product innovation.	Survey (SPSS).	Condor (B.B. Arréridj)	There is a very high correlation between technological intelligence and successful product innovation outcomes
Hetahat & Saïdat	**2017**	To examine BI as a pillar of innovation management	Conceptual analysis	Organizational context	Innovation is fueled by "intelligence products"; the most successful innovators apply BI

					frequently.
Mohellebbi	**2015**	To study intelligence within a cluster policy framework.	Triple Helix analysis	Economic organizations under cluster policy	nnovation is a collective effort between industry and state; intelligence clusters are key to cluster success.
Meriem, Hassaine & Maliki	**N/A**	To survey BI's impact on telecom innovation.	Survey research	3 Algerian telephone operators in Tlemcen: Ooredoo, Djezzy, Moblis	Business intelligence tools support innovation by facilitating access to information, but external factors such as market conditions may limit the innovation outcomes

Section four: Literature review on Absorptive Capacity

2.4.1. Absorptive capacity literature analysis:

In his review (Sakhdari, 2016) tried to comprehend how and why absorption capacity AC can be used for different organizational ends, by reviewing empirical studies on AC, He classified the results obtained into categories: articles conceptualizing AC, AC's outputs, moderators between AC and different organizational outputs, AC's antecedents. (Sakhdari, 2016) makes evident the gap in the theory on how organizational mechanisms could affect different features of AC.

Similarly, (Song, Gnyawali, Srivastava, & Asgari, 2018) have done a conceptual review of literature and identified:

- constitutive dimension of AC: Is composed of three dimensions; absorptive effort, absorptive knowledge base and absorptive process;
- End results of AC: knowledge acquisition, innovation and firm performance;
- Possible external knowledge conditions: the source of external knowledge and the type of this knowledge, governance mode.

As results of the meta-analysis Song et al. (2018) carried out, he found out that:

- AC does have a significant possible effect on firm outcomes;

- The acquisition of knowledge and innovation fully mediate the effect of absorptive knowledge base, but it only mediate partially when it comes to the effects of absorptive capacity and absorptive process on the performance of the firm;
- External knowledge contingencies do affect AC's effects on firm performance.

2.4.2. Latest Absorptive capacity literature review:

(Pu & Liu, 2023) did wat is called a meta-analysis; the basic concepts underlying meta-analysis were employed decades ago by (Thorndike, 1933)and Ghiselli (1949).Smith (1971) pointed out the need to cumulate findings across studies to provide a foundation for the establishment of cumulative knowledge and general psychological principle. There paper started with the first introduction of absorptive capacity in 1990 and used 1990–2021 as the search interval. A total of 6730 search results were obtained, however the relevant literature was narrowed to 301 articles. Finally, the total number of studies that met all criteria was 58 (Pu & Liu, 2023) p, 11. Therefore, to effectively integrate the variability of different empirical results and reveal the mechanism by which absorptive capacity acts on firm performance, this paper explores the relationship between absorptive capacity and firm performance from the perspectives of both theoretical exploration and META analysis. Authors found in their study, that in the literature review two problems with absorptive capacity theory are identified:

1. The abstract nature of the absorptive capacity concept: and this abstraction is due to the definition of AC, which is the result of an analogy between corporate knowledge acquisition processes and computer information processing processes that is based on cognitivist learning theory.

2. The variability of the empirical results on absorptive capacity: This stems from the neglect of specific contexts and the lack of a systematic assessment of absorptive capacity and firm performance.

Further findings of this study shows that AC that exhibits accumulation has a lesser impact on current firm performance, while AC that is dynamic has a bigger impact on current firm performance.

In terms of economic context, developing countries exhibit the dynamic nature of AC due to the backwardness of their knowledge systems and their lack of institutions. In terms of environmental dynamism, additional costs may reduce firm performance due to rapid environmental changes, while non-dynamism leads to a higher level of performance due to the role of knowledge accumulation. In terms of industry influences, the differences are nonsignificant due to the role of dynamism and the complexity of the knowledge base in high technology industries. Overall,

Through the process of theoretical combing, this paper finds that the existing core concept of AC is based on cognitivism, and the existing process behind absorptive capacity is based on a linear cognitive information processing process that focuses on the internal cognitive structure and process of the subject. However, due to the dynamic and complex nature of social phenomena, the process model cannot effectively reflect the influence of contextual factors on their relationships. Finally, the role of absorptive capacity on firm performance has significant contextual characteristics, among which the research context, economic context and sample context all have significant but distinct moderating effects on absorptive capacity and firm performance.

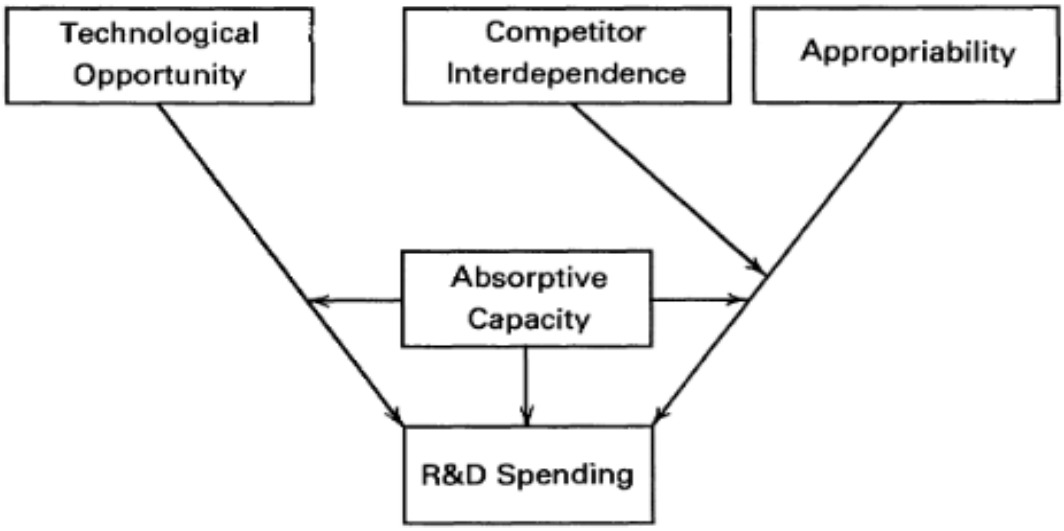
2.4.3. Different models of absorptive capacity:

- **Cohen and Levinthal (1990) model:**

Cohen and Levinthal (1989, 1990) introduced the term absorptive capacity to label the capabilities of the firm to innovate and, thus, to be dynamic. The dimensions proposed in their model are:

- Ability to value knowledge through past experience and investment
- Ability to assimilate:
  - based on knowledge characteristics
  - based on organizational or alliance dyad characteristics
  - based on technological overlap
- Ability to apply:
  - based on technological opportunity (amount of external relevant knowledge)
  - Based on appropriability (ability to protect innovation).

Figure 2.22 Cohen and Livinthal's absorption capacity model (1990)

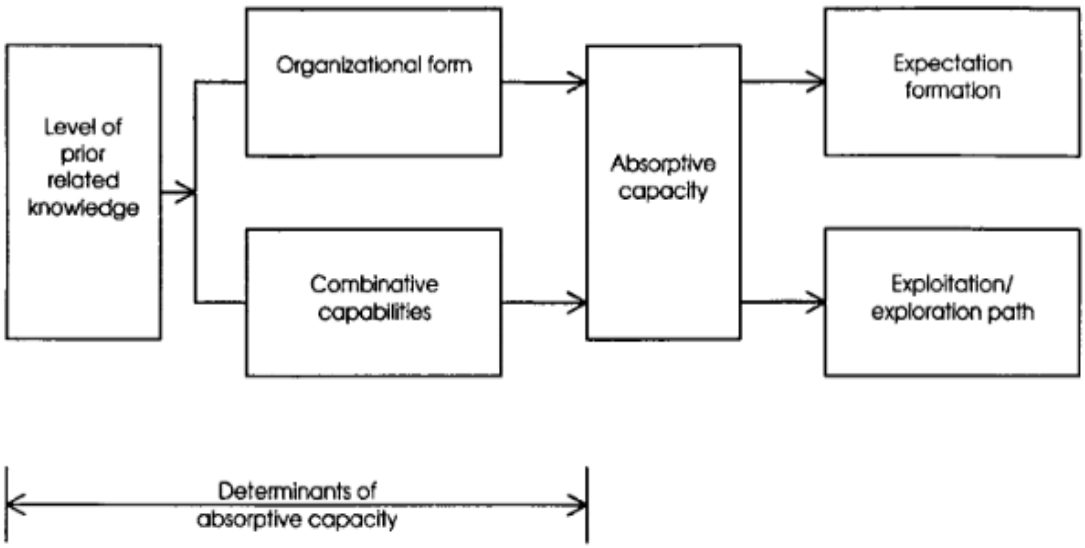


Source: (Cohen & Levinthal, 1990), p.140.

- **The Van den Bosch, Volberda and De Boer model (1999):**

(Van den Bosch et al., 1999) distinguish between three types of determinants of absorptive capacity, and two types of organizational outputs (absorptive capacity being considered a moderating variable). The determinants of absorptive capacity include the degree of prior knowledge specific to the knowledge domain to be transferred, and two types of context-specific determinants, namely organizational structure (traditional functional, matrix, network), and various sets of related or combined organizational capabilities (coordination capabilities, formal systems capabilities, socialization capabilities) (Van den Bosch et al., 1999, p.555). These various capabilities translate into various organizational mechanisms, such as participation in decision-making, or the routinization of practices (Jansen, Van Den Bosch, & Volberda, 2005).

Figure 2.23 Van den Bosch, Volberda and De Boer model (1999)

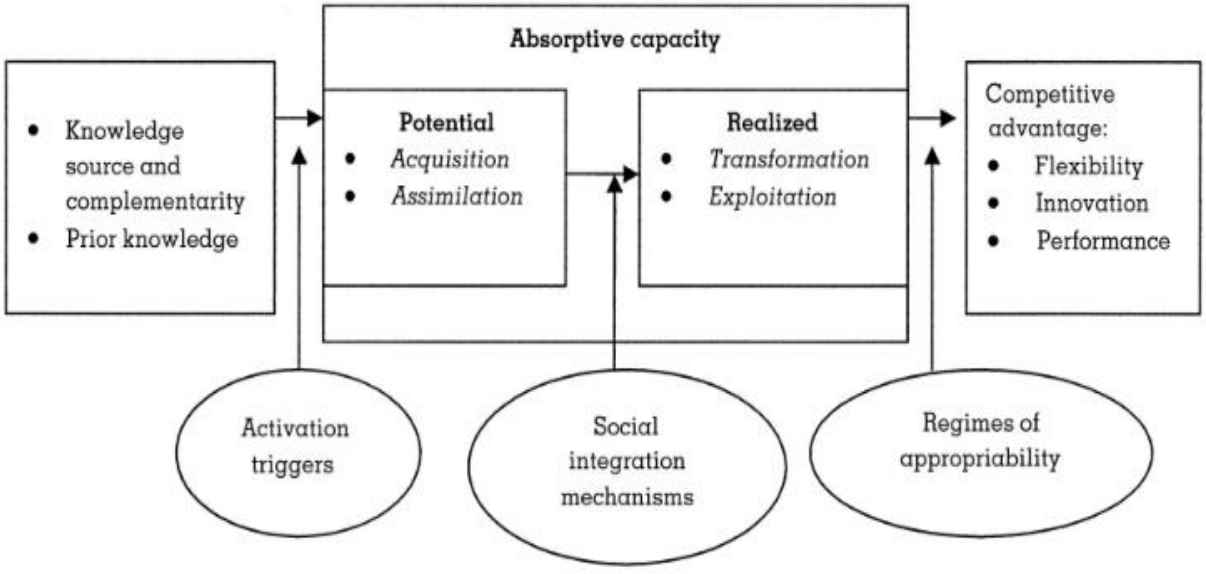


Source: (Van den Bosch et al., 1999), p.554.

- **Zahra and George (2002) model:**

Zahra and George's reconceptualization, strengthen theorizing on absorptive capacity. The refined model of absorptive capacity builds systematically on Cohen and Levinthal's (1990) seminal article, with a more extensive literature review on innovation and learning. They added "transformation" dimension. Also they proposed two meta-dimensions: potential absorption capacity (PACAP) and realized absorption capacity (RACAP). The two authors show that companies that have developed a high realized absorptive capacity, more exactly a capacity for transformation and exploitation, are likely to have excellent results in terms of innovation and new product development. However, companies that develop a high potential absorption capacity, i.e. a high capacity for acquisition and assimilation, will have greater flexibility and a greater ability to reconfigure their resources in line with strategic challenges.

Figure 2.24 Absorption capacity model by Zahra and George (2002)

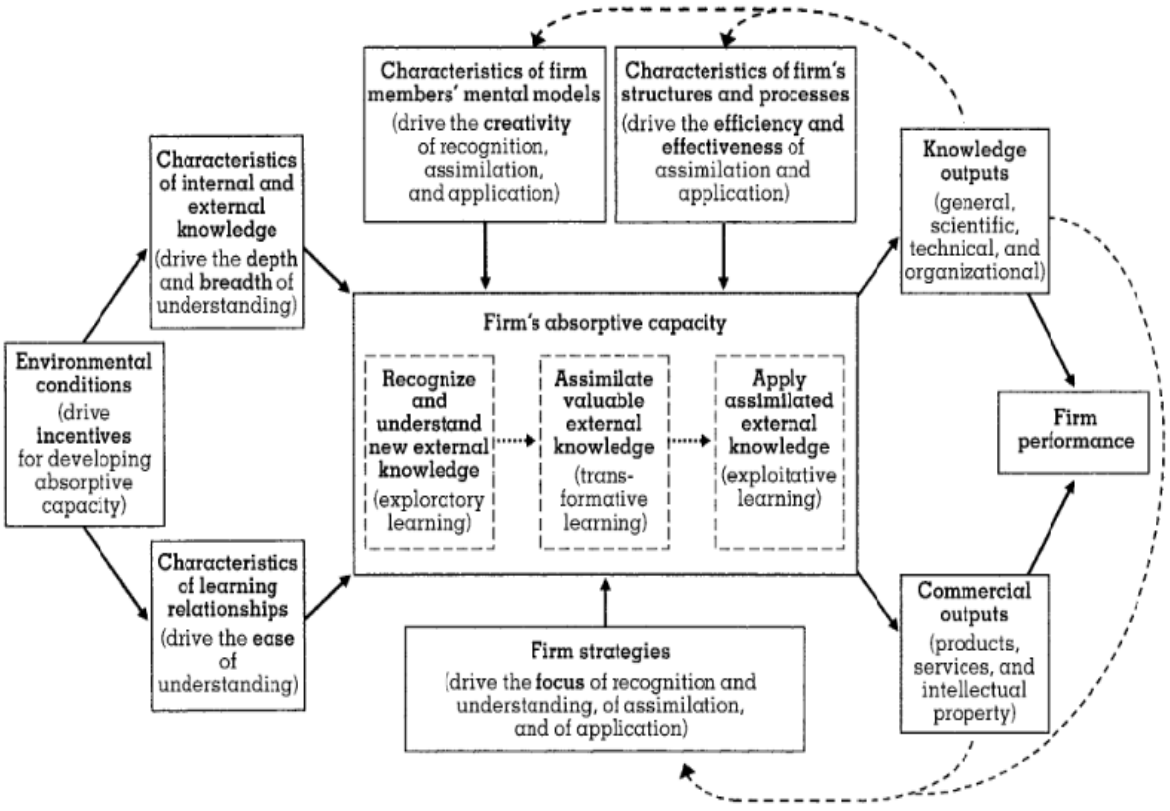


Source: (Zahra & George, 2002), p. 192.

- **Lane, Koka and Pathak model (2006):**

(Lane, Koka, & Pathak, 2006), p.857) develop a model that values the process of antecedents - absorptive capacity - outcomes, but refocuses on the drivers of absorptive capacity, both internal and external, on the multidimensional view of absorptive capacity, and on the outcomes ultimately achieved. (Fig 2.25) shows the Lane, Koka and Pathak (2006) model in detail. Through exploratory learning, the organization recognizes and understands the value of new external information. Through transformation learning, they assimilate and transform the newly acquired knowledge, and through exploitation learning, they apply and exploit the knowledge generated. The learning environment, the type of internal and external knowledge, and learning relationships all influence the development of absorptive capacity through R&D investment choices.

Figure 2.25 Lane, Koka and Pathak model (2006).

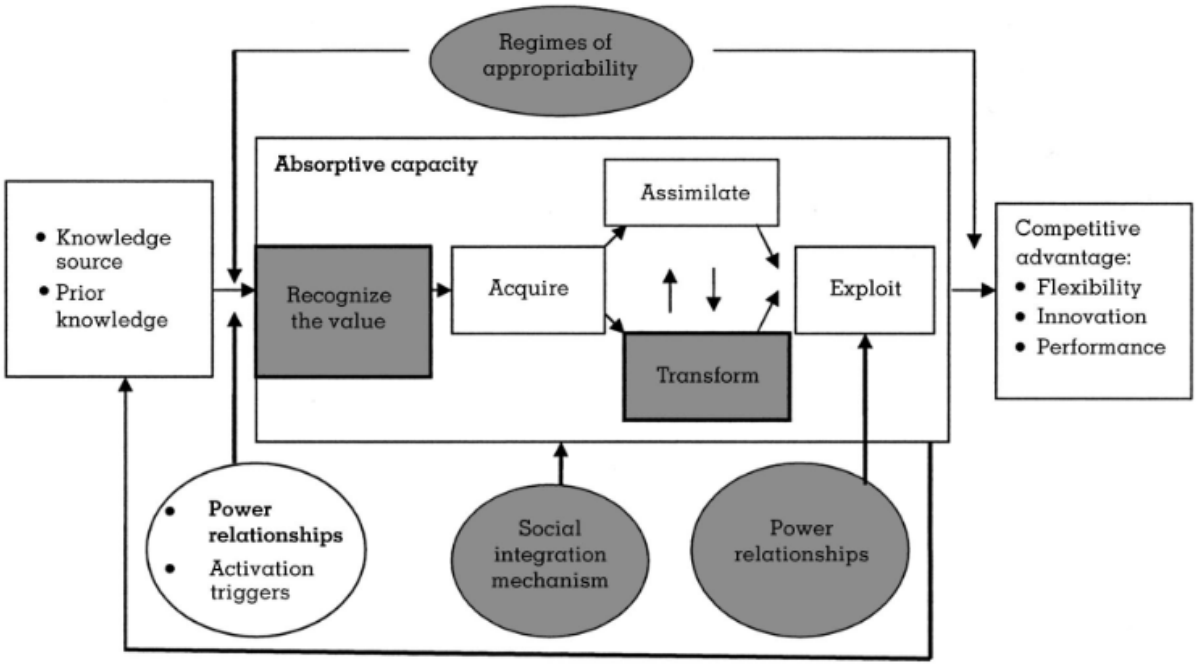


Source: (Lane et al., 2006), p.856.

- **Todorova and Durisin (2007) model:**

In a critical analysis of Zahra and George's (2002) model, Todorova and Durisin (2007) criticize them for having strayed far from Cohen and Levinthal's (1990) concept of origin. They suggest reintroducing the notion of value recognition as a step preceding the acquisition of knowledge. They argue that the processes of assimilation and transformation do not take place in sequence, according to Zahra and George's (2002) model, but are rather two alternative ways of processing new knowledge Todorova and Durisin.(2007,p.778). Assimilation takes place on the basis of acquired cognitive structures, whereas transformation requires an upgrade of cognitive structures to process the new information. Either alternative leads to the process of exploiting acquired knowledge, as shown in Figure 5. Authors also argue that social integration mechanisms can have a positive or negative influence on the development of absorptive capacity. They contradict Zahra and George's assertion that only strong ties and not weak ties can positively influence absorptive capacity Todorova and Durisin. (2007, p. 781). Moreover, the authors introduce the notion of power relations to the model. They influence the recognition of value and the exploitation of knowledge through the allocation of resources by those with power. They moderate the impact on the processes of assimilation, transformation and the development of absorptive capacity Todorova and Durisin. (2007, p. 782). Finally, to conform to the dynamics of the model expressed by Cohen and Levinthal, a feedback loop is indicated between generated knowledge and initial knowledge.

Figure 2.26 Todorova and Durisin (2007) model



Source: (Todorova & Durisin, 2007), p.776.

- **Sun and Anderson model (2010):**

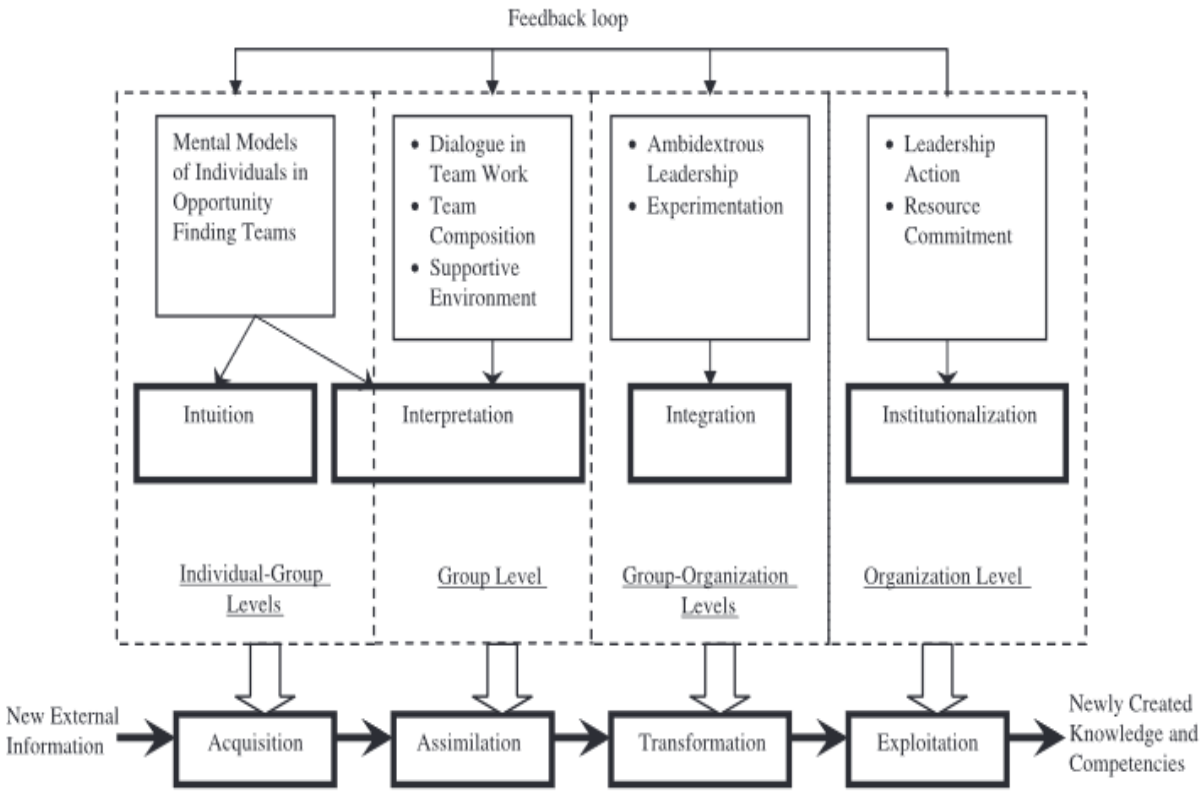
According to their model, the ability to acquire results from the social-psychological process of intuition and interpretation (fig). This ability enables to evaluate external sources of information and acquire knowledge from them.

Individual in nature, it extends to the group. Knowledge, meanwhile, needs to be reformulated to become intelligible in the context of the organization. This learning capacity is influenced by individuals' intuition and interpretation of events Sun and Anderson (2010.p, 142). The ability to assimilate is the result of the social-psychological process of interpretation. It involves analyzing, interpreting and understanding external sources of knowledge in the context of the organization. For the authors, this dimension of absorptive capacity is limited primarily to the group that decodes the information and subsequently shares it within the organization Sun and Anderson (2010.p, 143). The ability to transform is the result of the social-psychological process of integration. It

comes into play when the group shares the reformulated information within the organization Sun and Anderson (2010.p, 144).

Thus the ability to exploit results from the socio-psychological process of institutionalization. This last one, is also presented as the process by which new learning is embedded in new patterns of interaction governed by changes to systems, processes and structures Sun and Anderson (2010.p, 145).

Figure 2.27 Sun and Anderson model (2010)



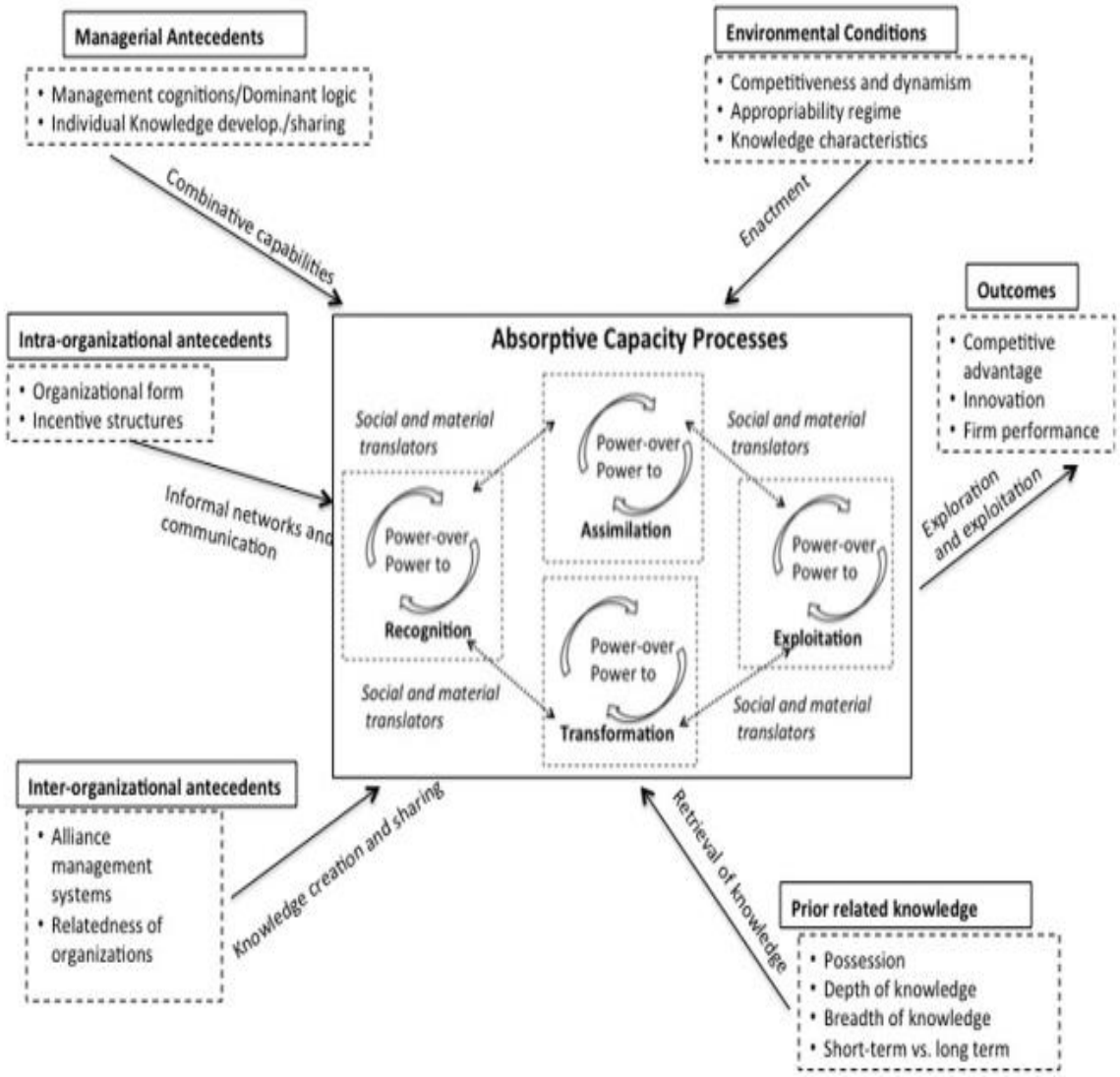
Source : (Sun & Anderson, 2010), p.142

- **Marabelli and Newell model (2014) :**

The model they use to advance their reconceptualization is that of Zahra and George (2002). Their reconceptualization describes how knowledge and know-how, involving the notion of power, produce a capacity to absorb external knowledge (fig). In contrast to Zahra and George's (2002) linear four-dimensional process, (Marabelli & Newell, 2014) present these dimensions

(acquisition, assimilation, transformation and exploitation) as four interactive phases that can overlap. The arrows linking the phases represent the movement of knowledge through space and time.

Figure 2.28 Marabelli and Newell model (2014)



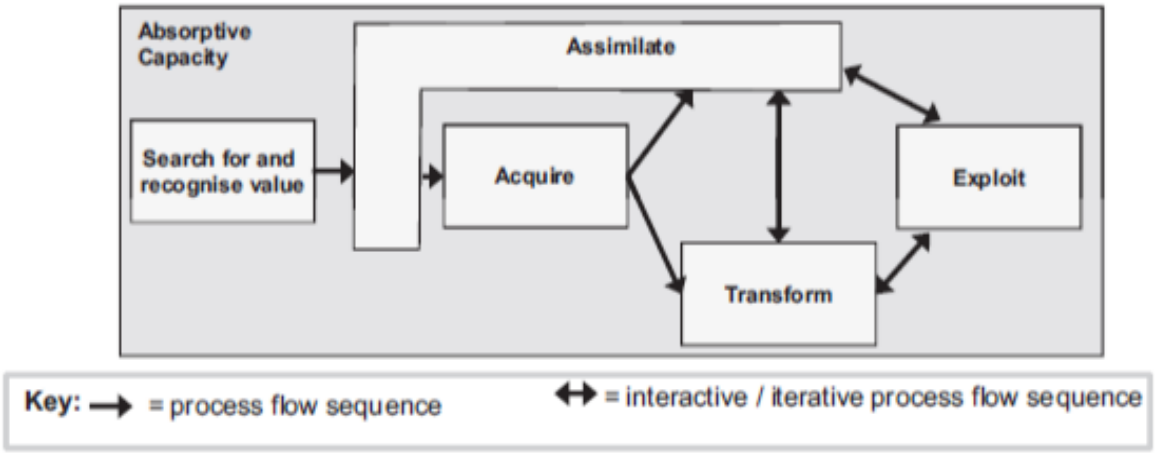
Source: (Marabelli & Newell, 2014), p. 11.

- **Patterson and Ambrosini model (2015):**

Authors built their model based on the studies of Zahra and George's (2002) and Todorova and Durisin's (2007). The new contribution to the literature and the model proposed was also based on empirical data. They suggest, that 'search for

value' and 'recognize value' should be split out from 'acquire', creating a sequential order to the 'assimilate and acquire' components. Adding, 'assimilation' should be recognized as continuing throughout the 'acquire, transform and exploit' components (Fig 2.29). *"The absorptive capacity model is not an inward looking process, but rather it should be connected to external organizations"* (Patterson & Ambrosini, 2015), p.86).

Figure 2.29 Patterson and Ambrosini model (2015)

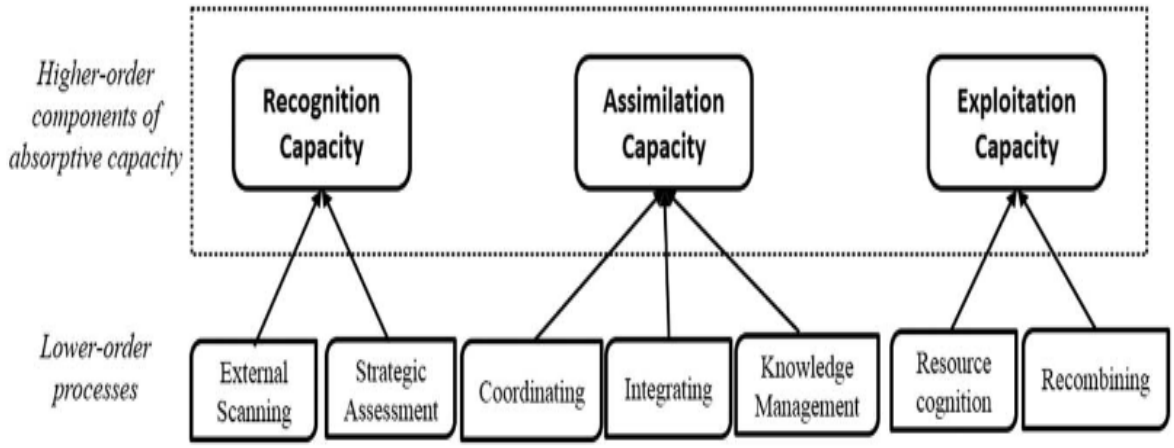


Source: (Patterson & Ambrosini, 2015), p.88.

- **Zobel model (2017) :**

In a study of open innovation, (Zobel, 2017)proposes a multidimensional model, articulated on the model of Zahra and George (2002), which clarifies the processes underlying the dimensions recognizing, assimilating and exploiting external sources of innovation. It demonstrates a positive relationship between access to external technological resources and the presence of a competitive advantage and innovation for an organization. This relationship is mediated by the organization's technological capabilities Zobel (2017, p.269) and is modified by the absorptive capacity of the organization.

Figure 2.30 Zobel model (2017)



Source: (Zobel, 2017), p. 273.

Table 2.7 Different absorption capacity models.

	Cohen & Levinthal (1990)	Van den Bosch et al, (1999)	Zahra & George (2002)	Todorova & Durisin (2007)	Sun &Anderson (2010)
Objective	Conceptualization of the construct: AC is 'the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends'. (p. 128)	Extension of the relative AC construct definition that focuses on organizational structure; moreover, the environment (stable vs. turbulent) can determine different ways to combine knowledge.	The reconceptualization has two main characteristics: (1) AC is seen as a dynamic apability; and (2) the four capabilities – acquisition, assimilation, transformation, and exploitation of new external knowledge – are combinative in nature and build upon each other to produce a dynamic organizational capability (AC). A process view of the construct is also developed.	Introduction of power relationships in the AC construct: the revised model (based on Zahra and George) highlights that power acts in particular in the phases of acquisition and exploitation. Moreover, it is suggested that power can partially explain why some firms are better in exploiting external knowledge.	Links between AC and organizational learning (OL): AC is part of OL and Zahra and George's four phases (learning capabilities) of AC are integrated with Crossan et al. (1999) OL model.
Determinants of	Previous	Levels of prior	Previous	Knowledge	Acquire results

absorptive capacity	knowledge of the company	knowledge Organizational structure Related organizational skills	knowledge of the company Additional sources of knowledge	sources Prior knowledge	from the social-psychological process of intuition and interpretation
Mediator variables	/	Absorptive capacity	Trigger Social integration mechanisms between potential absorption capacity and realized absorption capacity. Protective measures to curb imitation when creating products and services.	Recognizing value. Acquisition. Assimilation. Transformation. Exploitation.	Individuals intuition and interpretation of events
Outputs	Innovation Firm performance	Ability to detect opportunities in the environment	Innovation Firm performance	Flexibility Innovation Firm performance	New knowledge and competencies.

	Marabelli &Newell (2014)	Patterson &Ambrosini (2015)	Zobel (2017)
Objective	AC construct should be interpreted in light of the	'Search for value' and 'recognize value' should be	Clarifies the processes underlying the dimensions

	possession and the practice perspectives of knowledge power relationships.	split out from 'acquire', creating a sequential order to the 'assimilate and acquire' components.	recognizing, assimilating and exploiting external sources of innovation.
Determinants of absorptive capacity	Managerial antecedents Intra-organizational antecedents Inter-organizational antecedents Environmental conditions Prior related knowledge.	Project/programme management R&D discovery and/or development (various scientific departments) Commercial Alliance management.	External technological resources.
Moderator variables	human and material Social and material translators.	Regime of appropriability Organisational slack Project/programme management Alliance and collaboration management Social integration Mechanisms. Network strategy	Organization's technological capabilities.
Outputs	Competitive advantage Innovation Firm performance	Flexibility Innovation Firm performance	Competitive advantage Innovation

Source: (Meryem Amghar & Hessaine, 2023), p.109-110. Adapted by the researcher

Conclusion of chapter two:

In the first chapter, we defined the subject of our research. In this second chapter, we expanded our understanding by defining the processes of business intelligence, innovation and absorptive capacity.

First, we reviewed and defined different BI processes and identified the actors involved. We have noticed that innovation processes have undergone many changes over the years, and therefore many processes have been established by researchers in this field. However, it has been more difficult to keep track of changes and determine the processes developed by researchers in the field of BI, because this subject is not addressed in the literature as much as innovation.

The third section of this chapter was dedicated to a literature review on our subject. We examined previous studies on BI and innovation, and tried to find as many studies as possible that addressed the relationship between the two subjects, and more specifically, the impact that BI could have on innovation. All of these studies were conducted in Algerian enterprises and examined the Algerian economy.

With regard to our moderator variable, Absorptive capacity, we conducted a more extensive review of the extant literature on the subject in section four of this chapter. This was useful in creating our research framework, which we then used as a foundation for our field study, which is explained in the following chapter.

Chapter three:

Empirical research study

Introduction:

After gathering sufficient information through a review of the theoretical literature in the previous two chapters, which was used to formulate and test the study's hypotheses using statistical methods, we first identified the model on which the study was based and adapted it to create a model specific to our current study. We also designed a questionnaire tailored to the study, which we administered to a pilot sample to assess its validity and reliability, making the necessary adjustments before distributing it more widely to the study sample.

This chapter is divided into four sections. In the first section, we will identify the relationship between the variables and explain our choice of research model.

In the second section, we will identify the study hypotheses and the tools used in our research. In section three, we will test the study hypotheses and discuss the results obtained.

Chapter three: Empirical research study

Section one: Selecting a search model

3.1.1. The relationship between variables: Selecting a search model

The research topic is centered on clarifying the impact of Business Intelligence on the innovation process in Algerian organizations, based on many previous studies that emphasized the existence of a positive relationship between the information obtained by the organization through various types of Intelligence, which in turn feeds the process of the innovation system, but most of these studies lacked application on the practical level with field studies.

Based on the assumption that the innovation process depends on the information provided by the BI process, we relied on absorptive capacity as a mediating factor that allows us to measure the relationship between BI and innovation.

3.1.2. Selecting a search model:

The aim of this research is to determine the role that business intelligence can play in the innovation process using absorptive capacity as mediator factor. And for that we decided to relay on the Todorova and Durisin (2007) model who reintroduced an important notion of *value recognition* as a step preceding the acquisition of knowledge, this important step was initially set by Cohen and Levinthal's (1990) in their model, however in Zahra and George's (2002) model they excluded this dimension, and their main focus was to distinguish between potential absorptive capacity (PAC), which makes the company receptive to the acquisition and assimilation of external knowledge, and realized absorptive capacity (RAC), whose function is to transform and exploit information, and to take advantage of the knowledge absorbed thanks to PAC.

In Todorova and Durisin (2007) model, there is no separation between (PAC) and (RAC). They argued that social integration mechanisms can have a positive or negative influence on the development of absorptive capacity.

In our study it is important to use a model that is just adapted the nature of our country’s economy and especially to the nature of Algerian enterprises, who showed a shy adoption to either of business intelligence practices or adoption of

innovation as shown in the literature review (see chapter 2). There for the Todorova and Durisin's (2007) model lines perfectly with our point view, we need to know if Algerian enterprises recognize the value of information, and could tell withier an information is valuable and important form the one that is not.

Many researchers have adapted the Todorova and Durisin (2007) model, such as the research of (Punpukdee, 2020) ,that is about the innovative knowledge productivity, and the author used a comparison between several knowledge productivity models, and for absorptive capacity he used Todorova and Durisin (2007) model. Also (Ziam, Arduin, & Vieru, 2018) used Todorova and Durisin (2007) model in their study that focuses on the importance of educating knowledge holders and developing their skills needed to engage in a secure knowledge sharing process.

In his study, (Takahashi, 2009) re-conceptualized Todorova and Durisin's (2007) model, this paper points out the limitation of the conventional conceptualization of absorptive capacity, that are (1) the absence of sender of Knowledge, (2) inadequate explanation of "dynamic capability" within the knowledge transfer (absorption) process, and (3) the lack of consideration into socio-cultural difference between sender and recipient.(Dávila, Andreeva, & Gregório Sætre, 2019) also used Todorova and Durisin's (2007) model in order to explores the role of social integration mechanisms for knowledge absorptive capacity in southern Brazilian firms.

For the preps of our research, we will adapt the Todorova and Durisin's (2007) model to study the relationship between business intelligence and innovation through absorptive capacity. Because we are mostly interested in employees' ability to recognize the value, assimilate, acquire, transform and exploit information from business intelligence, to fuel an innovation process. We therefore introduce business intelligence as an independent variable, absorptive

capacity as a moderating variable (based on the literature review below), and innovation as a dependent variable.

3.1.3. Absorptive capacity as a mediator variable:

There are many studies that analyzed the impact of AC on innovation in terms of its dimensions, that is, PAC and RAC (Gölgeci, Swiatowiec-Szczepanska, & Raczkowski, 2017; Heil & Enkel, 2015), as well as science-push and demand-pull AC (Murovec & Prondan, 2009). The vast majority of researches showed a positive influence on AC. It was demonstrated that both PAC and RAC have an impact on firms' product and process innovation (Ali and Park, 2016), as well as on innovation capabilities (Nazarpoori, 2017). Furthermore, AC as a whole construct showed a positive effect both on explorative and exploitative innovation (Limaj, Bernroider, & Choudrie, 2016; Kohlbacher, Weitlaner, Hollosi, Grünwald, & Grahsl, 2013), as well as on product innovation (Moilanen et al., 2014; Su et al., 2013) and innovation capabilities (Dutse, 2013; Wuryaningrat, 2013). Table (3.1) summarizes the main studies on absorptive capacity as a mediator variable.

Table 3.1 Mediation forces acting on AC and innovation relationship

Force	Absorptive capacity	Innovation	Influence	Authors
Appropriability regime	PAC	Incremental radical	Positive	Ritala and Hurmelinna-Laukkanen (2013)
Autonomous R&D climate	AC	Innovation	Negative	Huang et al. (2015)
Cultural barriers (CB)	PAC	Innovation	Negative	Leal-Rodríguez et al. (2014)
Dynamism and competition in BCs	AC	Explorative	Positive	Kohlbacher et al. (2013)
Dynamism and competition in BCs	AC	Explorative	Negative	Kohlbacher et al. (2013)

Innovative culture (IC)	PAC	Process management	Positive	Ali and Park (2016)
Innovative culture (IC)	PAC	Product	No effect	Ali and Park (2016)
Innovative culture (IC)	RAC	Process management	Positive	Ali and Park (2016)
Innovative culture (IC)	RAC	Product	No effect	Ali and Park (2016)
Organizational cultural intelligence	AC	Innovation	Positive	Gölgeci, Swiatowiec-Szczepanska, and Raczkowski (2017)
Organizational cultural intelligence	PAC	Incremental radical	Positive	Gölgeci et al. (2017)
Organizational learning	AC	Innovation	Negative	Garcia-Morales et al. (2007)
Social network sites	PAC	Innovation	Negative	Scuotto et al. (2017)
Technological turbulence	AC	Explorative	Positive	Su et al. (2013)

BCs: Business Clusters'

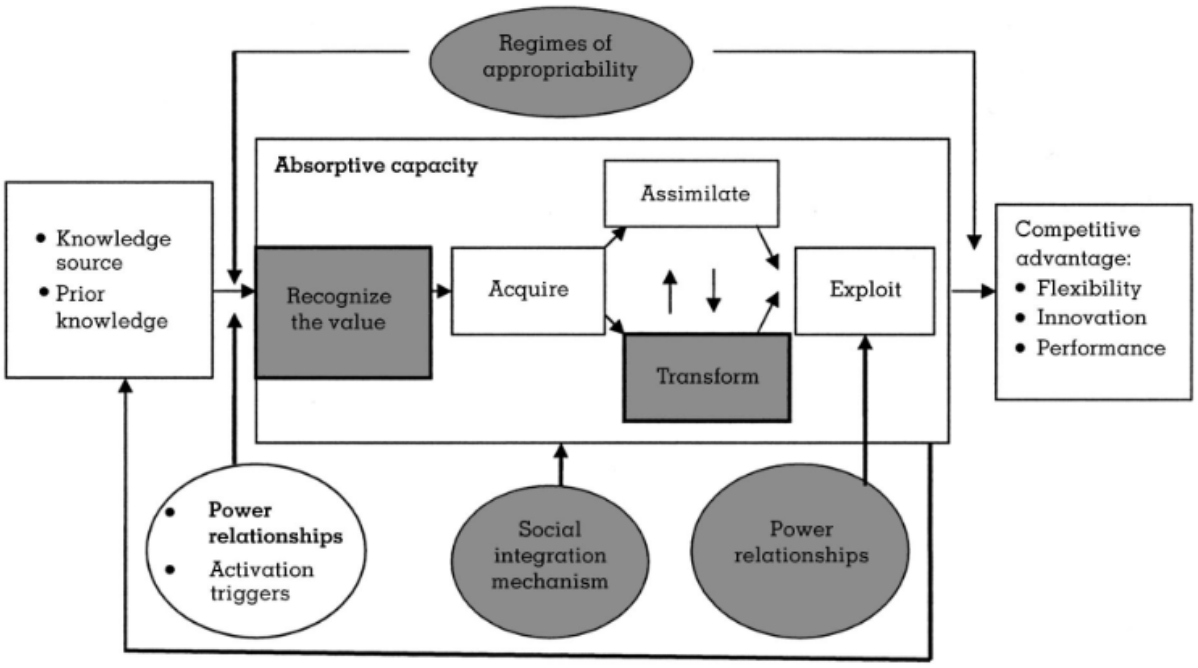
Source: (Mikhailov & Reichert, 2020), P.16, adapted by researcher.

Chapter three: Empirical research study

The proposed model for the study:

The initial model by Todorova and Durisin (2007):

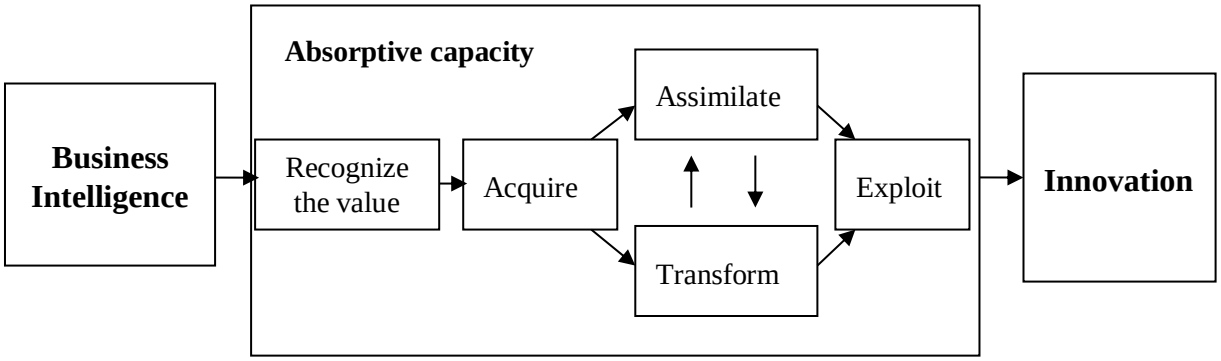
Figure 3.1 Todorova and Durisin (2007) model



Source: (Todorova & Durisin, 2007), p.776.

Our proposed research model adapted from the Todorova and Durisin (2007) model:

Figure 3.2 our study research model



Section two: Approach and methodology of the empirical study

3.2.1. Research problem and hypotheses:

The first step is to pinpoint the problem that we want to research.

- **Research problem:**

Some companies seek to use their existing technological knowledge to innovate in new fields of application (Cattani, 2006). Others seek to gather new information to feed their innovation process. For example, companies may engage in business intelligence. This activity enables them to try to understand and anticipate changes in their external environments, in order to reduce the uncertainties associated with any innovation process (Walkers et al., 2003). Some companies have also coupled their intelligence activity with their innovation process, in the hope of feeding it and the related decisions with richer, more relevant and anticipatory information.

Through previous studies, it shows that intelligence can foster creativity (Tang, 2016; Bertacchini and Strasser, 2011), identify opportunities and energize the innovation process (Howell and Shea, 2011); accelerate the innovation process thanks to the skills of intelligence officers (Kessler and Chakrabrati, 1996); facilitate the introduction and design of innovation on markets (Ahituv et al, 1998) and reduce the risks of divergence between market need and innovation (Caron- Fasan, 2008). Intelligence can thus play a role in innovation trajectories, and particularly in the development of innovative products/services.

Based on the literature pre-said, the purpose of our doctoral research is to determine whether there is an impact of business intelligence deployment on the adoption of innovation within Algerian enterprises. There for, our problem consists in answering the following main question:

"**What influence does the deployment of business intelligence have on the adoption of innovation through absorptive capacity**?"

Based on our research model (Fig 3.2), we will investigate the impact of deploying business intelligence on the adoption of innovation through the

different dimensions of absorptive capacity (recognizing value, assimilation and transformation, and exploitation).

- **Research hypotheses:**

To answer the research question, we set three main hypotheses, since we are looking to find the relationship between three practices within the enterprises business intelligence, absorptive capacity and innovation.

1. Business intelligence and the absorptive capacity:

Business intelligence is the management of information and knowledge to improve competitiveness. Its contribution consists in providing the organization with timely information and knowledge about its main competitors and its environment. The aim is to recognize the opportunities available to the organization to improve its competitive position, and to detect potential threats that could harm the organization's interests (Bournois & Romani, 2000). BI is a continuous process that never stops, and its phases are interconnected. Thus, the output of one phase represents the input of the next (Pellissier & Nzehele 2013).

Companies develop their dynamic capacities and organizational routines, enabling them to better apprehend the information they collect and make good use of it. This is known as developing the firm's capacity to absorb information.

The concept of absorptive capacity originated with the seminal article by Cohen and Levinthal (1990), where it is defined as “the ability of a firm to recognize the value of information, assimilate it and apply it to business purposes”. In the same way as business intelligence, a strong capacity for absorption can help companies to be proactive and identify opportunities in their market (Cohen and Levinthal, 1990). It has also been asserted that it contributes through its routines to the generation and maintenance of competitive advantage (Lewin et al. 2011).

Business intelligence refers to a company's ability to identify and acquire external information that is useful to its operations (Zahra & George 2002).

Indeed, the primary dimension of absorptive capacity, which is the acquisition of knowledge, is the first step in the business intelligence process: identifying

information needs. The assimilation dimension corresponds to the company's business intelligence stage. This is the phase of gathering information and processing it to generate information that can be transformed into useful knowledge for strategic decision-making. Furthermore, the transformation phase relating to absorption capacity corresponds to the phase of concrete use of the information collected and processed. Thus, the dimensions of information acquisition, assimilation and transformation correspond to the business intelligence cycle through which data is transformed into strategic information. Finally, the last dimension of absorption capacity, “exploitation”, refers to the strategic action resulting from this transformation of information into a strategic resource generating competitive advantage (flexibility, innovation and performance) (HAKMAOUI & BERRADA, 2020).

The findings of Cohen and Levinthal (1990) state that the absorptive capacity within organizations integrates the transfer of knowledge and the ability to understand and evaluate new knowledge. To do this, organizations must be able to recognize where relevant knowledge lies, so that the process of absorptive capacity can be set in motion. Rooting to Cohen and Levinthal (1990) model, Todorova and Durisin (2007) reintroduced “recognize the value”. And there for in our research we will focus on the ability of enterprises to “recognize the value” of information, to acquire it and transform it as part of their business intelligence process. Our first hypothesis is to look for the relation between business intelligence and absorptive capacity.

H1: There is a positive and significant relationship between business intelligence and absorptive capacity.

2. Absorptive capacity and innovation:

The capability of a firm to instill innovation depends on its knowledge resources. This capability can be utilized by facilitating knowledge sharing and absorptive capacity (Wuryaningrat, 2013). According to (Darroch, 2005), a firm which is able to manage its knowledge resources more effectively will

eventually be able to transform into a more innovative firm. A lot of literature and studies focusing on knowledge management have shown us that knowledge sharing and absorptive capacities are interesting, critical issues to be considered. The studies of (see, Liao et al. 2007; (Lin, 2007; Tsai, 2001); Tsai 2001) (Liao, Fei, & Chen, 2007) pointed out that knowledge sharing and absorptive capacity are the fundamental parts in the effort to improve innovation capabilities of a firm. Furthermore, (Davenport, 1998) who state that knowledge sharing must be supported by capability to absorb knowledge; otherwise, that knowledge will not be completely transferred. Despite the fact that knowledge management concept derived from Knowledge based View (KBV) theory focused on internal knowledge as main resource for organization's performance, Cohen & Levinthal (1990) proposed absorptive capacity concept that are vital to increase the speed, magnitude and frequency of innovation through the process of acquiring, assimilating, exploiting and transforming the knowledge(Saleh, Sani, & Noordin, 2018). They also assume that the level of absorptive capacity depends on learners' accumulated prior knowledge within an organizational context.

Todorova and Durisin (2007) state that the concept of power relationships, which interact with cognitive processes, learning, and capabilities in the organization, intra organizational power relationships can enable or inhibit the exploitation of new knowledge.

From all the above, we conclude that absorptive capacity, according to the results of various studies, has a positive role on innovation in the organization, and the greatest focus is related primarily to the human factor, as employees are the engine of this machine through their ability and skill in predicting and identifying important information related to the goals of the organization, and then collecting, analyzing and broadcasting it, and as a final step, processing it in order to support the wheel of innovation at the very end.

And for the purpose of our study, and following our proposed research model based on the Todorova and Durisin (2007): *"No new constructs of potential or*

realized absorptive capacity need to be introduced to investigate either the efficiency ratio or the balance of the four component capabilities", p.780.We will proceed to find the impact of the rest component of absorptive capacity namely "transform" and "exploit", as these two dimensions lead to the output of the AC process, in our case innovation.

H2: There is a significant positive relationship between absorptive capacity and innovation.

3. Business intelligence and innovation:

To innovate in new fields of application, some companies seek to use their existing technological knowledge (Cattani, 2006). Others try to gather new information to feed their innovation process. In this way, companies can carry out intelligence activities. This activity enables them to try to understand and anticipate changes in their external environments, in order to reduce the uncertainties associated with decision-making in an innovation process (Walker et al., 2003). from a managerial point of view, researchers showed that information and knowledge are strategic resources of an organization, therefore it very important to have advanced data analysis in order to allow not only faster decision making, but also enables the discovery of new business opportunities and furthermore, the identification of factors on which this development depends. In other words, BI stands for the synergy of data, information, processes, tools and technologies for data mining and multidimensional analysis (Liautaud, 2000), (Wells & Hess, 2002). (BI) is considered as a vital innovative tool for analyzing big data for organization's competitiveness (Ahmad, Ahmad, & Hashim, 2016).however, it is stated in in Gartner report that only 30% of BI projects meet the objectives of the business, so without careful considerations BI initiatives for creating innovation will not be successful (Ahmad et al., 2016). "*The uses of business intelligence systems, contribute to, and play an important role in highlighting the creative talents of organizations and add value to their work, to get through the different*

innovation output that helps them to put new products and services, designing new processes and methods"(Eckerson & Sherman, 2008). So, decision-makers today need for detailed and accurate information is provided by business intelligence structure, which enables them to use advanced tools for data analysis (Muntean, Cabău, & Rinciog, 2014).

Information is the engine of any system in the organization, especially the innovation system, which does not depend primarily on the development of the technology possessed by the organization as much as on its possession of an effective system that enables it to follow the market trend, predict the expressed and latent consumer desires, track everything related to its direct and potential competitors, and follow everything that may affect the work of the organization, whether inside or outside the country in which it operates. BI is a vital system that depends on several components, the most important of which is the nature of the people working with this system and their ability to carry out the intelligence process to the fullest in line with the goals of the organization, this system has shown that it contributes significantly to the organization's ability to innovate.

The main goal of our research is to find the impact that business intelligence can have on innovation, and for that we set the third study hypothesis.

H3: There is a positive and significant relationship between business intelligence and innovation.

Thesis empirical study:

After addressing the various epistemological and theoretical aspects of the different dimensions of the study, and after defining the model adopted in our study and defining the hypotheses, we will conduct an empirical study to test these hypotheses, through a questionnaire targets a group of organizations from different sector of activities.

3.2.2. Approach and methodology of the empirical study:

Discussions of methods centered at length on the quantitative/qualitative rivalry, but according to (Pierret, 2004) these debates actually distance the researcher from his objectives. She shares the theories of (Bourdieu, Chamboredon, & Passeron, 1968) who asserts that all methods have their limits and their share of biases, as none of them is capable of fully grasping social reality. Hence, we can't carry out research on a social entity or phenomenon without taking into account the quantitative data produced and the tools used to do it. As stated by (Dumez, 2016) who points out that *"the researcher himself is driven to produce and manipulate statistics in order to facilitate understanding of the actors under study, and to take the necessary distance; this is unquestionably part of his duties»*. So, despite the notable differences, a large number of authors advocate the combined use of qualitative and quantitative methods. Among them, (Pierret, 2004) mentions a complementarity between the two, particularly for standardized interviews and questionnaires.

The aim of all research work, whatever its scope, is primarily to develop "explanatory concepts" that facilitate understanding of the social processes we set out to analyze, hence its explanatory purpose and search for meaning" (Jones, 1999). Finding a problem consists in selecting, in a relevant way, the main theoretical references of the research in order to make the reality of the subject intelligible.

Since the aim of our study to determine the impact of Business intelligence on innovation, and in order to carry out our research and test the relationship between our variables, we opted for a descriptive-analytical approach, which involves synthesizing the data to draw out useful information or even prepare it for further analysis.

And for the empirical study we opted for a single method, a quantitative one through a questionnaire that was administrated to various executives, engineers

and department heads, to understand how these employees perceive this same relationship.

3.2.3. Method of data analysis:

We built our research model based on the Todorova and Durisin (2007) model who reintroduced “recognize the value” dimension as the first step in the absorptive capacity process, referring to the model of Cohen and Levinthal (1990) concept of origin. It is important for the employees charged with intelligence in the company to detect any potential important information when they see it.

For that, in this study we set three (3) hypotheses, to answer our research problem regarding the possible impact business intelligence could have on innovation, the first hypothesis is set to define the relationship between business intelligence and absorptive capacity, the second hypothesis is set the look for absorptive capacity’s impact on innovation, and the third hypothesis is eventually determine the relationship between business intelligence and innovation.

Following the study hypotheses, three fundamental variables are set and will be put to the tests, namely, business intelligence, absorptive capacity, and innovation. Each of these variables is determined by the dimensions that characterize them, and we drew on these to design our questionnaire. Before proceeding to analyzing phase, we first put our questionnaire to some stability tests, so we used Cronbach's Alpha, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity, calculated by SPSS (Statistique Package for social Sciences), version 22. Tests were satisfying, so we distributed the questionnaire on a wider range of enterprises.

Now, we move on to the analysis phase, which we have divided into four steps. First, we run a descriptive analysis of the respondents to find out about their age, qualifications, experience, position, and to find out more about the enterprises, regardless of their size, sector of activity, and targeted market. Descriptive

analysis of the various data helps to deepen the study and provide an overall description using statistics.

In the second step of the analysis phase, is dedicated to processing our moderator variable absorptive capacity. Based on the works of (Cohen et Liventhel, 1990; Van Den Boshe et al., 2005), who have stated that absorptive capacity is related to both: the level of education and experience within the enterprise. And for that, at this stage a bivariate analysis is deployed in the aim of comparing the average of the four dimensions of knowledge absorptive capacity with the explanatory variables (diploma and experience).

Following, the third step of the analysis phase, it involves hypotheses testing. In this part, we will confirm or refute the three hypotheses we proposed in our research, which resulted from our literature review. Several tests will be carried out, and the results obtained in this stage will highlight our various conclusions about the relationship between the variables.

The fourth and the last step of the analysis phase, is to study the correlation matrix and PCA (Principal Component Analysis), when initial variable is reduced to smaller factors and then loaded with the initial variables. The principle of resolution is to successively find a first factor that best summarizes the information contained in the initial matrix, then a second, independently of the first, that best summarizes the residual information, and so on. **Some variables will also be correlated by two.**

It is to note that in order to complete our analysis, we used SPSS software version 22.0 when it comes to the comparison of means and PCA (Principal Component Analysis), this software can produce descriptive statistics, frequencies, exams, crosstabs, t-tests, and the study of relationships between variables (e.g. correlation, regression, etc.). The same software is used to carry out the analysis of linear regression.

3.2.4. Sampling method:

Over 500 exhibitors (see appendix 2) participated in 31st edition of the Algerian Production Fair organized by the Algerian Company for Exhibitions and Exports (SAFEX) at the Pine Palace in the capital Algiers. This is where we carried out our field study. This faire lasted over then a week (the period for open visits to public).

14 December 2023 was the official opening day of the fair and its inauguration by the president of the country and from 15to 23 December of 2023 it was open to the public.

The main criterion for the choice of the survey sample is linked in particular to the concentration of a large number of companies of different sizes and in different sectors of activity in the same location.

No lists of exhibitors were provided to us by the organizers, we had to take a tour between all the different halls to identify the enterprises that could fit to our research. After spending two days identifying the exhibitors, we started excluding some categories of exhibitors as follows:

- The army: I fact, The People's National Army was represented by twenty nine (29) production units belonging to the Air Force and Navy Commands, the Signals, Information Systems and Electronic Warfare Department, the Central Directorate of Materiel and the Directorate of Military Industries of the Ministry of National Defense[†]. We excluded this category because they simply cannot participate in our study for security matters.
- Handicrafts: counting 38 exhibitors in this category, which we excluded because they are not enterprises, but more of small personal business.
- Promotional selling space: Where 40 exhibitors were invited to directly sell their goods to consumers.

Now this leaves us with 393 enterprises left, we still proceed to narrow it down because we were focused on innovative enterprises, so we continued excluding

[†] https://my.radioalgerie.dz/ar/node/22025

until we got 250 enterprises that fit our research and our time lapsed, since we had six days left to closer day.

We distributed 250 questionnaires, and got 121 questionnaire fully completed.

All the companies interviewed were informed of the purpose of the study, the institutional framework for the research, the time required to complete the questionnaire, the themes and the anonymous nature of their responses.

3.2.5. Data collection and description:

After all the information we have learnt from the theoretical side, we were able to develop our survey, Most of the measures of our variables come from previous research on absorption capacity, mainly those proposed by (Chauvet, 2003) and a similar study to our research conducted by (Meriem Amghar, 2019).

Section three: Questionnaire design and Data analysis

3.3.1. Elaboration and analysis of the stability of the questionnaire:

-Method of administering the questionnaire:

As far as data collection, we distinguish between two methods of administering questionnaires to interviewees: it can be self-administered (by e-mail or post) or presented by an interviewer (by telephone or face-to-face).

We initially solicited the participation of company directors and managers by sending them an e-mail in January 2023, explaining the objectives of the study and giving the address of the website where the questionnaire was housed. Unfortunately, out of a sample of 300 random Algerian companies, only three companies returned the questionnaire. After three reminder emails a month apart, only one company returned the questionnaire (partially completed). Given the length of the questionnaire and its self-administered nature, some companies were unable or unwilling (complex questions, requiring a memory effort, lack of availability, etc.) to complete the survey.

So, eventually, we took the opportunity of the 2023 Algiers National Fair to administer the questionnaire ourselves face-to-face. Our aim was to reassure the interviewee and increase the response rate, to clarify ambiguous answers or to clarify questions that were not clear.

We tried to set the time taken to administer the questionnaire at a range between 20 to 30 minutes, taking into account the time that could be devoted to explaining certain questions or terms.

3.3.2. Questionnaire design:

The pre-test:

A pre-test was carried out with 3 managers and a university lecturer, which enabled us to spot certain errors in the formulation of questions or procedures and to modify the questionnaire accordingly.

Final structure of questionnaire:

The structure of our questionnaire (see appendix 1) is divided into five sections:

- **An introduction:** includes information about our identity, the institute to which we belong and the purpose of the study.
- **First section:** including seven questions to identify the respondent. These questions concern :
  - Variable of «diploma», a quantitative ordinal variable integrating five grades: «Bachelor's degree» (Bd),«Master's degree»(Md), «Engineer» (Ing), «Magistere Degree»(Mg), «Ph.D. degree» (PHD).
  - The «Age» (AGE) variable, which is defined as a quantitative ordinal variable incorporating three age brackets: «under 35» (< 35), «between 36 and 50» (36 - 50) and «over 51» (> 51).
  - Socio-professional category (Function), which we have divided into five classes (CEO, DG, DRH, Manager, Marketing and sales).

- The «Years of experience» variable (YEXP) is a quantitative ordinal variable comprising three classes: «less than 5 years» (< 5years), «between 6 and 10 years» (6 - 10 years), «more than 11 years» (> 11years).
- The sector of activity variable is an ordinal qualitative variable divided into four sectors: «Agri-food» (AG), «Building and public works» (BTP), «Industry» (IND) and «Service» (SER). The industry sector includes the following industries (electrical, mechanical, chemical and petrochemical, textiles, furniture, etc.).
- The «Size of company» variable is a qualitative ordinal variable measured according to four classes: «small enterprise» (SE), «medium-sized enterprise» (ME), «large enterprise» (LE), «very large enterprise» (VLE).
- The «enterprise's target market» variable is a qualitative ordinal variable measured according to three categories: «National market» (Algerian only) (NM), «Export» (EXR) and «Mixed» (National &Export) (MIX).

- **Second section:** Is composed of four questions, regardless the types of innovation, the rate of innovation, and the triggers of changment and the state of innovation as seen by the enterprise.
- **Third section:** Is composed of seven questions, about the collection of information, the sources of information, the diffusion of information, the surveillance, and the target of surveillance, the results, and finally, the influence of change.

- **Fourth section:** Is composed of four questions, about recognize the value of new external knowledge, acquisition of information, assimilation, transformation, and finally, operating.

The questionnaire can be found in the list of appendices (Appendix 1).

Table 3.2 Table of items, Source: Created by the researcher.

Coding	Items
General information	
Diploma	What is your last diploma obtained?
Age	Are you aged?
Function	What is your function within your enterprise?
Experience	How many years of experience do you have in your enterprise?
Sector	Choose your enterprise's sector of activity
Size	What is the size of your enterprise?
Market	What is your enterprise target market?
Innovation	
Type1	The type of innovation or change you practice most is product innovation
Type2	The type of innovation or change you practice most is service innovation
Type3	The type of innovation or change you practice most is process innovation
Type4	The type of innovation or change you practice most is managerial innovation
Type5	The type of innovation or change you practice most is Organizational innovation
Type6	The type of innovation or change you practice most is marketing Innovation
Rate1	These innovations are generally carried out at a very strong rate
Rate1	These innovations are generally carried out at a strong rate
Rate1	These innovations are generally carried out at an average rate
Rate1	These innovations are generally carried out at a weak rate
Rate1	These innovations are generally carried out at a very weak rate
Trigger1	In your activity the trigger for change is due to the identification of needs
Trigger2	In your activity the trigger for change is due to the technological development
Trigger3	In your activity the trigger for change is due to both at the same time
Trigger4	In your activity the trigger for change is due to the environmental actors
Trigger5	In your activity the trigger for change is due to the opening of the market
State1	Our company integrates technologies into new products/services
State2	We take existing services and transform them into better, more efficient services
State3	Our senior management is fully committed to supporting innovation activities and programs
State4	We are perceived by our customers as being more innovative than our competitors

State5	Innovation is effectively communicated among our employees and strongly encouraged through incentives
Business Intelligence	
Information1	The collection of information is generally done by all the company's staff
Information2	The collection of information is generally done by the monitoring unit
Information3	The collection of information is generally done by the R&D department
Information4	The collection of information is generally done by the marketing service
Information5	The collection of information is generally done by the executive management
Information6	The collection of information is generally done by the sales department
Information7	The collection of information is generally done by the consultants outside the company
Source1	In general your sources of information are the professional press
Source2	In general your sources of information are market studies
Source3	In general your sources of information are professional salons
Source4	In general your sources of information are commercial sources
Source5	We use our own information network
Source6	In general your sources of information are to track innovations and patents in the field
Source7	In general your sources of information are: Use the Internet
Source8	In general your sources of information are: Participate in seminars
Source9	In general your sources of information are: Visiting customers on site
Dissemination1	The information collected are generally disseminated personally
Dissemination2	The information collected are generally disseminated by phone
Dissemination3	The information collected are generally disseminated by email
Dissemination4	The information collected are generally disseminated by Report
Dissemination5	The information collected are generally disseminated by Meeting
Dissemination6	The information collected are generally disseminated by Other ways
Surveillance1	In general, your Intelligence practice covers the price
Surveillance2	In general, your Intelligence practice covers the product
Surveillance3	In general, your Intelligence practice covers identifying potential new competitors
Surveillance4	In general, your Intelligence practice covers technological developments
Surveillance5	In general, your Intelligence practice covers market development
Surveillance6	In general, your Intelligence practice covers regulations
Surveillance7	In general, your Intelligence practice covers knowing your customers better
Target1	The targets of your Intelligence practice are competitors
Target2	The targets of your Intelligence practice are clients
Target3	The targets of your Intelligence practice are suppliers
Target4	The targets of your Intelligence practice are subcontractors
Result1	The information collected are generally used to achieve productivity gains
Result2	The information collected are generally used to retain current customers
Result3	The information collected are generally used to develop new products or services
Result4	The information collected are generally used to prospect new customers
Result5	The information collected are generally used to conquer new market shares
Result6	The information collected are generally used to improve the quality of

	products or services
Integration1	The information you collect is involved in the innovation process in the idea creativity phase
Integration2	The information you collect is involved in the innovation process in the study phase
Integration3	The information you collect is involved in the innovation process in the validation phase
Integration4	The information you collect is involved in the innovation process in the launch phase
Integration5	The information you collect is involved in the innovation process in the marketing phase
Integration6	The information you collect is involved in the innovation process in the development phase
Integration7	The information you collect is involved in the innovation process all along the project
Influence1	Over all the whole changes within your company is influenced by risk context
Influence2	Over all the whole changes within your company is influenced by strategic context
Influence3	Over all the whole changes within your company is influenced by speed context
Influence4	Over all the whole changes within your company is influenced by change context
Influence5	Over all the whole changes within your company is influenced by organization as a whole
Absorptive Capacity	
Recognize1	Our company has the ability to anticipate the movements of competitors
Recognize2	Our company has the ability to anticipate customer needs
Recognize3	Our company has the ability to stay in touch with external institutions and specialized sources
Recognize4	Our company has specialized personnel, equipment and services for environmental monitoring
Recognize5	Our company has difficulty recognizing changes occurring in our market/products
Recognize6	Our company understands new opportunities to satisfy our customers quickly
Recognize7	Our company quickly interprets changes in market attraction
Recognize8	Our company intuitively knows which areas can use acquired technology or external knowledge
Acquisition1	Our employees are kept informed of changes to our products and services
Acquisition2	In our company, employees are kept informed of changes in strategic direction
Acquisition3	In our company, employees are informed about technology transfers and innovations
Acquisition4	In our company, employees are kept informed of changes in partners, suppliers and distributors.
Acquisition5	Our Employees get together to share ideas and information without being forced by the organization or being part of a project
Acquisition6	Our Employees get together to solve problems without being forced by the organization or being part of a project

Acquisition7	Employees often have the opportunity to work on new ideas
Assimilation1	Through exchanges with my partners, I learn new management methods and processes
Assimilation2	Through exchanges with competitors, I discover new suppliers or distributors
Assimilation3	During exchanges with my competitors, I gain knowledge of external technical processes and technological innovations
Assimilation4	When I talk to my competitors, I discover new products and services
Assimilation5	When I talk to my competitors, I get new ideas
Assimilation6	We often organize study groups to discuss the influence of new knowledge on our business
Assimilation7	We have special procedures and practices to help staff assimilate new knowledge and combine it with existing knowledge
Transformation1	Our employees participate in improving procedures by reporting on their work
Transformation2	Our employees contribute to improving procedures by proposing new solutions
Transformation3	Our employees participate in improving procedures by finding ways to go faster
Transformation4	Our employees take part in improving procedures by proposing the transformation of certain procedures
Exploitation1	We have a strong reputation for technological excellence
Exploitation2	Our company is characterized by the intensity of our knowledge
Exploitation3	Our products and services have a strong knowledge component
Exploitation4	We thought about how to use new knowledge to improve existing operational efficiency and effectiveness
Exploitation5	Our company regularly rethinks its technologies and adapts them in line with new knowledge

In our study, we use the nominal scales of the Likert scale. This additive Likert scale is named after its designer «Rensis Likert» (Likert, 1932). It measures a person's attitude by the sum of the answers given to a series of scales, the respondent is asked to express their degree of approval (agreement) or disapproval (disagreement) to a series of proposals (items).

The questions are administered in the form of a five-point Likert scale. The five levels are: 1. strongly disagree, 2. disagree, 3. no response, 4. agree, 5. strongly agree.

3.3.3. Principles for validating a measurement scale:

It is after the publication of Churchill's article (1979), that the researchers became aware of the importance of the validity of measurement scales. (Ruekert

& Churchill Jr, 1984) proposed a procedure for strengthening the validity and reliability of measurements, because it is necessary to test the reliability of the collection instruments in order to statistically validate the study and its results. The results must be sufficiently reliable to be used in other research.

Validity indicators of a measurement scale:

The aim of validity tests is to check whether the various items in an instrument are a good representation of the phenomenon being studied (Messick, 1990). There are three main forms of validity: content validity, criterion-related validity and construct validity.

The reliability of a measurement scale:

A scale is said to be reliable when it produces the same results on repeated measurements, regardless of who uses it and when the test is carried out(Vehkalahti, 2000).

- **Cronbach's alpha coefficient**: this is a reliability coefficient that measures the internal consistency of a scale constructed from a set of items. The practice is to reduce a large number of initial items in an iterative process of retention/elimination of items according to the value of the alpha coefficient, which varies between 0 and 1. For an exploratory study, a coefficient of (0.7) is acceptable.

Table 3.3 Cronbach's alpha values according to the Devellis typologie

< 0,6	Insufficient
Between 0,6 and 0,65	Weak
Between 0,65 and 0,7	Acceptable minimum
Between 0,7 and 0,8	Good
Between 0,8 and 0,9	Very good
> 0,9	Consider reducing the number of items

Source: (DeVellis & Thorpe, 2021)

Factorial analysis:

Is an exploratory method for analyzing contingency tables (Benzecri J.-P. 1970-1990). It refers to a set of multivariate statistical methods whose main objective

is to define the structure of correlations between a large number of variables by determining a set of common dimensions (Factors).

It is important to ensure that the data can be factorized. They must form a coherent whole so that we can look for common dimensions that make sense (Evrard et al., 2009). Correlations between variables must be sufficient. We will use the following indicators:

- **Bartlett's Sphericity Test**: This test verifies the null hypothesis that all correlations are zero. Correlations are zero (the probability of obtaining the test value must be less than 0.05).

Table 3.4 Bartlett's Sphericity Test values

Above 0,10	Reject
Between 0,05 and 0,10	Acceptable
Less than 0,05	Significant
0.000	Very significant

Source: (Tobias & Carlson, 1969)

- **The Kaiser-Meyer-Olkin (KMO)**: Measure indicates the extent to which the variables selected form a coherent whole and adequately measure a concept. It tests whether the correlations between the variables are not too weak.

Table 3.5 KMO values

>0.5	Unacceptable
0,5	Bad
0,6	Poor
0,7	Medium
0,8	good
0,9	Superb

Source: (Shrestha, 2021)

As already mentioned, a pre-test was carried out before we distributed our questionnaire on a large scale. It was essential to test its stability in order to ensure the reliability of the results. The following table summarizes the results

of the Cronbach's alpha, Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity tests, calculated using SPSS version 22.

3.3.4. Data analysis and results:

Interpretation of descriptive analysis:

At this stage of the research, we will describe the socio-demographic characteristics of the sample. First, we present a flat sort of the different variables studied.

Socio-demographic analysis of the sample:

In the end, 121 questionnaires were completed, however in the analysis phase we kept only 118 questionnaire (due to outliers), corresponding to a response rate of 48.4%, which can be considered fairly well for this type of survey.

Seven variables were studied: four individual variables: age and years of experience, diploma and function within the enterprises; three organizational variables such as company size, sector of activity, and the company's target market.

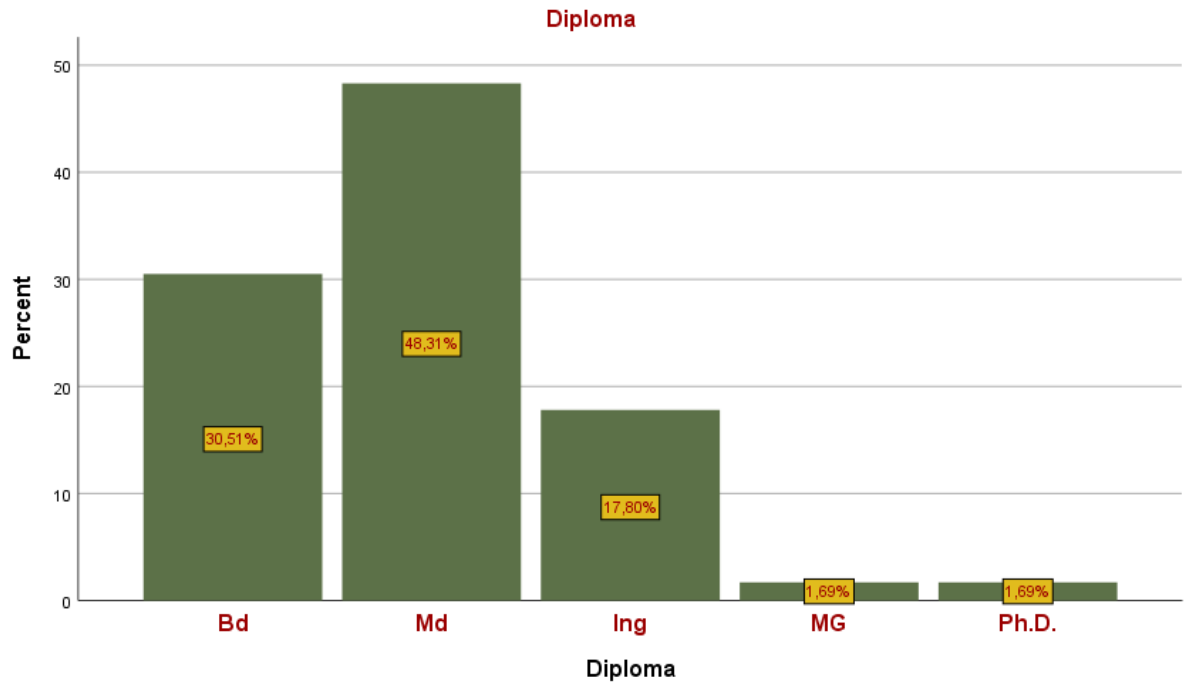
Individual variables:

Table 3.6 Level of education of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bd	36	30,5	30,5	30,5
	Md	57	48,3	48,3	78,8
	Ing	21	17,8	17,8	96,6
	MG	2	1,7	1,7	98,3
	Ph.D.	2	1,7	1,7	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.3 Level of education of the respondents



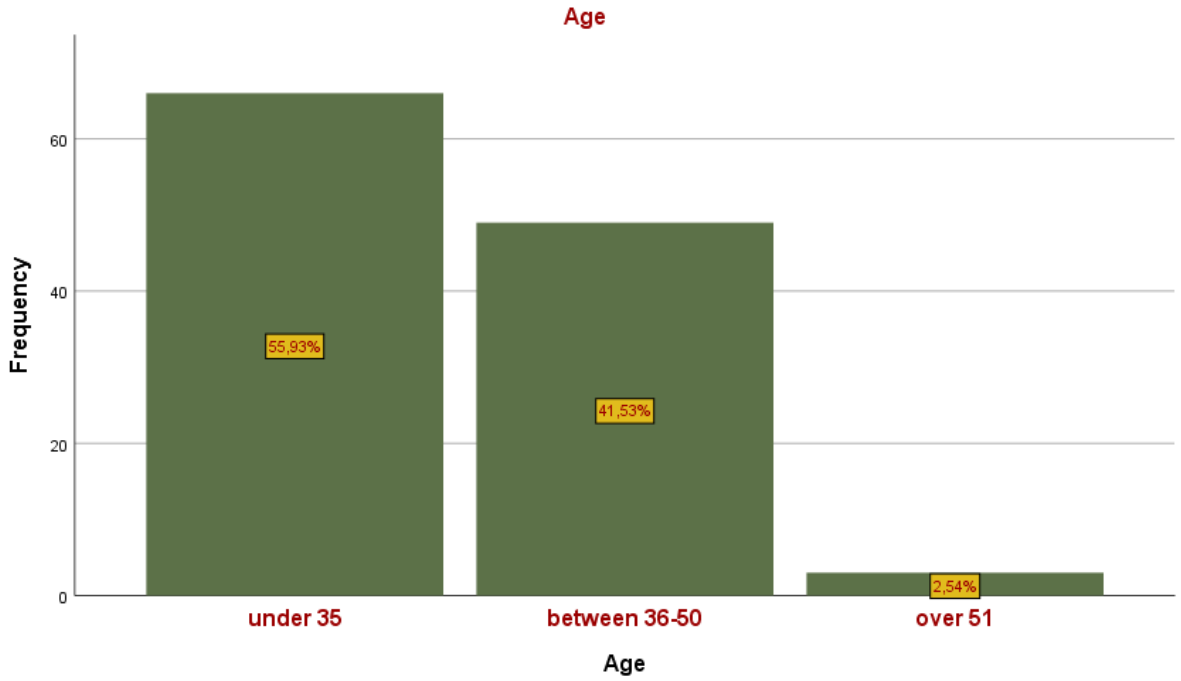
The analysis shows that 48.31% of the respondents have a Master's degree and 31.36% have a Bachelor's degree. 17.80% have engineer degree, while Ph.D. and Magister degree equally represent represents 1.69%. This indicates that Algerian companies are seeking to recruit employees who mostly hold a Master's degree.

Table 3.7 Age bracket of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 35	66	55,9	55,9	55,9
	Between 36-50	49	41,5	41,5	97,5
	Over 51	3	2,5	2,5	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.4 Age bracket of respondents



More than 55.93% of respondents are less than 35 years old, 41.53% are between 36 and 50 years old and 2.54% represent respondents over 51 years old. The respondents are relatively young. This can be explained by the relatively high employment rate of the population aged between 25 and 50‡.

Function

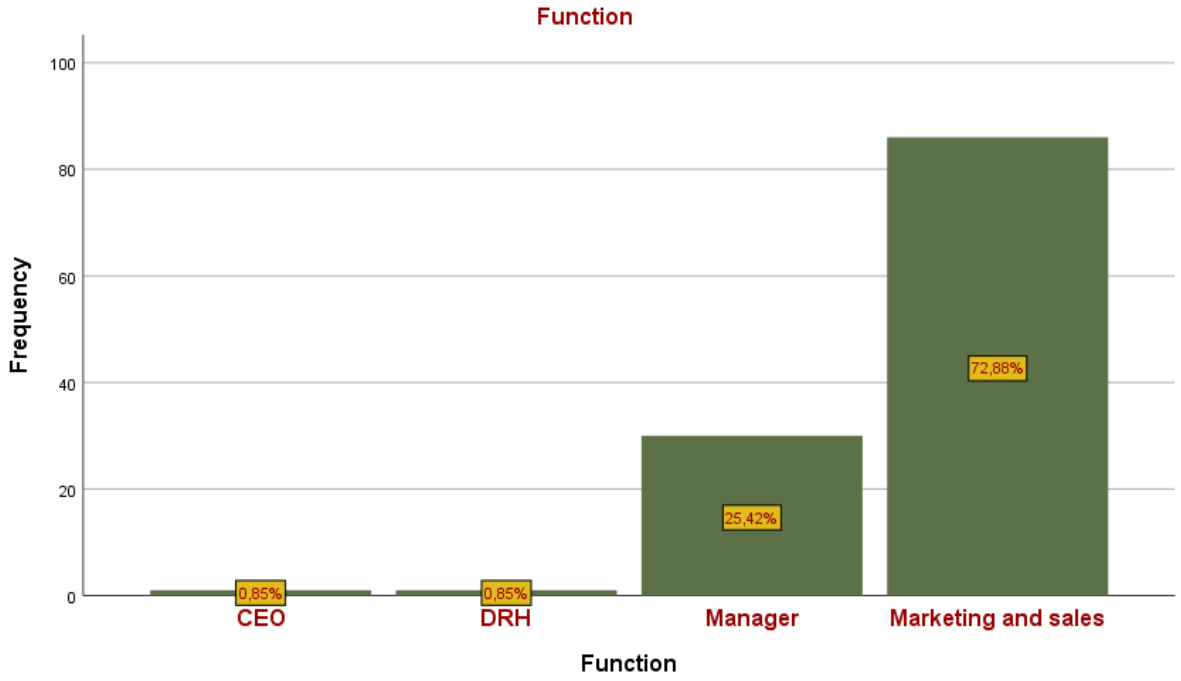
Table 3.8 function of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CEO	1	,8	,8	,8
	DRH	1	,8	,8	1,7
	Manager	30	25,4	25,4	27,1
	Marketing and sales	86	72,9	72,9	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

‡ See Table N°1 Activity, Employment, Unemployment in September 2015, N°726. www.ons.dz

Figure 3.5 function of the respondents



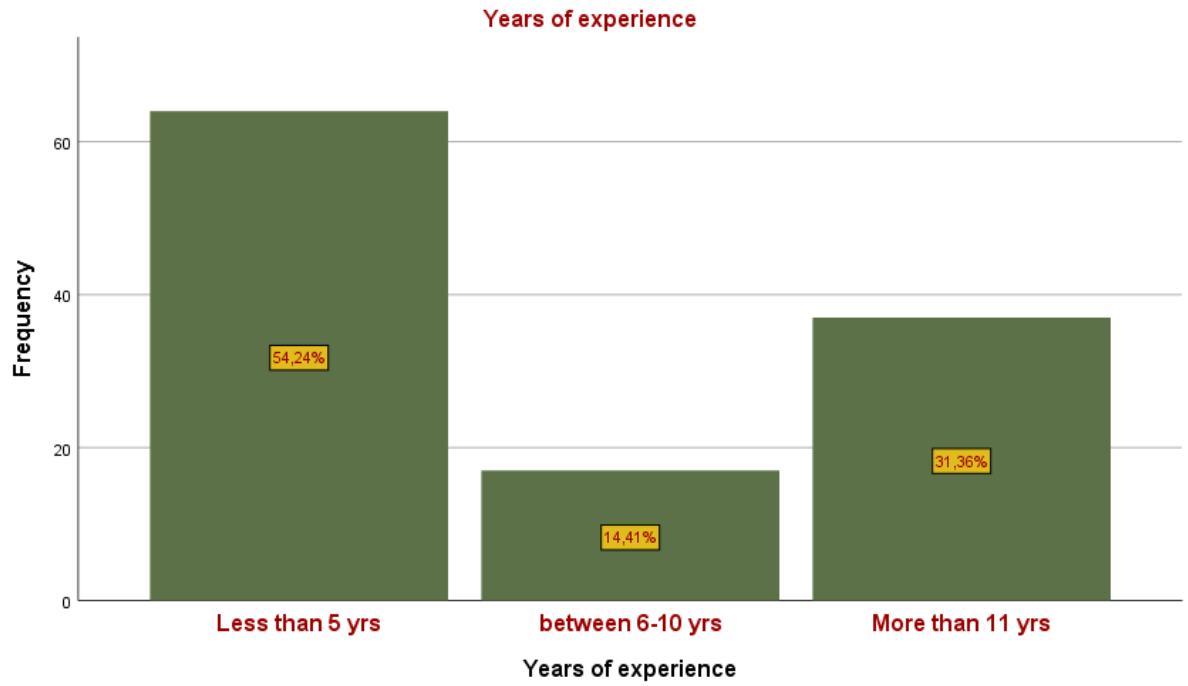
Marketing & sales agent where the most personnel to represent their enterprises they represent a percentage of 72.88%. Managers represent 25.42%. While DRH' and COS' where the least to represent their enterprises, they represent equally 0.85%. It is normal for DRH to not represent their enterprises because of the nature of the Algerian enterprises especially in a fair. However, when it comes to CEOs, they avoid taking the time to answer a questionnaire because they are too busy maintaining business links. They would rather command a manager or marketing/sales agent to answer the questionnaire.

Table 3.9 Experience of the respondents in their companies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 yrs	64	54,2	54,2	54,2
	Between 6-10 yrs	17	14,4	14,4	68,6
	More than 11 yrs	37	31,4	31,4	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.6 Experience of the respondents in their companies



More than half of the respondents have been in their current company for less than five years 54.24%, which can be explained both by the newness of these companies and by the constantly changing economic climate and regulations in the country, which make employees prefer to work in the public sector rather than the private sector. Others have been in their current job for more than 11 years with a percentage of 31.36%, the rest have been in their job for between six and ten years 14.41%.

Organizational variables:

We have selected the size of the company in terms of the number of employees, the business sector, grouped into four strategic sectors, and the target market of the company.

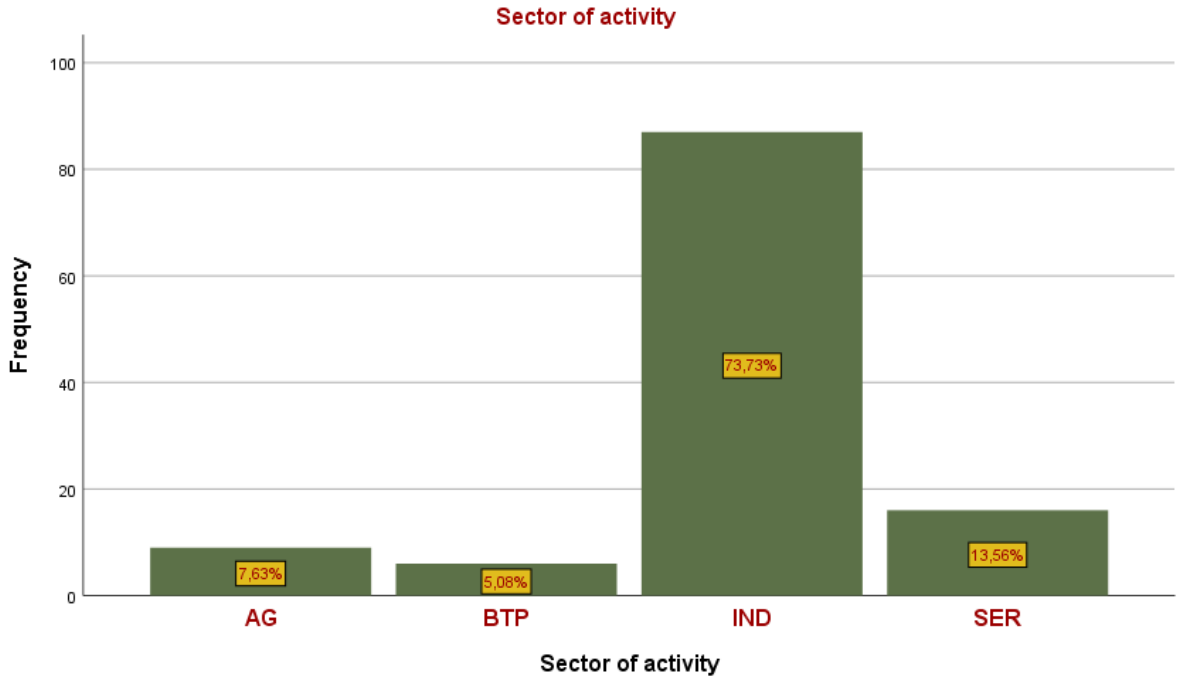
In order to facilitate the analysis of our results, we have grouped the activities into four sectors (Agriculture and Agro-food (AG), Construction and Public Works (BTP), Industry (IND) and Services (SER). Our sample is represented as follows:

Table 3.10 Sector of activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AG	9	7,6	7,6	7,6
	BTP	6	5,1	5,1	12,7
	IND	87	73,7	73,7	86,4
	SER	16	13,6	13,6	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.7 Sector of activity



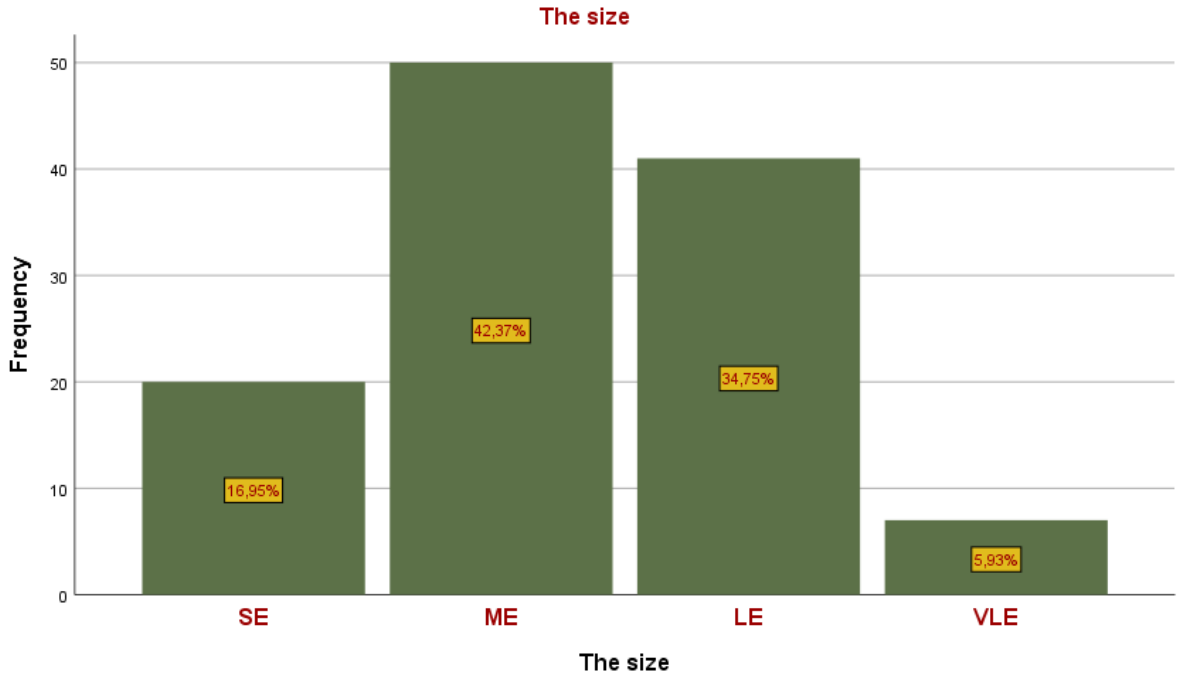
The dominant sector is the industrial sector, as it was the most represented sector at the fair. In our study, 73.73% of the companies are from the industrial sector. This is followed by the services sector with 13.56%, agriculture and agro-food with 7.63% and finally construction and public works with 5.08%.

Table 3.11 Company size (based on number of employees)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SE	20	16,9	16,9	16,9
	ME	50	42,4	42,4	59,3
	LE	41	34,7	34,7	94,1
	VLE	7	5,9	5,9	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.8 Company size (based on number of employees)



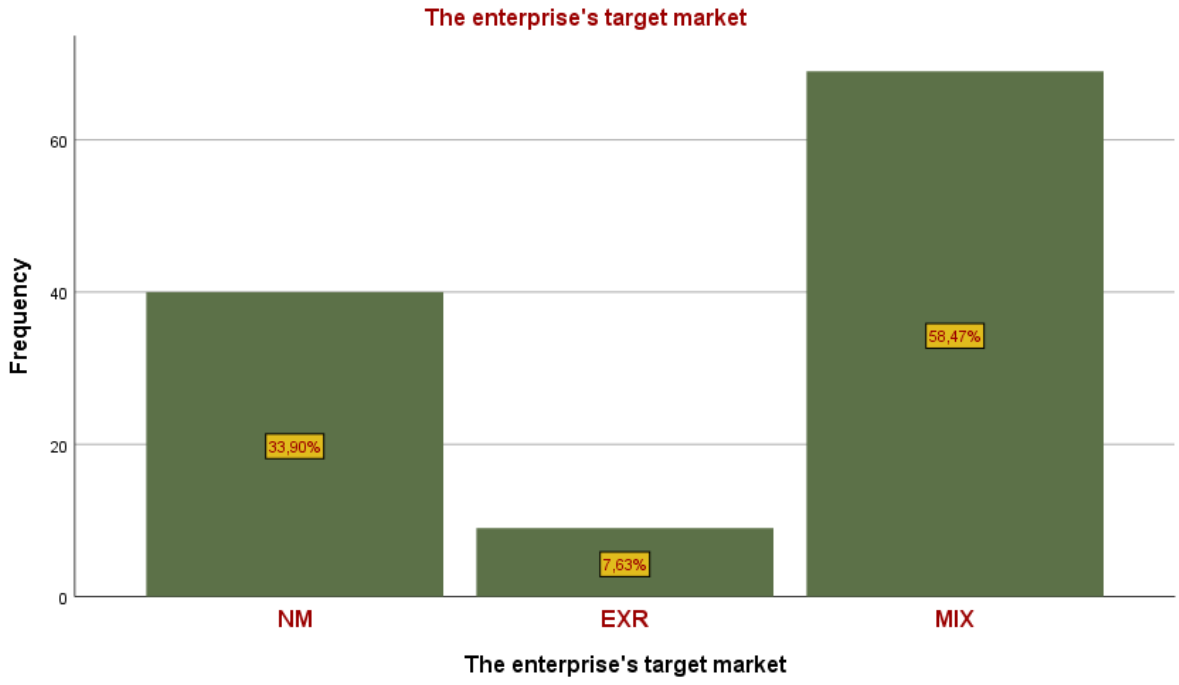
42.37% of enterprises are medium-sized, 34.75% are large, 16.95% are small and we are left with 5.93% of very large enterprises.

Table 3.12 Target market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NM	40	33,9	33,9	33,9
	EXR	9	7,6	7,6	41,5
	MIX	69	58,5	58,5	100,0
	Total	118	100,0	100,0	

Source: Adapted by the researcher from SPSS software version 22

Figure 3.9 Enterprise's target market



The enterprise's target market

Results shows that more than the half of the enterprises focuses on the mixed market 58,47% , and this is due to new regulations in the country seeking to push local business toward exporting their products, by providing them all kind of facilities (lower taxation, impose higher taxes on the imported products

…etc.) in order to differentiate the country's income outside of Fuel revenues. 33,9% focuses on the national market, and only 7,63% are focused on exporting only.

3.3.5. Calculating the mean of the axes:

In this section, we will begin our analysis by calculating the mean for each axis. We used a five-point Likert scale, where 1 means 'strongly disagree' and 5 means 'strongly agree'.

Table 3.13 5-points Likert scale

Likert scale	Interval	Difference	Description
1	1,00-1,79	0,79	Strongly Disagree
2	1,80-2,59	0,79	Disagree
3	2,60-3,39	0,79	No Opinion
4	3,40-4,19	0,79	Agree
5	4,20-5,00	0,80	Strongly Agree

Innovation:

Types of innovation:

Table 3.14 the average for the type of innovation

		Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
N	Valid	118	118	118	118	118	118
	Missing	0	0	0	0	0	0
Mean		4,36	4,31	4,08	4,19	4,24	4,31
Median		4,50	4,00	4,00	4,00	4,00	5,00
Std. Deviation		,834	,832	1,039	,867	,834	,893

Source: Adapted by the researcher from SPSS software version22

The table shows that the majority of enterprises focus on product innovation, with a mean score of 4.36. This is followed by service innovation and marketing innovation, which have an equal mean score of 4.31.

Rate of innovation:

Table 3.15 the average for rate of innovation

		Rate 1	Rate 2	Rate 3	Rate 4	Rate 5
N	Valid	118	118	118	118	118
	Missing	0	0	0	0	0
Mean		4,24	4,21	3,98	4,00	4,02
Median		4,00	4,00	4,00	4,00	4,00
Std. Deviation		,903	,904	1,046	1,233	1,301

Source: Adapted by the researcher from SPSS software version22

The table shows that the majority of enterprises consider their innovation practices to be very strong, as evidenced by the higher mean of 4.24.

Trigger for change:

Table 3.16 the average for the trigger of change

		Trigger1	Trigger 2	Trigger 3	Trigger 4	Trigger 5
N	Valid	118	118	118	118	118
	Missing	0	0	0	0	0
Mean		4,02	4,43	4,28	4,21	4,14
Median		4,00	5,00	4,00	4,00	4,00
Std. Deviation		1,301	,882	,738	,885	,927

Source: Adapted by the researcher from SPSS software version22

According to the results in the above table, technological development is the main driver for seeking innovation, with an average score of 4.43.

State of innovation:

Table 3.17the average for the State of innovation

		State 1	State 2	State 3	State 4	State 5
N	Valid	118	118	118	118	118
	Missing	0	0	0	0	0
Mean		4,22	4,34	4,23	4,19	4,21
Median		4,00	4,00	4,00	4,00	4,00
Std. Deviation		,878	,731	,721	,819	,794

Source: Adapted by the researcher from SPSS software version22

The heist mean is for state 2 which refers to the ability of the enterprises to take existing services and transform them into better, more efficient services.

Business intelligence:

1- The collection of information:

Table 3.18 the average for the collection of information

		Information 1	Information 2	Information 3	Information 4	Information 5	Information 6	Information 7
N	Valid	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0
Mean		4,04	4,07	4,10	4,26	4,47	4,41	4,01
Median		4,00	4,00	4,00	4,00	5,00	4,00	4,00
Std. Deviation		1,135	1,130	1,024	,928	,792	,644	1,034

Source: Adapted by the researcher from SPSS software version22

According to the results, executive management is the most used department, with a mean score of 4.47. This is followed by the sales department (M=4.41) and then the marketing department (M=4.26). Other enterprises rely on the R&D department, which scored a mean of 4.10, and the monitoring unit, which scored 4.07. These results demonstrate that Algerian enterprises use different departments to monitor their environment.

2- Sources of information:

Table 3.19 the average for the sources of information

		Source 1	Source 2	Source 3	Source 4	Source 5	Source 6	Source 7	Source 8	Source 9
N	Valid	118	118	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0	0	0
Mean		3,83	4,25	4,47	4,33	4,19	3,95	4,28	3,92	4,30
Median		4,00	4,00	5,00	4,00	4,00	4,00	4,00	4,00	4,00
Std. Deviation		1,135	,905	,676	,641	,830	1,028	,815	1,152	,909

Source: Adapted by the researcher from SPSS software version22

According to the results professional salons are the most used source of information with a mean equal to 4.47. Commercial sources are the second most used source with a mean score of 4.33. Using internet comes in the 3rd place with a mean equal to 4.28.

3- Dissemination of information:

Table 3.20 the average for the dissemination of information

		Dissemination 1	Dissemination 2	Dissemination 3	Dissemination 4	Dissemination 5	Dissemination 6
N	Valid	118	118	118	118	118	118
	Missing	0	0	0	0	0	0
Mean		4,15	4,23	4,39	4,25	4,33	3,98
Median		4,00	4,00	5,00	5,00	4,00	4,00
Std. Deviation		,957	,982	,858	1,023	,740	1,013

Source: Adapted by the researcher from SPSS software version22

Information is mainly disseminated by e-mails (M=4.39) because it is a quick way and does not require paper, also by meetings (M=4.33) and reports (M=4.24). In addition, in some enterprises information is disseminated by telephone or in person.

4-The intelligence practice:

Table 3.21 the average for the intelligence practice

		Surveillance1	Surveillance2	Surveillance3	Surveillance4	Surveillance5	Surveillance6	Surveillance7
N	Valid	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0
Mean		4,28	4,36	4,32	4,14	4,31	4,31	4,34
Median		4,00	4,00	4,00	4,00	4,00	4,00	4,00
Std. Deviation		,625	,634	,665	,739	,634	,801	,707

Source: Adapted by the researcher from SPSS software version22

According to the results, enterprises' main focus in their intelligence practice is on new products being introduced to the market, and they also focus on knowing

their customers better. Keeping track of prices, market developments, regulations and identifying new competitors.

5- Targets of business intelligence:

Table 3.22 the average for the targets of business intelligence

		Target 1	Target 2	Target 3	Target 4
N	Valid	118	118	118	118
	Missing	0	0	0	0
Mean		4,27	4,49	4,22	3,98
Median		4,00	5,00	4,00	4,00
Std. Deviation		,781	,689	,807	,987

Source: Adapted by the researcher from SPSS software version22

In their business intelligence practice, the enterprises responded that their main target was their customers (M=4.49), followed by their competitors (M=4.27).

6- The use of information collected:

Table 3.23 the average for use of information collected

		Result 1	Result 2	Result 3	Result t4	Result 5	Result 6
N	Valid	118	118	118	118	118	118
	Missing	0	0	0	0	0	0
Mean		4,36	4,41	4,53	4,56	4,36	4,52
Median		4,00	4,00	5,00	5,00	4,00	5,00
Std. Deviation		,698	,670	,725	,593	,636	,581

Source: Adapted by the researcher from SPSS software version22

The main use of the information gained from the intelligence process is to find new customers (M=4.56), develop new products or services (M=A.53), or improve existing ones (M=4.52). Respondents also indicated that the information is also used to retain existing customers, improve productivity and gain new market share.

7- The integration of the collected information:

Table 3.24 the average for the integration of the collected information

		Integration1	Integration2	Integration3	Integration4	Integration5	Integration6	Integration7
N	Valid	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0
Mean		4,34	4,24	4,08	4,28	4,38	4,43	4,42
Median		4,00	4,00	4,00	4,00	4,00	4,00	4,00
Std. Deviation		,558	,580	,780	,665	,739	,592	,544

Source: Adapted by the researcher from SPSS software version22

As a result of the above table, it can be seen that the information gathered from the intelligence process is integrated into the innovation process mainly in the development phase. It can also be used in the other different phases, as all the means are above 4.

8- The change motives:

Table 3.25 the average for change motives

		Influence 1	Influence 2	Influence 3	Influence 4	Influence 5
N	Valid	118	118	118	118	118
	Missing	0	0	0	0	0
Mean		3,98	4,53	4,33	4,37	4,47
Median		4,00	5,00	5,00	5,00	5,00
Std. Deviation		,896	,580	,827	,760	,748

Source: Adapted by the researcher from SPSS software version22

From this table, we can see that the majority of the respondents state that, on the whole, the changes taking place in their enterprises are influenced by the whole organization context (M=4.47) and strategic context.

Absorptive capacity:

1- Recognize the value of information:

Table 3.26 the average for recognize the value of information

		Recognize 1	Recognize 2	Recognize 3	Recognize 4	Recognize 5	Recognize 6	Recognize 7	Recognize 8
N	Valid	118	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0	0
Mean		4,29	4,51	4,38	4,04	3,59	4,43	4,35	4,33
Median		4,50	5,00	5,00	4,00	4,00	5,00	4,00	4,00
Std. Deviation		,907	,689	,739	1,041	1,410	,768	,767	,774

Source: Adapted by the researcher from SPSS software version22

If we look at the mean value of the responses, it varies between "agree" and "strongly agree", which indicate that enterprises recognize the value of information.

2- Acquisition of information:

Table 3.27 the average for acquisition of information

		Acquisition1	Acquisition2	Acquisition3	Acquisition4	Acquisition5	Acquisition6	Acquisition6
N	Valid	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0
Mean		4,52	4,19	4,11	4,03	4,25	4,12	4,40
Median		5,00	4,00	4,00	4,00	4,00	4,00	4,00
Std. Deviation		,713	1,015	1,068	1,121	,915	,888	,629

Source: Adapted by the researcher from SPSS software version22

The overall responses range from "agree" to "strongly agree", indicating that information acquisition is taking place in the enterprises surveyed.

3-Assimilation of information:

Table 3.28 the average for assimilation of information

		Assimilation1	Assimilation2	Assimilation3	Assimilation4	Assimilation5	Assimilation6	Assimilation7
N	Valid	118	118	118	118	118	118	118
	Missing	0	0	0	0	0	0	0
Mean		4,36	4,27	4,26	4,24	4,25	4,17	4,16
Median		4,00	4,00	4,00	4,00	4,00	4,00	4,00
Std. Deviation		,759	,864	,881	,854	,847	1,040	,896

Source: Adapted by the researcher from SPSS software version22

The results from the table show that the means range from «agree» to «strongly agree», so we can say that the enterprises assimilate different information.

4- Transformation of information:

Table 3.29 the average for transformation of information

		Transformation 1	Transformation 2	Transformation 3	Transformation 4
N	Valid	118	118	118	118
	Missing	0	0	0	0
Mean		4,36	4,34	4,36	4,22
Median		5,00	5,00	5,00	4,00
Std. Deviation		,911	,869	,802	,807

Source: Adapted by the researcher from SPSS software version22

The result of the table is an indication that the employees of the respondent enterprises have the ability to transform information.

5- Exploitation of information:

Table 3.30 the average for exploitation of information

		Exploitation1	Exploitation2	Exploitation3	Exploitation4	Exploitation5
N	Valid	118	118	118	118	118
	Missing	0	0	0	0	0
Mean		4,42	4,34	4,59	4,55	4,37
Median		5,00	4,00	5,00	5,00	5,00
Std. Deviation		,810	,787	,573	,661	,814

Source: Adapted by the researcher from SPSS software version22

The mean of the table confirms the existence of information exploitation among enterprises, ranging from «agree» to «strongly agree».

3.3.6. Discussion around the results:

Our sample composed of 118 Algerian enterprises, which results shows that 48.31% of the respondents have a Master's degree and 31.36% have a Bachelor's degree. Engineers represent a ratio of 17.80%, those holding a Ph.Ds. and Magister degree equally represent represents 1.69%. More than 55.93% of those surveyed are aged less than 35 years, 41.53% are aged between 36 and 50 and 2.54% represent respondents aged over 51years. More than half of the respondents have been in their current company for less than five years (54.24%). Others have been in their current job for more than 11 years with a percentage of (31.36%), and the rest have been in their job for between six and ten years (14.41%).

Additionally, the results show that product innovation is the most common type of innovation in these enterprises, with a very high rate of occurrence. Technological development is the main driver for innovation.

These enterprises are well versed in different types of business intelligence, as information is mainly collected by the executive management and sales and marketing departments. Other enterprises rely on R&D and monitoring units.

Professional salons gather information from commercial sources and the internet, as well as other methods. This information is then disseminated mainly via email and meetings.

When practicing intelligence, enterprises focus on keeping track of new products introduced to the market and getting to know their customers better, as well as keeping track of prices and market development and regulations and identifying new competitors. The information gathered is mainly integrated into the intelligence process to find new customers.

When it comes to the absorptive capacity, the respondents made clear that they have the ability to recognize the value, acquire, assimilate, transform and exploit information. Absorptive capacity is then practiced in these enterprises with all its dimensions. With that being said, it is considered sufficient to continue our tests and analysis.

Section four : Analysis of variance (ANOVA):

3.4.1. Interpretation of bi-varied results (comparison of means): Analysis of variance (ANOVA):

We will precede our analysis by carrying out a series of comparison of means and correlation tests. These tests allowed us to check whether there is statistically significant differences between employees in their ability to recognize the value, identify, assimilate, acquire, transform and exploit information. The aim of these tests was to better identify the profile of the respondents, so we carried out a bivariate analysis, treating each of the dimensions of employees' absorptive capacity in turn, according to their qualifications and experience, and for that we used the Analysis of variance (ANOVA).

- **Analysis of variance (ANOVA):**

This test is applied when one or more categorical explanatory variables are measured (then called variability factors, their different modalities sometimes being called «levels») which have an influence on the distribution of a continuous variable to be explained.

Two main conditions are theoretically necessary for the conclusions of an ANOVA to be valid: homogeneity of the within-group variance and normality of the data. Our aim is to obtain a significance level greater than 5%.

If the data are not suitable for an ANOVA (heterogeneity of variances or highly skewed data), we can use corrected statistics such as Welch, which replaces F,

or even use non-parametric tests that assume neither homogeneity of variance nor a normal distribution .

1- **Analysis of Variance according to the level of education of those interviewed regarding their ability to recognize the value:**

First we checked the homogeneity of variances using the Levene test, with a result of a=0.061 greater than 0.05, this test indicates that the variances are homogeneous.

The ANOVA approach is based on Fisher's test and leads to the retention of significant variables (less than or equal to 0.05 to consider that the differences are significant).

Table 3.30. 1-factor ANOVA Diploma-recognize the value

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	**1,642**	**4**	**,411**	**1,258**	**,291**
Within Groups	**36,894**	**113**	**,326**		
Total	**38,536**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for recognizing the value of knowledge according to the diploma of enterprises interviewed employees indicate that there is no statistically significant difference between the average level of recognizing the value of knowledge and the diploma. This is confirmed by the significance level a =0.291 that is greater than 0.05. The degree of freedom is 4 and F=1.258. Multiple comparisons were carried out to confirm this result using the Scheffé's Test (appendix3).

2- **Analysis of Variance according to the years of experience of those interviewed regarding their ability to recognize the value:**

We tested the homogeneity of variances using the Levene test, with a result of a=0,473 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.31 factor ANOVA Experience -recognize the value

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**1,632**	**2**	**,816**	**2,543**	**,083**
Within Groups	**36,904**	**115**	**,321**		
Total	**38,536**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for recognizing the value of knowledge according to the experience of the interviewed employees indicate that there is no statistically significant difference between the average level of recognizing the value of knowledge and the experience held by the employees. This is confirmed by the significance level a =0.083, greater than 0.05. The degree of freedom is 2 and F=2.543. Multiple comparisons were carried out to confirm this result using the Scheffé's Test (appendix3).

3- **Analysis of variance of the capacity of acquisition regarding the level of education:**

The Levene test was used to check the homogeneity of variances, and it showed that a=0.188 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.32 factor ANOVA Diploma-Acquisition

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**,905**	**4**	**,226**	**,576**	**,681**
Within Groups	**44,402**	**113**	**,393**		
Total	**45,308**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for acquisition of information according to the diploma of the enterprises interviewed employees indicate that there is no statistically significant difference between the average level of acquisition of information and the diploma. This is confirmed by the significance level a =0.681 > 0.05. The degree of freedom is 4 and F=0.576. Multiple comparisons were carried out to confirm this result using the Scheffé's Test (appendix3).

4- **Analysis of variance of the capacity of acquisition regarding the years of experience:**

The Levene test was used to check the homogeneity of variances, and it showed that a=0.318 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.33 factor ANOVA Experience - Acquisition

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**1,173**	**2**	**,587**	**1,529**	**,221**
Within Groups	**44,134**	**115**	**,384**		
Total	**45,308**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for acquisition of information of according to the experience of the interviewed employees indicate that there is no statistically significant difference between the capacity of the acquisition of information and the experience held by the employees. This is confirmed by the significance level a =0.221 greater than 0.05. The degree of freedom is 2 and F=1.529. To confirm the result the Scheffé's Test (appendix3).

5- **Analysis of variance of the capacity of assimilation regarding the level of education:**

Following the same analysis method, we first tested the homogeneity of variances using the Levene test, with a result of a=0.865 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.34 factor ANOVA Diploma-Assimilation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**,474**	**4**	**,119**	**,319**	**,865**
Within Groups	**41,979**	**113**	**,371**		
Total	**42,453**	**117**			

Source: Adapted by the researcher from SPSS software version22

Results of the table show that the test for equality of means (Anova test) for assimilation of information according the diploma of enterprises interviewed employees indicate that there is no statistically significant difference between the average level of assimilation of information and the diploma. This is confirmed by the significance level a =0.865, greater than 0.05. The degree of freedom is 4 and F=0.319. To confirm the result the Scheffé's Test (appendix3).

6- **Analysis of variance of the capacity of assimilation regarding the years of experience:**

We first tested the homogeneity of variances using the Levene test, with a result of a=0.630 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.35 1-factor ANOVA Experience - Assimilation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**,237**	**2**	**,119**	**,323**	**,725**
Within Groups	**42,216**	**115**	**,367**		
Total	**42,453**	**117**			

Source: Adapted by the researcher from SPSS software version22

Results of the table show that the test for equality of means (Anova test) for assimilation of information according to the experience of the interviewed employees indicate that there is no statistically significant difference between the capacity of assimilation of information and the experience held by the employees. This is confirmed by the significance level a =0.725, greater than 0.05. The degree of freedom is 2 and F=0.323. To confirm the result the Scheffé's Test (appendix3).

7- **Analysis of variance of the capacity of transformation regarding the level of education:**

We first tested the homogeneity of variances using the Levene test, with a result of a=0.440 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.36 1-factor ANOVA Diploma-Transformation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**,264**	**4**	**,066**	**,130**	**,971**
Within Groups	**57,471**	**113**	**,509**		
Total	**57,736**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for transformation of information according to the diploma of the enterprises interviewed employees indicate that there is no statistically significant difference between the average level of transformation of information and the diploma. This is confirmed by the significance level a =0.971>0.05 .The degree of freedom is 4 and F=0.130. To confirm the result the Scheffé's Test was used (appendix 3).

8- Analysis of variance of the capacity of transformation regarding the years of experience:

We first tested the homogeneity of variances using the Levene test, with a result of a=0.135 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.37 . 1-factor ANOVA Experience - Transformation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**2,944**	**2**	**1,472**	**3,089**	**,049**
Within Groups	**54,792**	**115**	**,476**		
Total	**57,736**	**117**			

Source: Adapted by the researcher from SPSS software version22

The results of the test for equality of means (Anova test) for transformation of information according to the experience of the enterprises interviewed employees indicate that there is a statistically significant difference between the average level of transformation of information and the years of experience. This is confirmed by the significance level a =0.049 < 0.05. The degree of freedom is 2 and F=3.089.

9- Analysis of variance of the capacity of exploitation regarding the level of education:

Using the Levene test, we tested the homogeneity of variances, with a result of a=0.117 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.38 1-factor ANOVA Diploma-Exploitation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**1,265**	**4**	**,316**	**,921**	**,454**
Within Groups	**38,805**	**113**	**,343**		
Total	**40,071**	**117**			

Source: Adapted by the researcher from SPSS software version22

Results of the table show that the test for equality of means (Anova test) for exploitation of information according the diploma of enterprises interviewed employees indicate that there is no statistically significant difference between the average level of exploitation of information and the diploma. This is confirmed by the significance level a =0.454, greater than 0.05. The degree of freedom is 4 and F=2.921. Multiple comparisons were carried out to support this result using the Scheffé's Test (appendix 3).

10- **Analysis of variance of the capacity of exploitation regarding the years of experience:**

Using the Levene test, we tested the homogeneity of variances, with a result of a=0.693 greater than 0.05, this test indicates that the variances are homogeneous.

Table 3.39 1-factor ANOVA Experience - exploitation

	Sum of Squares	Df	Mean Square	F	Sig
Between Groups	**,637**	**2**	**,318**	**,929**	**,398**
Within Groups	**39,434**	**115**	**,343**		
Total	**40,071**	**117**			

Source: Adapted by the researcher from SPSS software version22

Results of the table show that the test for equality of means (Anova test) for exploitation of information according to the experience of the interviewed employees indicate that there is no statistically significant difference between the capacity of exploitation of information and the experience held by the employees. This is confirmed by the significance level a =0.398, greater than 0.05. The degree of freedom is 2 and F=0. 929.

3.4.2. Discussion of the results of the comparison of means:

In this faze, the surviving employees were put to the test to identify their ability to: recognize the value, acquisition of information, assimilation, transformation and exploitation (the five steps of AC), regardless of two mean determinants:

their level of education and the years of experience they have. The results of the analysis were as follows:

The results show that there is no statistically significant difference in the ability of the employees surveyed to recognize the value of information, regardless of their degree or years of experience. This is because the value of information depends on its context. Successful businessmen recognize valuable information through their human intelligence, and sometimes rely on common sense and their instincts!

Further, results also show neither level of education nor years of experience influence the ability to acquire information. Information acquisition is the process of gathering data or knowledge, which often occurs incidentally through activities such as browsing, exploration and discovery. This process can be influenced by factors such as attention, emotions and personal traits.(Heinstrom, 2010)

The ability to assimilate information also does not show any statistically significant difference with the degree and the number of years of experience.

Transformation in the other hand is not affected by the degree of the employees, however results showed that is affected by their years of experience. The human experience is dynamic and constantly evolving, influenced by personal growth, societal changes, and technological advances. It is characterized by the search for meaning, navigating challenges, forming relationships, and constantly adapting to an ever-changing world.

Finally, the results also show that the exploitation of information takes place within the companies without being influenced by the level of education or years of experience. Especially in now days when the exploitation of information is done automatically thought payed BI solutions.

Section five: Tests of hypotheses and interpretation of results

3.5.1. Analysis methodology:

In this section, we will continue to analyze the data. It is necessary to define the methodology and methods on which this study relies, as the quality of measurements and scales is statistically evaluated using factor analyses. Factor analysis is used to explore data, reveal patterns of interrelationships among variables that are not readily apparent, confirm hypotheses, and reduce the number of variables to a manageable level(Giannini, Cassidy, Petty, Laxer, & Lindsley, 2005). Next, we will test the study hypotheses using simple linear regression. Linear regression is the simplest and most commonly used method for prediction. It predicts by considering the linear relationship between the dependent variable and independent variables. Linear regression is also sensitive to outliers. The multicollinearity among the variables should be removed before applying it.

3.5.2. Preliminary analyses:

Before moving on to multivariate analysis, the data must be examined. To accomplish this, we performed the following analyses:

- Treatment of missing values
- Treatment of outliers and extreme values
- Testing the normality of the data.

a. missing values:

There were no missing values in our results because we ensured that all respondents answered all questions. Their answers were carefully filed in the SPSS software.

b. Outliers and extreme values:

The term 'outlier' is open to interpretation, but it is generally agreed that an outlier is a data point that is far outside the norm for a variable (Jarrell, 1994; Rasmussen, 1988; Stevens, 1984). According to Hawkins, an outlier is an

observation that "deviates so much from other observations as to arouse suspicion that it was generated by a different mechanism" (Hawkins, 1980, p. 1). Outliers are typically measured using distance, popular indices include Mahalanobis' distance and Cook's D are both frequently used.

There is a great deal of debate surrounding what should be done with identified outliers. Studies showed that the presence of outliers have a negative effect on correlations (Osborne & Overbay, 2004).

The Initial population of the study was 121, While the results of the Mahalanobis test showed that the specified distance for this test had been exceeded, indicating the presence of outliers (see the attached table), these three values were closely re-examined after they had been identified to determine the reason for their significant deviation from the rest of the values. It became clear that the answers were not objective and contained contradictions, which is normal for this type of inquiry due to its complexity and length. This prompts some respondents to give random answers combining rejection and acceptance of the same question. Therefore, as these answers were unreliable, they were deleted to maintain the credibility of the results. The final sample size became 118.

Table 3.40 Mahalanobis Distance Test

	N	Minimum	Maximum	Mean	Std. Deviation
Stud. Deleted Residual	118	-2,832	3,446	,002	1,019
Mahal. Distance	118	,021	12,980	1,983	2,496
Cook's Distance	118	,000	,302	,010	,031
Centered Leverage Value	118	,000	,111	,017	,021

Source: Adapted by the researcher from SPSS software version22

From the table, we can see that the largest value of Mahalanobis distance is (12,980), which is less than the tabulated value of chi-squared equal to (16,27) at a degree of freedom of (3) and a significance level of (P = 0.001). Therefore, there are no outliers.

c. Testing the normality of the data:

It is necessary to test the normal distribution of the sample and ensure the moderation of variables through statistical tests, such as the kurtosis and skewness coefficients. According to (George & Mallery, 2010), they showed that skewness coefficient should range between [-0.5 to + 0.5], while the kurtosis coefficient should range between [-2 to+ 2] in order to follow the normal distribution.

Table 3.41 Normal distribution of study results (with skewness and kurtosis)

	N	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Innovation	118	,36768	-,337	,223	,450	,442
Business Intelligence	118	,29440	-,805	,223	1,620	,442
Absorptive capacity	118	,49354	-1,082	,223	,504	,442

Source: Adapted by the researcher from SPSS software version22

Based on the results showed in the table above, the sample is subject to normal distribution, and we can carry on our analysis.

3.5.3. Factorial analysis:

This is an exploratory method for analyzing contingency tables (Benzecri J.-P. 1970-1990). It refers to a set of multivariate statistical methods whose main objective is to define the structure of correlations between a large numbers of variables by determining a set of common dimensions (Factors).

Factor analysis is relevant when the survey introduces numerous variables into the questionnaire, subjecting a considerable number of individuals. In this context, the data table is difficult not only to create, but also to analyze. This is partly because the data are complex to organize, and partly because of their sheer volume. Simplification is essential. Factor analysis can be used to reduce the number of variables, highlighting and prioritizing only those factors that generate significant variance.

Many of the steps that were repeated across the literature on exploratory factor analysis were:

1- Analyzing the matrix of correlations between the measured variables.

2- Factor extraction method.

3- Calculating the factor scores for each individual.

a. The extraction method used:

Extraction for principal component analysis (PCA) this is a numerical operation, not estimation. This type of extraction necessarily produces a solution, and the solution produced is unique. It is a solution that maximizes the variance explained by the factors.

Before performing the analysis, it is important to ensure that the data can be factored. They must form a coherent whole in order to be able to search for meaningful common dimensions (Evrard et al., 2009).

In order for the correlation matrix to be globally analyzable, it must meet the following specifications(امحمد بوزيان, 2012) p.32 :

1. Most correlation coefficients should be greater than 0.30 and significant.
2. The absolute value of the correlation matrix determinant must be greater than 0.00001.
3. The correlation matrix should differ from the singular matrix. To ensure this, we use Bartlett's test of sphericity, which should produce a statistically significant result. Through the Bartlett test, the null hypothesis is rejected and the alternative hypothesis is accepted, meaning that there are non-zero correlation coefficients. The significance level of this test must be less than 0.05 (Dauriat, 2011, p. 157).
4. The correlation coefficient should be low, and the Kaiser-Meyer-Olkin (KMO) test and the Measures of Sampling Adequacy (MSA) test should be greater than 0.5.

The correlations between the variables must be sufficient. We will use the following indicators:

- ***The Kaiser-Meyer-Olkin (KMO) measure***: More commonly known as KMO, the Kaiser-Meyer-Olkin measure is an index of factor solution adequacy. It indicates the extent to which the set of variables selected is a coherent set and can be used to construct one or more adequate measures of concepts. A high KMO indicates that there is a statistically acceptable factor solution that represents the relationships between the variables.
    - A KMO value of less than .5 is unacceptable
    - .5 is poor
    - .6 is mediocre
    - .7 is average
    - .8 is commendable
    - .9 is excellent
- ***Bartlett's sphericity test:*** This test verifies the null hypothesis that all correlations are equal to zero. Therefore, we must attempt to reject the null hypothesis, meaning that the probability of obtaining the test value must be less than 0.05.

b. The number of factors to consider:

Dimensionality refers to the number of axes that should be retained. To determine dimensionality, an analysis of eigenvalues is performed. Each eigenvalue represents the total variance explained by a given factor (Malhotra et al., 2007). We use the Kaiser–Meyer–Olkin (KMO) criterion to examine the eigenvalues, retaining all axes with an eigenvalue greater than 1, and we also use the eigenvalue graph to visualize the inflection point(s) (scree test), using the SPSS software version 22.

c. Interpretation of factorial axes:

This involves selecting the items to be taken into account and interpreting the factorial axes. The quality of representation of each item must be assessed and those that do not meet the applicable conditions must be discarded. To determine the importance of the initial variables in the formation of factors, we

have the correlation coefficients between these variables and the selected factors. We used the scale purification criteria of Evrard et al. (2003), eliminating items whose factorial contribution is less than 0.50 on one of the main components identified.

d. Axis rotation:

Rotation is a mathematical operation performed on the correlation matrix with the aim of improving the position of the extracted factors, i.e., enlarging the large saturations and reducing the small saturations.

It is well known that the factors extracted in factor analysis explain the greatest amount of variance, and that the extraction process is done using purely mathematical methods. However, the extracted factors may not represent the best possible situation in terms of understanding and explaining the phenomenon, and the best situation may be obtained through rotation. After rotation, the first factor may still explain the highest percentage of variance.

We used ***Varimax orthogonal rotation*** to maximize factor weights by maximizing the correlation coefficients of the most correlated variables. Each variable in the set has the highest possible weight on one factor and the lowest weight on the other factors. Varimax rotation therefore allows us to discriminate between factors.

- **Business intelligence:**

Table 3.42 correlation matrix of Business intelligence.

		Collection	Sources	Dissemination	Intelligence	Targets	Results	Integration	Influence
Correlation	Collection	1,000	,355	,536	,216	,155	,113	,090	,306
	Sources	,355	1,000	,518	,347	,190	,133	,195	,074
	Dissemination	,536	,518	1,000	,215	,311	,148	,108	,281
	Intelligence	,216	,347	,215	1,000	,316	,328	,383	,068
	Targets	,155	,190	,311	,316	1,000	,409	,328	,284
	Results	,113	,133	,148	,328	,409	1,000	,371	,166
	Integration	,090	,195	,108	,383	,328	,371	1,000	,338
	Influence	,306	,074	,281	,068	,284	,166	,338	1,000

From the table we can see that the absolute value of the correlation matrix determinant is greater than 0.00001.

Table 3.43 Bartlett's test, KMO index

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**,706**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**203,740**
	df	**28**
	Sig.	**,000**

As shown in table () the KMO of BI was 0,706 it is considered as average and a significance of T=0,000.

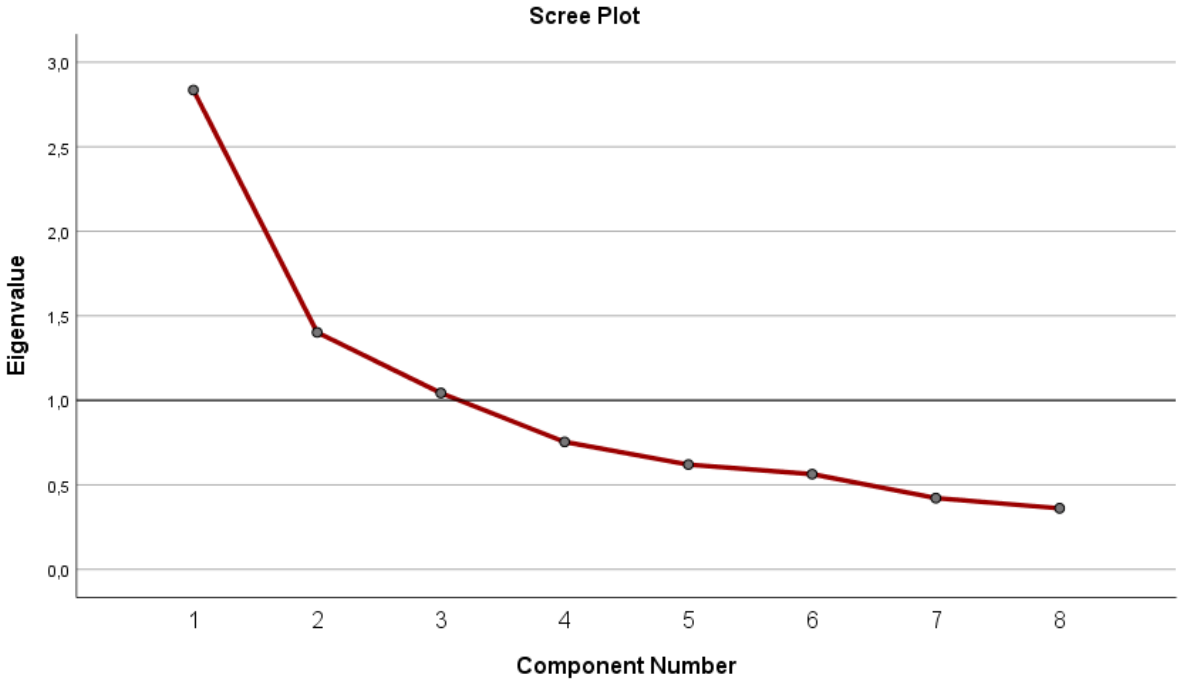
Table 3.44 The Eigen Value of factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,835	35,443	35,443	2,835	35,443	35,443	2,096	26,203	26,203
2	1,402	17,524	52,967	1,402	17,524	52,967	2,039	25,482	51,685
3	1,043	13,038	66,005	1,043	13,038	66,005	1,146	14,320	66,005
4	,754	9,424	75,429						
5	,620	7,746	83,175						
6	,563	7,042	90,217						
7	,422	5,269	95,486						
8	,361	4,514	100,000						

Extraction Method: Principal Component Analysis.

Three factors with Eigenvalues greater than one were extracted, and the proportion of total variance explained by each factor was obtained. These three factors account for 66,005% of the total variance, which is a high value.

Figure 3.10 Scree Plot



The graphical examination of the eigenvalues (fig3.10) confirms the results shown in the table, which indicates that the three factors account for more than 1 of the total inertia. Therefore, these results confirm that the choice of these three factors is correct.

Table 3.45 The Matrix of factors after rotation

	Component		
	1	2	3
Results	,748		
Integration	,743		
Intelligence	,668	,330	-,335
Targets	,648		
Dissemination		,833	
Sources		,769	
Collection		,758	,300
Reasons			,855

The table shows the matrix of factors after rotation and includes three factors.

Accordingly, we observe from the table that the variables: Results, integration, intelligence and targets load on factor 1. Variables: dissemination, sources and collection load on factor 2. Variable reasons loads on the third factor.

Absorptive Capacity:

Table 3.46 correlation matrix of Absorptive Capacity

		Recognize	Acquisition	Assimilation	Transformation	Exploitation
Correlation	Recognize	1,000	,655	,573	,588	,706
	Acquisition	,655	1,000	,539	,635	,570
	Assimilation	,573	,539	1,000	,384	,363
	Transformation	,588	,635	,384	1,000	,496
	Exploitation	,706	,570	,363	,496	1,000

From the table we can see that the absolute value of the correlation matrix determinant is greater than 0.00001.

Table 3.47 Bartlett's test, KMO index of Absorptive Capacity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,807
Bartlett's Test of Sphericity	Approx. Chi-Square	273,732
	df	10
	Sig.	,000

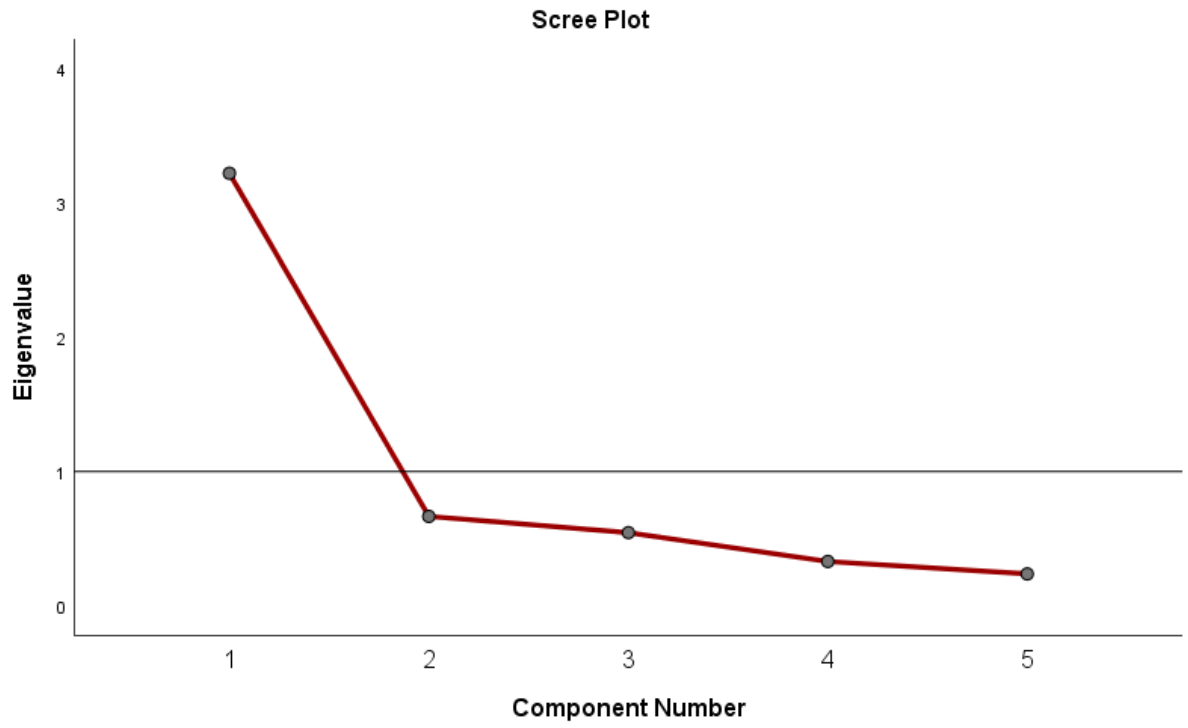
As shown in table () the KMO of AC was 0,807 it is considered as commendable and a significance of T=0,000.

Table 3.48 The Eigen Value of factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,222	64,441	64,441	3,222	64,441	64,441
2	,666	13,320	77,762			
3	,544	10,889	88,650			
4	,330	6,598	95,249			
5	,238	4,751	100,000			

One factor with an Eigenvalues greater than one was extracted, and the proportion of total variance explained by the factor was obtained. This factor account for 64,441% of the total variance, which is a high value.

Figure 3.11 Scree Plot



The graphical examination of the eigenvalues (fig) confirms the results shown in the table, which indicates that the only factor account for more than 1 of the total inertia. Therefore, these results confirm that the choice of this one factor is correct.

Table 3.49 The Matrix of factors

	Component
	1
Recognize	,887
Acquisition	,854
Exploitation	,787
Transformation	,775
Assimilation	,698

Innovation:

Table 3.50 correlation matrix of Innovation

		Type	Rate	Trigger	State
Correlation	Type	1,000	,061	,228	,223
	Rate	,061	1,000	,142	,158
	Trigger	,228	,142	1,000	,411
	State	,223	,158	,411	1,000

From the table we can see that the absolute value of the correlation matrix determinant is greater than 0.00001.

Table 3.51 Bartlett's test, KMO index of Absorptive Capacity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,619
Bartlett's Test of Sphericity	Approx. Chi-Square	33,628
	df	6
	Sig.	,000

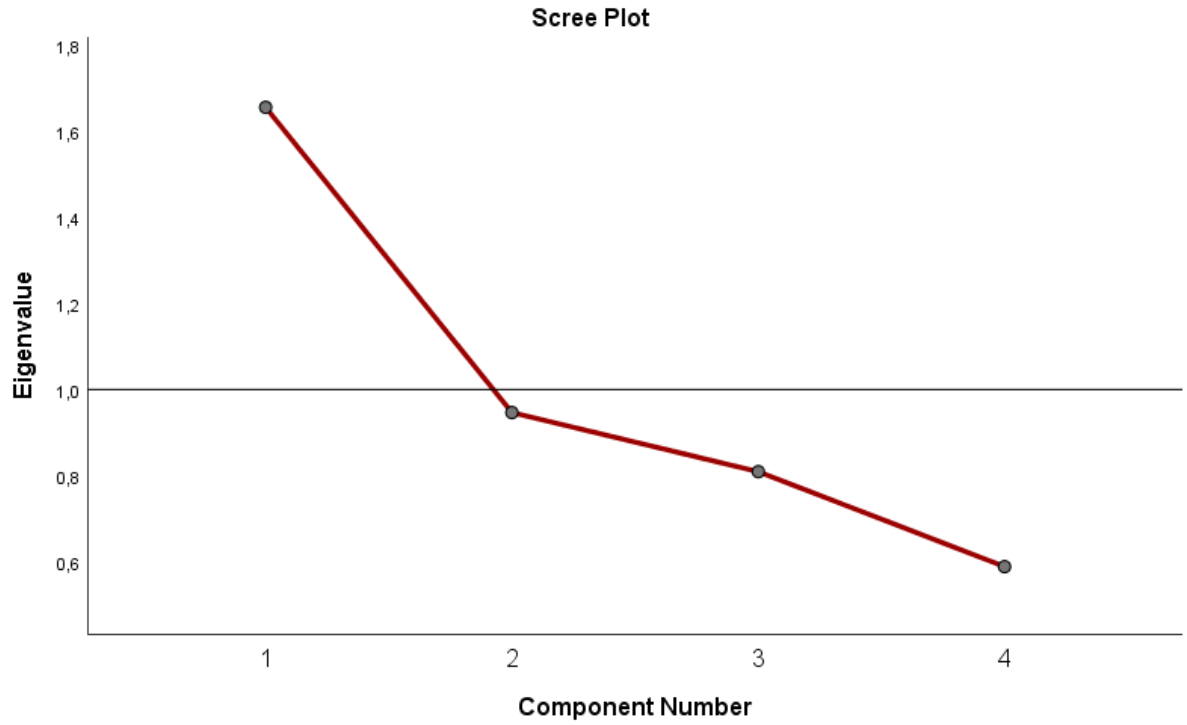
As shown in table (3.51) the KMO of AC was 0,619 and a significance of T=0,000.

Table 3.52 The Eigen Value of factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1,656	41,403	41,403	1,656	41,403	41,403
2	,946	23,661	65,064			
3	,809	20,227	85,291			
4	,588	14,709	100,000			

One factor with an Eigenvalues greater than one was extracted, and the proportion of total variance explained by the factor was obtained. This factor account for 41,403% of the total variance.

Figure 3.12 Scree Plot



The graphical examination of the eigenvalues (fig 3.12) confirms the results shown in the table, which indicates that the only factor account for more than 1 of the total inertia. Therefore, these results confirm that the choice of this one factor is correct.

Table 3.53 The Matrix of factors

	Component
	1
State	,768
Trigger	,765
Type	,564
Rate	,403

Testing hypotheses and interpreting results:

To test the study's hypotheses, we relied on linear regression, which measures potential relationships between independent and dependent variables; both simple and multiple regression were used.

Simple linear regression: is a simple technique for estimating the value of a quantitative Dependent Variable, denoted as Y, on the basis of a single Independent Variable, denoted as X. It is assumed that there is an approximately linear relationship between X and Y. Often, this relationship is expressed as regressing Y onto X and is defined mathematically as:

$$Y = \beta 0 + \beta 1X + \in$$

where $\beta 0$ is the expected value of Y when X = 0 (the intercept), and $\beta 1$ represents the average change in Y for a one-unit increase in X (the slope), $\beta 0$ and $\beta 1$ are unknown parameters or coefficients. The error term, $\in$, acknowledges that there is variation in Y not accounted for by this simple linear model—unexplained variance.

In other words, it is highly unlikely that there is a perfectly linear relationship between X and Y, as additional variables not included in the model are likely to also influence Y.

The conditions for applying regression are:

- The linearity of the measured phenomenon (verified by examining the residuals);
- Constant variance of the error term;
- Independence of the error terms;
- Normality of the error term distribution.

Interpretation of the regression results:

The regression results can be interpreted using the following indices:

- R (the multiple correlation coefficient): This is a standardized index ranging from -1 to +1, indicating the strength of the relationship between all the independent variables and the dependent variable. The higher the correlation, the stronger the linear relationship between the independent variables and the dependent variable.

- R^2 (the coefficient of determination): this is a measure representing the proportion of dependent variance explained by the independent variables included in the equation.
- Beta (standardized coefficient): this is a regression coefficient scaled to a standard range (between -1 and +1). It allows for comparing the contribution of each variable.
- The F-test (Fisher's F): obtained by dividing the mean square of the regression by the mean square of the residuals; its value indicates whether the variance or the addition of explained variance is significant.
- The T-test (significance): its value indicates whether each of the coefficients of the variables in the equation is significant; it must be greater than 1.96 to be significant (marked * at $p < 0.05$).

Multiple regression analysis:

This is an extension of simple linear regression that involves multiple independent variables. Overall, the objectives of multiple regression are the same as those of simple regression. The primary goal is to explain variations in the dependent variable based on variations in multiple independent variables. The second goal is to determine the strength of this relationship. Finally, compared to simple regression, multiple regression offers the advantage of analyzing the contributions made by each explanatory variable in interpreting the phenomenon under study (Giannelloni and Vernette, 2001).

Simple and multiple linear regressions will be performed using the same software, SPSS 26, as this allows the results to be demonstrated easily and clearly.

Hypothesis 1: There is a positive significant relation between business intelligence and absorptive capacity.

The variables were linked based on the relationship between the hypotheses we formulated so that they could be tested. For this part of the study, we decided to use SPSS version 26. As a result, several tests were conducted.

Table 3.54 The regression method

Variables Entered/Removed[a]			
Model	**Variables Entered**	**Variables Removed**	**Method**
1	**Business Intelligence[b]**	**.**	**Enter**

a. Dependent Variable: Absorptive capacity

b. All requested variables entered.

The table above lists the variables included in the regression equation. The dependent variable is AC, and the independent variable is BI.

Table 3.55 The Model Summary

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	**,585[a]**	**,342**	**,337**	**,40194**	**1,515**

a. Predictors: (Constant), Business Intelligence

b. Dependent Variable: Absorptive capacity

The table shows the Pearson correlation coefficient between the dependent variable and the independent variables. The mean value is (0,585), the coefficient of determination is (0,342) and the adjusted coefficient of determination is (0,337). This indicates that the independent variables account for 34% of the variation in absorptive capacity.

Table 3.56 The Analysis of variance (ANOVA)

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	**Regression**	**9,759**	**1**	**9,759**	**60,406**	**,000[b]**
	Residual	**18,740**	**116**	**,162**		
	Total	**28,499**	**117**			

a. Dependent Variable: Absorptive capacity

b. Predictors: (Constant), Business Intelligence

The table shows the results of the ANOVA analysis for the regression significance test. We can see that the Sig value (0.000) is less than (0.05). Therefore, we reject the null hypothesis and accept the alternative hypothesis that the regression is significant. Consequently, the independent variables have an effect on the dependent variable, and we can predict the dependent variable using these independent variables.

Table 3.57 The table of Coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,102	,541		,189	,850		
	Business Intelligence	,981	,126	,585	7,772	,000	1,000	1,000

a. Dependent Variable: Absorptive capacity

From the table, we can see that there is no multicollinearity among the variables, as the inflation coefficients are less than 3.

The regression equation can be written as follows:

$$Y = 0{,}102 + 0\,{,}981\ X + \in$$

Absorptive capacity = 0,102 + (0, 981× Business Intelligence) + $\in$

The results of the statistical tests confirm the following hypothesis:

H1: There is a positive significant relation between business intelligence and absorptive capacity.

Charts:

Figure 3.13 Histogram

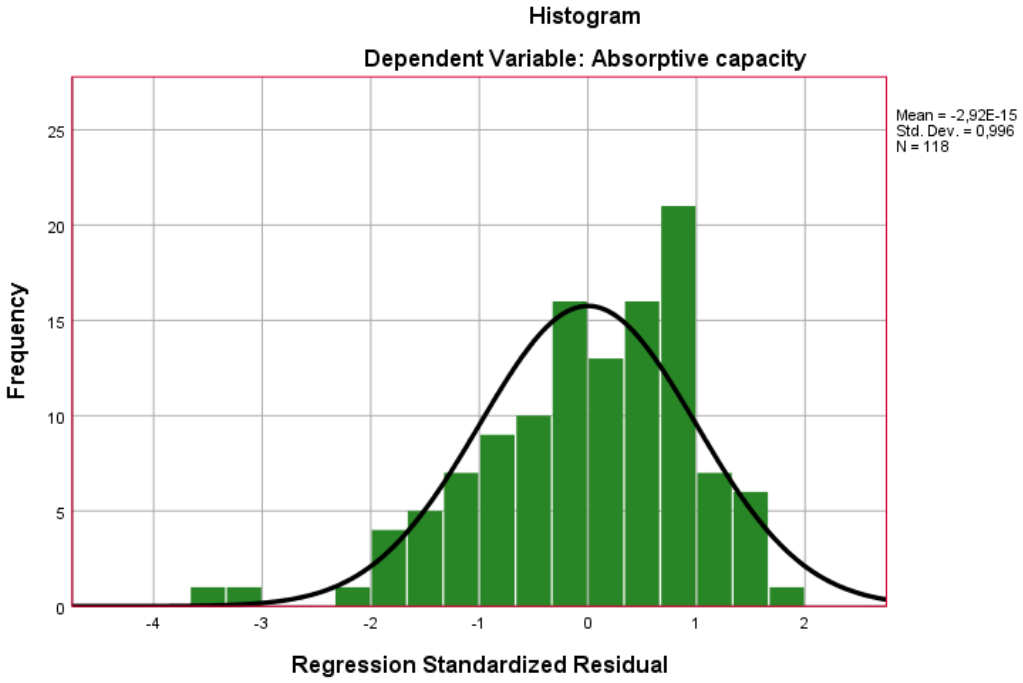


Figure 3.14 Normal P-P Pplot of regression

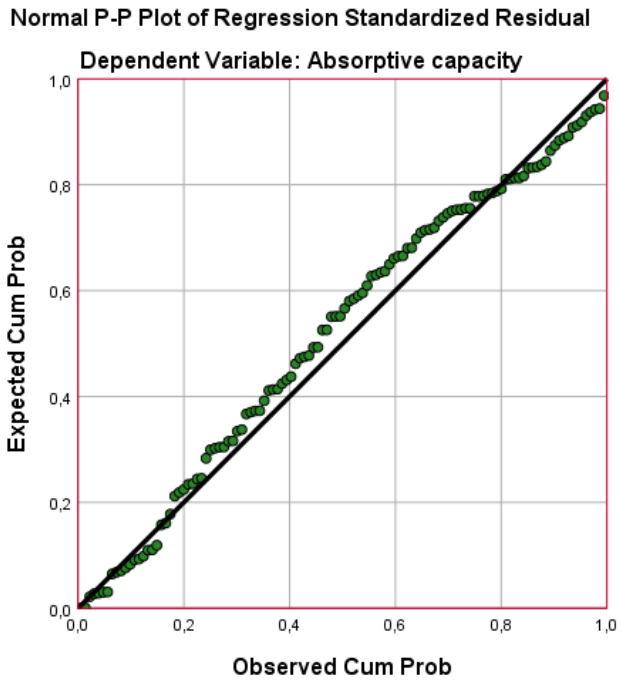
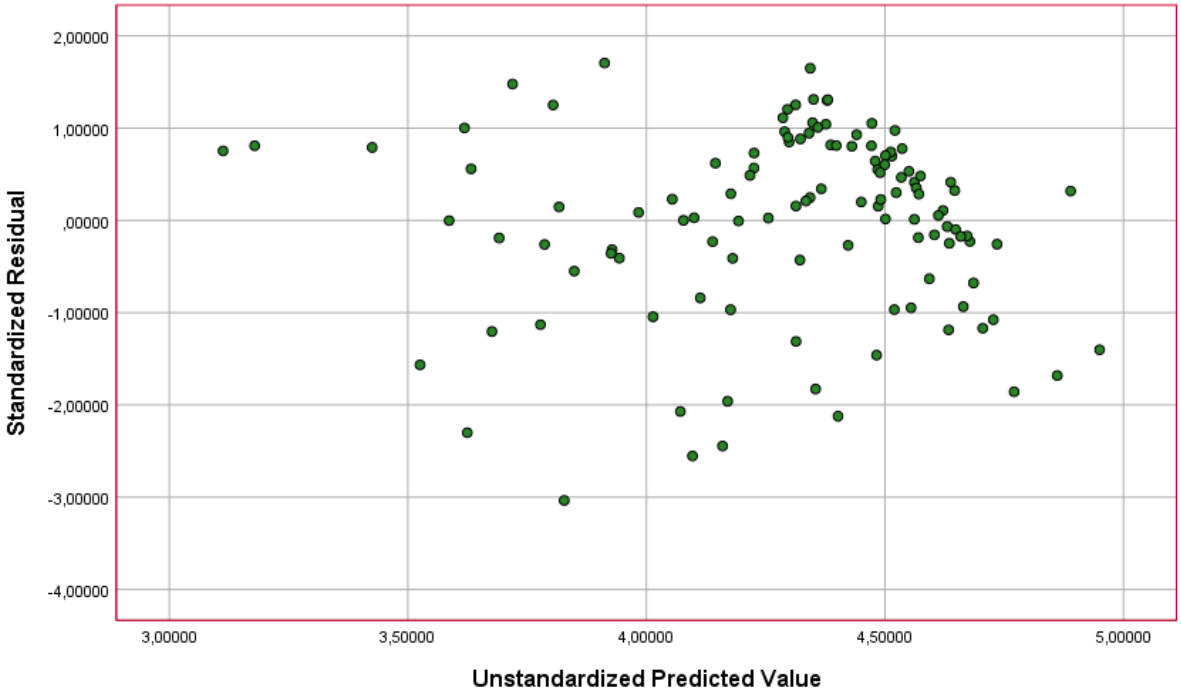


Figure 3.15 Homogeneity of the residuals



The previous figures show that the residuals are normally distributed and that the data cluster around the straight line. Therefore, the residuals follow a normal distribution, which is a prerequisite for the validity of the regression analysis.

As we have established a positive correlation between business intelligence and absorptive capacity, we will conduct a more in-depth analysis to measure the impact of business intelligence dimensions on absorptive capacity.

It denotes that, according to the earlier factor analysis, we loaded three factors and regrouped three new dimensions from the e original ones:

- Data collection and preparation;
- Data analysis;
- Data reporting.

Table 3.58 Model summary/Anova

R	R Square	F	Sig.
,693[a]	,480	35,141	,000[b]

a. Predictors: data_collection_preparation, data_analysis, data_visualization

b. Dependent Variable: Absorptive capacity

Table 3.59 Results of the multiple regression BI dimensions – AC

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,602	,510		1,182	,240		
	Data_collection_preparation	,495	,078	,462	6,353	,000	,863	1,159
	Data_analysis	-,026	,117	-,017	-,226	,821	,849	1,177
	Data reporting	,400	,071	,410	5,655	,000	,866	1,155
a. Dependent Variable: Absorptive capacity								

Data collection/preparation as well as data reporting have a positive significance both $< 0{,}05$. However data analysis have no significance $(0{,}821 > 0{,}05)$.

Since a large amounts of data present a significant challenge for enterprises in terms of their ability to manage it, as storing, processing and making optimal use of this data can be problematic. At the same time, big data can give enterprises a competitive advantage if it is utilized and analyzed. This enables decision-makers to make accurate decisions and increases their chances of achieving competitive success in business. This also suggests that Algerian enterprises still have a way to go in terms of data analysis.

So, given that the regression is statistically significant and the findings show that the independent variables explain 48% of the variance in AC, the beta value showing the relationship between AC and data collection and preparation is 0, 495. And this is statistically significant, as you can see from the t-value and its p-value. This indicates that for each additional unit of data collected and

prepared, AC increases by 0, 495 units. The same applies to data reporting: for every one-unit improvement in data reporting, AC improves by 0,400 units.

As the inflation coefficients are less than 3, there is no multicollinearity among the variables, as can be seen from the table. The regression equation can be written as follows:

Absorptive capacity = O, 602 + (0, 495 × data collection and preparation) + (0, 400 × data reporting) + ∈

Hypothesis 2: There is a positive significant relation absorptive capacity and innovation.

Table 3.60 The regression method

Variables Entered/Removed[a]			
Model	**Variables Entered**	**Variables Removed**	**Method**
1	**Absorptive capacity[b]**	**.**	**Enter**

a. Dependent Variable: Innovation

b. All requested variables entered.

The table above lists the variables included in the regression equation. The dependent variable is Innovation, and the independent variable is AC.

Table 3.61 The Model Summary

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	**,329[a]**	**,108**	**,100**	**,34873**	**1,686**
a. Predictors: (Constant), Absorptive capacity					
b. Dependent Variable: Innovation					

The table shows the Pearson correlation coefficient between the dependent variable and the independent variables. The mean value is (0.329), the coefficient of determination is (0.108) and the adjusted coefficient of determination is (0.100). This indicates that the independent variables account for 10 % of the variation in absorptive capacity.

Table 3.62 The Analysis of variance (ANOVA)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,710	1	1,710	14,058	,000[b]
	Residual	14,107	116	,122		
	Total	15,817	117			
a. Dependent Variable: Innovation						

The table shows the results of the ANOVA analysis for the regression significance test. We can see that the Sig value (0.000) is less than (0.05). Therefore, we reject the null hypothesis and accept the alternative hypothesis that the regression is significant.

Table 3.63 The table of Coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3,164	,283		11,195	,000		
	Absorptive capacity	,245	,065	,329	3,749	,000	1,000	1,000
a. Dependent Variable: Innovation								

From the table, we can see that there is no multicollinearity among the variables, as the inflation coefficients are less than 3. (Charts and graphs are joined in the appendix).

The regression equation can be written as follows:

$$\textbf{Innovation} = 3{,}164 + (0{,}245 \times \textbf{Absorptive capacity}) + \in$$

The results of the statistical tests confirm the following hypothesis:

H2: There is a positive significant relation between Absorptive Capacity and Innovation.

Given the positive effect of AC on innovation, we can continue our analysis to determine the impact of the five AC dimensions on innovation.

Table 3.64 Model summary/Anova

R	R Square	F	Sig.
,397[a]	,158	,120	002[b]

a. Dependent Variable: Innovation

b. Predictors: (Constant), Exploitation of information, Assimilation of information, Transformation of information, Acquisition of information, Recognize the value of information

Table 3.65 Results of the multiple regression AC dimensions – Innovation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3,129	,290		10,771	,000		
	Recognize the value of information	,233	,096	,363	2,434	,016	,338	2,960
	Acquisition of information	-,053	,078	-,090	-,677	,500	,429	2,333
	Assimilation of information	,006	,068	,010	,090	,928	,613	1,630
	Transformation of information	-,005	,062	-,009	-,080	,937	,542	1,844
	Exploitation of information	,072	,079	,114	,905	,367	,471	2,122

a. Dependent Variable: Innovation

Four dimensions out the five dimensions are non-significant ($p > 0,05$). This can be explained by difficulties and the complexity of the development of these processes among Algerian enterprises in the Innovation context.

So, given that the regression is statistically significant and the findings show that the independent variables explain 15,8% of the variance in Innovation, the beta value showing the relationship between Innovation and recognize the value of

information is 0, 233. And this is statistically significant, as we can see from the t-value and its p-value. This indicates that for each additional unit of data recognizing the value of information, Innovation increases by 0, 233 units.
As the inflation coefficients are less than 3, there is no multicollinearity among the variables, as can be seen from the table.

The regression equation can be written as follows:

Innovation = 3,129+ (0, 233× recognizing the value of information) +∈

Hypothesis 3: There is a positive significant relation between Business Intelligence and Innovation.

Table 3.66 The regression method

Variables Entered/Removed[a]			
Model	**Variables Entered**	**Variables Removed**	**Method**
1	**Business Intelligence[b]**	**.**	**Enter**
a. Dependent Variable: Innovation			
b. All requested variables entered.			

The software entered the dependent variable Innovation and the independent variable BI.

Table 3.67 The Model Summary

Model Summary[b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	**,679[a]**	**,461**	**,456**	**,27120**	**1,794**
a. Predictors: (Constant), Business Intelligence					
b. Dependent Variable: Innovation					

The results indicate a significant correlation (R = 67,9%) between the dependent variable, Innovation, and the explanatory variable BI. The R^2 value is 0,461. The model is of satisfactory quality, as the independent variable explains more than 46% of the variance in the dependent variable.

Table 3.68 The Analysis of variance (ANOVA)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,285	1	7,285	99,047	,000[b]
	Residual	8,532	116	,074		
	Total	15,817	117			
a. Dependent Variable: Innovation						
b. Predictors: (Constant), Business Intelligence						

The Anova table shows that the regression is significant as Sig=0,000 < 0,05 which indicates that the regression is significant. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

Table 3.69 The table of Coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,591	,365		1,620	,108		
	Business Intelligence	,848	,085	,679	9,952	,000	1,000	1,000
a. Dependent Variable: Innovation								

From the table, we can see that β = 0,848, which represents the strength of the relationship between BI and innovation. There is also a statistically significant effect of BI on innovation (Sig = 0.000). The table also shows that there is no multicollinearity among the variables, as the inflation coefficients are less than 3. (Charts and graphs are provided in the appendix).

The regression equation can be written as follows:

Innovation = 0,591 + (0,848× Business Intelligence) +∈

The results of the statistical tests confirm the following hypothesis:

H 3: There is a positive significant relation between Business Intelligence and Innovation.

Having confirmed the existence of a relationship between BI and innovation, we will continue our analysis by examining the effect of each BI dimension on innovation.

Table 3.70 Model summary/Anova

R	R Square	F	Sig.
,712[a]	,507	39,113	,000[b]

a. Predictors: data_collection_preparation, data_analysis, data_visualization

b. Dependent Variable: Innovation

Table 3.71 Results of the multiple regression BI dimensions – AC

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,021	,361		2,830	,006		
	data_collection_preparation	,488	,056	,612	8,788	,000	,892	1,122
	data_analysis	,241	,120	,202	2,004	,047	,425	2,353
	data_visualization	,024	,085	,027	,282	,778	,459	2,178
a. Dependent Variable: Innovation								

The results indicate a significant correlation (R = 71,2%) between the dependent variable, Innovation, and the explanatory variables BI dimensions. The R^2 value is 0,507.

The beta value showing the relationship between Innovation and Data collection and preparation is 0, 488. And this is statistically significant, as we can see from the t-value and its p-value. This indicates that for each additional unit of Data

collection and preparation, Innovation increases by 0, 488 units. The same applies to Data analysis: for every one-unit in Data analysis practice, Innovation improves by 0,241units.

As the inflation coefficients are less than 3, there is no multicollinearity among the variables, as can be seen from the table.

The regression equation can be written as follows:

Innovation = 1,021 + (0, 488× Data collection and preparation) +

(0,241× Data analysis) +∈

3.5.4. Discussion around results:

The field study that we conducted on a sample of 118 Algerian enterprises produced positive results with regard to the relationships examined in the hypotheses formulated for this study. After carrying out factor analysis and identifying the factors, we performed simple regression analysis to test the hypotheses with regard to the independent variable (strategic awareness), the dependent variable (innovation) and the mediating variable (absorptive capacity). We will discuss the results of the study and the hypothesis testing below.

Discussion of the study's descriptive findings and the relationships among them:

In terms of innovation within Algerian enterprises, the questionnaire aimed to clarify the nature of innovation, its implementation and how to obtain the necessary information to initiate the innovation process.

The results showed that Algerian enterprises primarily focus on product innovation, with an average score of (4, 36) for this dimension. This explains the emergence of a large number of new Algerian products that are locally manufactured and range in quality from acceptable to good. Furthermore, a recent study showed that Algerian consumers have positive attitudes towards the quality of locally produced goods(بوحالـة, أمـين, لعـلاوي, & عمـور, 2023), oher

enterprises, meanwhile, focus on innovation in services and marketing, where we obtained an arithmetic mean of (4,31).

The primary driver of innovation in Algerian enterprises is the acquisition of new technologies, with this factor recording the highest arithmetic mean (4,34). This aligns with a study by (Berbar & Benhabib, 2015), which showed that innovation processes in Algerian enterprises largely revolve around mastering and imitating foreign technologies, often with gradual improvements to existing knowledge to better adapt to specific organizational or market needs.

Regarding business intelligence, the results were positive, showing that Algerian enterprises embrace its principles, even if this is not done in a structured or formal manner. Rather than being collected by a specific department dedicated to this purpose, information is collected by various departments within these enterprises. The executive branch ranks first with a mean score of (4,47). This was followed by the sales department (4,41) and then the marketing department (4,26). Other enterprises rely on the R&D department (4,10) and few do have monitoring units (4,07). Since executives collect the information, this is consistent with the finding that they consider trade shows and exhibitions to be the most important channels for obtaining new information. This dimension recorded the highest mean score of (4.47). Furthermore, the collected information is primarily distributed via email (4,39). As email is a fast and secure method, the results also align with the fact that these enterprises primarily seek to develop new products through a process of intelligence (consistent with the fact that product innovation ranked first), as well as focusing on understanding and satisfying customers and acquiring new ones. As the results showed, the information gathered for innovation purposes is used in product development.

As for absorptive capacity results showed that this enterprises have an absorptive capacity at a certain level.

Discussion of tests for differences between study groups based on demographic factors:

In many cases, respondents' answers are influenced by their personal characteristics. In light of this, we examined the impact of educational level and years of experience on the absorptive ability.

Interesting the five absorptive capacity dimensions showed no influence regardless of the employees' qualifications or their years of experience, except for transformation of information that happened to be influenced by years of experience.This is because, when processing information, experience plays a crucial role in selecting the appropriate tools and determining the specific time required processing the information. In their study (Vaghely, Julien, & Cyr, 2007) stated the information that is already known is processed using algorithms. New information, especially information about new products or services, is processed using heuristics. However the business climate in Algeria differs greatly from that of the rest of the world. The way enterprises operate and the methods used to obtain information are not similar to those in the Western world, where fierce competition to acquire the latest technology is predominant. This is particularly evident given that Algerian enterprises are relatively inactive in this context, which is why various aspects are not influenced by employees' personal factors, as innovation is determined by other, more significant factors (Fleuren, Paulussen, Van Dommelen, & Van Buuren, 2014).

Discussion and Interpretation of the Results of the Hypotheses Test:

We did run linear regression to put the hypotheses to test, and we proceed on discussion of the results.

Discussion of the Results of the First Main Hypothesis:

This hypothesis states that there is "**a positive significant relation between business intelligence and absorptive capacity**".

Results show that the relation is positive and the first hypothesis is confirmed.

This indicates that the independent variable (business intelligence) account for 34% of the variation in absorptive capacity.

This demonstrates that Algerian enterprises that engage in business intelligence enhance their ability to collect, analyze and process information, which they will later use to create added value, either within the organization or through innovation or the acquisition of a competitive advantage. This is consistent with researches of (Al-Eisawi, Serrano, & Koulouri, 2021) and (Božič & Dimovski, 2019) and (Hassani & Mosconi, 2021) .

For further analysis we examined the effect of the dimensions of business intelligence on absorptive capacity by recoding the previous dimensions into three new ones (data collection and preparation; data analysis; data reporting) and performing a multiple regression analysis. The results showed that there is a positive relation between data collection and preparation and absorptive capacity as Absorptive capacity is generally identified as the ability of an enterprise to recognize the value of new external information, assimilate it, and apply it to commercial ends this. While data visualization also have a positive impact on absorptive capacity, this lines with the studies of (Duchek, 2013) and (Arndt, Aharonson, Jansen, Jiang, & Ting, 2023) and (Gebauer, Worch, & Truffer, 2012).

data analysis did not have a positive impact on absorptive capacity, this could be related to the way business intelligence is applied in Algerian enterprises, as we have seen earlier the collection of information and the intelligence process evolves most of the department of the enterprises, however the analysis process is generally limited to a certain qualified personnel with certain skills and knowledge, so it can not generate an overall a positive abortive capacity. Or the enterprises could be seeking paid services. These services would be for analyzing their data. Overall we add that absorptive capacity literature has

neglected both organizational design and individual-level antecedents (Volberda, Foss, & Lyles, 2010).

Discussion of the Results of the Second Main Hypothesis:

The second hypothesis was positively confirmed "**There is a positive significant relation between absorptive capacity and innovation**". As we showed in the first chapter, the role of absorptive capacity is to mediate between business intelligence and innovation. The idea is that enterprises develop absorptive capacity through business intelligence, which is then used for innovation. In our study results indicates that the independent variable (absorptive capacity) account for 10% of the variation in innovation.

Although the relation is not very high, it is still good enough to confirm the positive relation between the variables. An enterprises' innovation performance can be boosted by Absorptive capacity, which serves as a tool for processing useful external knowledge. It may also contribute to a firm's innovative performance by facilitating the transfer of knowledge for cross-organizational innovation activities (Cohen & Levinthal, 1990) and (Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011).

We did run further analysis to discover the relation between each of the five dimensions of absorptive capacity with innovation. The acquisition and transformation of information are the second and third dimensions of absorptive capacity, respectively (Todorova & Durisin, 2007) did not have a positive impact on innovation in Algerian enterprises, This is consistent with our earlier findings, which showed that most existing innovations in the national market are based on imitating available technology. Is imitation an innovation? The answer is in the definition of innovation according to (Schumpeter & Swedberg, 2021) innovation is the process of introducing new combination of materials and forces to produce a new thing or the same thing relaying on different methods.(Pérez-Luño, Valle Cabrera, & Wiklund, 2007) Stated that enterprises that adopt innovations developed by other innovative organizations are highly

attuned to global trends and seek to differentiate themselves and be the first to introduce these innovative ideas into their local markets in order to offer better products and services to their customers. In the other hand (Porter, 1980a) stated that enterprises that seek to overlap their competitors, regardless of developing new products, will face an important technological risk, compared to the ones who only react to the actions of their competitors. Imitation could clearly indicate a lack of absorptive capacity within an enterprise (Zahra & George, 2002).

Transformation and exploitation of information also did not have a significant effect on innovation in Algerian enterprises, however recognizing the value of information did have a significant effect on innovation. These results demonstrate that the absorptive capacity practice is limited in the first dimension recognizing the value of information. This can be due several reasons regardless of the complexity of the process or due to the nature of information in the environment, (Van den Bosch et al., 1999) emphases that a firm's absorptive capacity relate to the nature of the knowledge in its environment. Adding that Absorptive capacity can be efficient as a by-product of routine activity when the knowledge domain that the firm wishes to exploit is close to its current knowledge and skills base (Cohen & Levinthal, 1990). Absorptive capacity also depends on the individuals' capabilities and skills and their knowledge. It can also be affected by the efficiency of the communication system within the enterprise.

Discussion of the Results of the third Main Hypothesis:

Results confirmed this hypothesis stating that **"There is a positive significant relation between Business Intelligence and Innovation».** The independent variable (business intelligence) account for 46% of the variation in innovation.

This alliance with the research of (Eidizadeh, Salehzadeh, & Chitsaz Esfahani, 2017) who argued that business intelligence creates the optimal conditions for innovation within an organization. And also (المهدي, هتهات, نجمي, & سعيدات, 2017)

who have stated that the steering and management of innovation based on monitoring the company's external environment and technological changes and developments, with the aim of obtaining up-to-date and reliable information to facilitate the creation of new ideas, products, and services, thereby better ensuring the company's long-term viability, expanding its market share, and building customer loyalty. Strategic intelligence plays a vital role in the innovation process because it helps to gather and analyze strategic data to support decisions that benefit the company (Bessouh & Seddiki, 2022). (Bergeron & Hiller, 2002) argue that business intelligence stimulates creativity, innovation, and a willingness to change within the organization, with the aim of becoming a "smart, learning organization" .An organization's willingness and ability to learn and integrate new knowledge are also key factors in the successful implementation of business intelligence.

To better understand the relationship between business intelligence and innovation, we examined the impact of the components of business intelligence on innovation: the first dimension data collection & preparation have a positive effect on innovation among Algerian enterprises.

This indicates that Algerian enterprises are focusing their efforts on gathering and processing information in order to identify innovative opportunities, particularly when looking at the global level to learn about the latest technologies and innovations, or at the local level, especially in light of the economic transformations the country is undergoing, which are accelerating the pace of change in both the legislative and economic levels.

This was firsthand observed when the reasons for attendance at the exhibition were asked of survey participants; the seeking of new information and trying to learn what their competitors were doing to improve their current products and services was indicated in most of the responses given.

Data reporting have a negative impact on innovation among Algerian enterprises. The process of data reporting is the conversion of data into a format that is simple to comprehend. This alliance with the study of (White, Woodfield, & Ritchie, 2003) in which they stated that Regular data reporting enables enterprises to measure specific metrics, track progress over time and monitor performance. In addition, data reporting takes information that is often difficult to process and presents it in an easy-to-grasp manner, making information more accessible. This allows enterprises to notice trends that can help them to better understand their business performance, informing data-driven decision-making for long-term success. Reporting can be done using simple tolls like Excel table / Spreadsheet, or the enterprise use more developed tolls such as powered BI applications. Among Algerian enterprises the results show that this process is not much practiced, due to its relevance with new Information trends and technics which requires certain skills. Reports are still prepared and delivered in the old fashion way.

Data analysis have a significant relation on innovation in Algerian enterprises, despite the complexity and the high cost going along with the specific individual characteristics required for this type of processes. This alliance with the study of (Hmoud et al., 2023) who highlighted that business intelligence (BI) tools, and analytics techniques has emerged as a key driver of innovation and organizational efficiency in a variety of organizations.

There is no doubt that the Algerian enterprises struggle with adapting an efficient analysis system. In their study (Lahchame & Djilali, 2021) the authors denoted main obstacles facing the implementation of an efficient data analysis system in Algerian enterprises:

- Technological: sometimes outdated infrastructure, limited software, lack of high-quality connectivity;

- Organizational: lack of cross-departmental coordination, excessive centralization of certain decisions, lack of clear leadership;
- Cultural: resistance to change, weak digital culture, and lack of ongoing training tailored to technological advancements.

Another important reasons of why the data analysis system does not generate positive insight, is because of the nature of the information collected. This alliance with (Hmoud et al., 2023) who stated that Business intelligence systems use data and information to generate insights it requires information that is accurate, complete and relevant. And the climate of business in Algeria is not stable and constantly changing (changes in laws, Exchange rate) for example.

It is to denote that there is a difference between data reporting and data analysis:

- **Data Reporting:** Focuses on "what" is happening by organizing and summarizing data.
- **Data Analysis:** Digs deeper into the "why" it is happening, asking the right questions, concluding, and making data-driven decisions.

Conclusion of chapter three:

In this chapter, we first presented the objectives and methodology of the study. We provided details of the research setting and data collection method (questionnaire). We also outlined the key themes of our research to justify and develop our research hypotheses.

We adopted a research model based on our review of the theoretical literature ; in light of this, we adapted a questionnaire previously used in a prior study to fit our research model. We conducted the study on a sample consisting of 118 national Algerian enterprises and used statistical software SPSS V22.

The use of Principal Component Analysis allowed us to assess the reliability and validity of our measurement tool.

After conducting the necessary tests, we confirmed that BI has the strongest direct effect on innovation ($R^2 = 0.461$), explaining 46.1% of variance. This suggests that in the Algerian context, the sheer availability of business intelligence information is the primary driver of innovation, even more than the firm's capacity to absorb that information.

This study validates the Todorova & Durisin (2007) model in a developing economy context (Algeria). It demonstrates that:

- "Recognize value" is the critical first step for enterprises with limited AC maturity.

- BI's direct effect on innovation may be stronger than its indirect effect through AC where AC is underdeveloped.
- Data collection capabilities matter more than analytical capabilities for driving innovation in emerging markets.

Finnaly, **All 3 hypotheses confirmed:** BI → AC → Innovation chain validated in Algerian context

Strongest effect: BI directly explains 46.1% of innovation variance.

Critical skill: "Recognizing value" is the key AC dimension for innovation.

Foundation matters: Data collection is the most significant BI capability.

General conclusion

General conclusion:

At the macroeconomic level, innovation is recognized as the dominant factor driving economic growth and trade specialization among countries (L'OCDE, 1997). There is no single way to innovate successfully, and that SMEs looking to innovate can adopt very different approaches whether following the model of a large corporation or that of a startup. This choice may depend on their size, industry, culture, and capabilities (Le Déaut & Sido, 2014).
Creating and adopting innovations is an important driver of long-term firm success. In the face of rapid technological change and increasing globalisation, the ability to generate and implement innovations is crucial for firms to survive in the global marketplace (Wagner, 2009).

Besides the domination of information technologies, has created entirely new businesses, they have destroyed those who cannot adapt to this change and have created an ever increasing demand for innovation. An A company should try to institutionalize innovation by creating the appropriate culture, structure, systems and processes that enable the emergence of innovation(Dogan, 2017).

The increasing need for relevant information among enterprises calls for the implementation of a Business Intelligence system that enables enterprises to listen to the weakest signals from their environment.

In our research we aimed to answer to the following research question:

- **« Does Business Intelligence influence Innovation through Absorptive Capacity in Algerian enterprises? »**

This study enabled us to obtain positive results, particularly with regard to demonstrating the impact of mindfulness on innovation a relationship that has

been rarely addressed in the previous literature. Our study revealed a correlation between the two variables.

The study also revealed that vigilance practices exist within Algerian enterprises, although most are not carried out by dedicated vigilance teams but are instead decentralized and involve various departments depending on the nature of each enterprise.

However, it was clear that officials were well aware of the importance of monitoring the enterprises' external environment and being attuned to subtle shifts.

When enterprises conduct competitors Intelligence, we have also observed that decision-makers do not distinguish between competitors, whether they are powerful or have only recently entered the market. Every competitor, regardless of his size, is a potential threat that should not be underestimated.

Take, for example, the recent case of the global company Jumia, which entered the Algerian market with an online ordering and delivery service. Its owners claimed they had no competitors in the Algerian market, but this situation did not last long, and the company was forced to withdraw from the Algerian market within a year due to fierce competition from individuals working independently in the field of remote sales and delivery, as the company began to incur significant financial burdens.

Furthermore, when we conducted the survey and asked about Intelligence units, we noticed that respondents showed great interest in the nature of these units and expressed their approval of the idea of having a unit within their enterprises' dedicated to Intelligence practices.

We also noted that some respondents were unfamiliar with the concept of Intelligence, as the vast majority practices it instinctively without realizing that mindfulness is a comprehensive and structured system relied upon by leading innovative companies.

The results showed that there is a positive relation between data collection and preparation and absorptive capacity as Absorptive capacity is generally identified as the ability of an enterprise to recognize the value of new external information, assimilate it, and apply it to commercial ends this. And along with data visualization.

The acquisition and transformation of information are the second and third dimensions of absorptive capacity, respectively (Todorova & Durisin, 2007) did not have a positive impact on innovation in Algerian enterprises, This is consistent with our earlier findings, which showed that most existing innovations in the national market are based on imitating available technology.

Transformation and exploitation of information also did not have a significant effect on innovation in Algerian enterprises, however recognizing the value of information did have a significant effect on innovation. These results demonstrate that the absorptive capacity practice is limited in the first dimension recognizing the value of information.

Algerian enterprises are focusing their efforts on gathering and processing information in order to identify innovative opportunities, particularly when looking at the global level to learn about the latest technologies and innovations, or at the local level, especially in light of the economic transformations the country is undergoing, which are accelerating the pace of change in both the legislative and economic levels.

General conclusion

Data reporting have a negative impact on innovation among Algerian enterprises. The process of data reporting is the conversion of data into a format that is simple to comprehend. This alliance with the study of (White et al., 2003) in which they stated that Regular data reporting enables enterprises to measure specific metrics, track progress over time and monitor performance. In addition, data reporting takes information that is often difficult to process.

Data analysis have a significant relation on innovation in Algerian enterprises, despite the complexity and the high cost going along with the specific individual characteristics required for this type of processes. This alliance with the study of (Hmoud et al., 2023 ENREF 121) who highlighted that business intelligence (BI) tools, and analytics techniques has emerged as a key driver of innovation and organizational efficiency in a variety of organizations.

Research Contributions :

- This research added value to the literature since we it did establish the existence of an impact of Business Intelligence on innovation in Algerian enterprises.
- The large number of enterprises that participated in this research helpd us gain a more accurate insight into the state of Business Intelligence and innovation in an Algerian context.
- This is one of the earliest studies in Algeria to examine absorptive capacity and Business Intelligence in a large number of national enterprises.
- This study is also important for entrepreneurs or those considering starting new businesses, as it highlights both the importance and the risks associated with the external environment and information regarding the organization’s operations.
-

General conclusion

Limitations and Shortcomings of the Study:

- The nature of the business climate in Algeria makes it very difficult to conduct empirical studies, especially when it comes to completing questionnaires.
- It was very difficult to find a moderating variable beside of Absorptive capacity because there was a lack of researchers who looked at the relationship between BI and innovation.
- The questionnaire used in the study could have been elaborated upon by regrouping some items and amending some questions.

Future Research Directions:

- The current research did deliver positive results; however, other researchers may wish to examine the relationship between business intelligence and innovation using other moderator variables.
- When studying absorptive capacity, it is more efficient to study it by level within the enterprise: personal, group and organizational. This is because each level could generate different results.
- Implementation of an intelligence unite within an enterprise could be a very research if it would be assessed by the researcher.

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Appendix 1: Questionnaire

Doctoral research questionnaire on the contribution of strategic monitoring (Business intelligence) to innovation within Algerian companies.

Madam, Sir,

As part of our doctoral research on the contribution of strategic monitoring (Business intelligence) to innovation within Algerian companies, we are sending you this survey questionnaire intended to collect precise information on strategic monitoring of companies as a lever for innovation.

We are convinced that the participation of as many companies as possible is essential to the success of our study and we hope that your company will agree to take part.

Thanking you for your participation in the study, please accept our best wishes.

Ms. Drihem Sarra. Doctoral student in economics at the Faculty of Economics, Management and Commercial Sciences. Abou Bakr Belkaid Tlemcen University.

Under the direction of: **Pr BOUKLIKHA Latifa**

Laboratory: « POLDEVA »

Email : drihem.sarra@gmail.com

Part Ⅰ:In this part, you are asked to provide general information about your company and yourself.

Please select an answer to each question by checking X in the appropriate box

- **What is your last diploma obtained?**

Bachelor's degree ☐ Master's degree ☐ Engineering ☐ Magistere degree ☐ Ph.D. ☐

- **Are you aged?**

Less than 35 ans ☐ Between 36-50 ☐ More than 51 ans ☐

- **What is your function within your enterprise?**

PDG ☐ DG ☐ DRH ☐ Manager ☐ Marketing &sales ☐

- **How many years of experience do you have in your enterprise?**

Less than 5 ans ☐ Between 6-10 ans ☐ More than 11ans ☐

- **Choose your enterprise's sector of activity**

☐ Agro-industry

☐ Buildings and Public Works

☐ Industry (industrial capital goods, health, mechanics, etc.)

☐ Services (Financial, ICT, Transport and logistics)

- **What is the size of your enterprise?**

Small Enterprise ☐ Medium Enterprise ☐ Large Enterprise ☐ Very Large Enterprise ☐

- **What is your enterprise target market?**

National (Algerian only) ☐ Export ☐ Mixed ☐

Part II: Innovation within the company

Using a scale of 1 to 5, where 1 means "Strongly disagree" and 5 means "Strongly agree", How much do you agree with each of the following statements.

1. **The type of innovation or change you practice most is:**

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Product innovation					
Service innovation					
Process innovation					
Managerial innovation					
Organizational innovation					
Marketing Innovation					

2. **These innovations are generally carried out at a rate:**

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Very strong					
Strong					
Average					
Weak					
Very weak					

3. **In your activity the trigger for change:**

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Identification of needs					
Technological development					

Both at the same time (Identification of needs and technological development)					
Other environmental actors					
The opening of the market					

4. The state of innovation in our company:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Our company integrates technologies into new products/services					
We take existing services and transform them into better, more efficient services					
Our senior management is fully committed to supporting innovation activities and programs					
We are perceived by our customers as being more innovative than our competitors					
Innovation is effectively communicated among our employees and strongly encouraged through incentives					

Part III: Business Intelligence within the company

5. The collection of information is generally done by:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
All company's staff					
Monitoring unit					

R&D department					
Marketing Service					
Executive management					
Sales department					
Consultants outside the company					

6. In general your sources of information are:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
The professional press					
Market studies					
Professional salons					
Commercial sources					
Use our own information network					
Track innovations and patents in the field					
Use the Internet					
Participate in seminars					
Visiting customers on site					

7. The information collected are generally disseminated by:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Personally					
Phone					
Email					
Reports					
Meeting					

Other					

8. In general, your environmental monitoring covers:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Price					
Product					
Identify potential new competitors					
Technological developments					
Market development					
Regulations					
Know your customers better					

9. The targets of your environmental Intelligence are:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Competitors					
Clients					
Suppliers					
Subcontractors					

10. The information collected are generally used to:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Achieve productivity gains					
Retain current customers					
Develop new products or services					
Prospect new customers					
Conquer new market shares					
Improve the quality					

of products or services					

11. The information you collect is involved in the innovation process In:

Statements	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
The idea creativity phase					
Study phase					
Validation phase					
Launch phase					
Marketing phase					
Development phase					
All along the project					

12. Over all the whole changes within your company is influenced by:

Statements	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Risk context					
Strategic context					
Speed context					
Change context					
Organization as a whole					

Part IV: Absorptive Capacity

13. Recognize the value of new external knowledge:

Statements	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
Our company has the ability to anticipate the movements of competitors					
Our company has the ability to anticipate customer needs					

Our company has the ability to stay in touch with external institutions and specialized sources					
Our company has specialized personnel, equipment and services for environmental monitoring					
Our company has difficulty recognizing changes occurring in our market/products					
Our company understands new opportunities to satisfy our customers quickly					
Our company quickly interprets changes in market attraction					
Our company intuitively knows which areas can use acquired technology or external knowledge					

14. Acquisition:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Our employees are kept informed of changes to our products and services					
In our company, employees are kept informed of changes in strategic direction					
In our company, employees are informed about technology transfers and innovations					
In our company, employees are kept					

informed of changes in partners, suppliers and distributors.					
Our Employees get together to share ideas and information without being forced by the organization or being part of a project					
Our Employees get together to solve problems without being forced by the organization or being part of a project					
Employees often have the opportunity to work on new ideas					

15. Assimilation :

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Through exchanges with my partners, I learn new management methods and processes					
Through exchanges with competitors, I discover new suppliers or distributors					
During exchanges with my competitors, I gain knowledge of external technical processes and technological innovations					
When I talk to my competitors, I discover new products and services.					
When I talk to my competitors, I get new ideas.					

We often organize study groups to discuss the influence of new knowledge on our business.					
We have special procedures and practices to help staff assimilate new knowledge and combine it with existing knowledge.					

16. Transformation :

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**
Our employees participate in improving procedures by reporting on their work.					
Our employees contribute to improving procedures by proposing new solutions.					
Our employees participate in improving procedures by finding ways to go faster					
Our employees take part in improving procedures by proposing the transformation of certain procedures					

17. Exploitation:

Statements	**Strongly Disagree**	**Disagree**	**No Opinion**	**Agree**	**Strongly Agree**

We have a strong reputation for technological excellence					
Our company is characterized by the intensity of our knowledge.					
Our products and services have a strong knowledge component					
We thought about how to use new knowledge to improve existing operational efficiency and effectiveness.					
Our company regularly rethinks its technologies and adapts them in line with new knowledge.					

Thank you for your collaboration

Appendix 2: List of Exhibiting Companies by Field of Activity

	Field of Activity	Company Name (English)
1.	Food Industry & Packaging	REVO FOOD
2.	Food Industry & Packaging	ETRADIPAS (GOYA)
3.	Food Industry & Packaging	FADIPLAIT
4.	Food Industry & Packaging	BERKACHE ABDELKRIM
5.	Food Industry & Packaging	LAITERIE SOUMMAM
6.	Food Industry & Packaging	CEBON
7.	Food Industry & Packaging	STAR AIT
8.	Food Industry & Packaging	SAADET ALGIERS
9.	Food Industry & Packaging	YASMINE FOOD
10.	Food Industry & Packaging	SAKOUFOOD
11.	Food Industry & Packaging	S.T.L.D
12.	Food Industry & Packaging	LABELLE AGRO ALIMENTAIRE
13.	Food Industry & Packaging	BUENO FOOD COMPANY
14.	Food Industry & Packaging	COLAITAL
15.	Food Industry & Packaging	BIMO BISCUITERIE
16.	Food Industry & Packaging	PROMASIDOR DJAZAIR
17.	Food Industry & Packaging	ALAWAFI DATES & OLEAGINOUS PRODUCTION
18.	Food Industry & Packaging	CGA TASSALA
19.	Food Industry & Packaging	INTERLAIT
20.	Food Industry & Packaging	DELICE D'ALGERIE BISCUITERIE
21.	Food Industry & Packaging	ADVANCED PRO PACK PRINT
22.	Food Industry & Packaging	MODERN CHEESE FACTORY
23.	Food Industry & Packaging	BIAXIAL FILMS PACKAGING
24.	Food Industry & Packaging	IGAL FOOD
25.	Food Industry & Packaging	MATEMA
26.	Food Industry & Packaging	TAFADIS
27.	Food Industry & Packaging	ORAN GREAT SUGAR REFINERY
28.	Food Industry & Packaging	BONA IDC
29.	Food Industry & Packaging	JEELBAZ
30.	Food Industry & Packaging	YASMINE DAIRY
31.	Food Industry & Packaging	ABICHEESE
32.	Food Industry & Packaging	IGHIL PRODUCTION
33.	Food Industry & Packaging	SB ADVERTISING
34.	Food Industry & Packaging	GENERAL CONDIMENT ALGERIA
35.	Food Industry & Packaging	BELLAT CVA
36.	Food Industry & Packaging	INDAGRO ALIMENTARIA
37.	Food Industry & Packaging	CONFI CHOC
38.	Food Industry & Packaging	GOUMIDI INDUSTRIAL GROUP
39.	Food Industry & Packaging	SIM AGRO
40.	Food Industry & Packaging	GOLDEN PALM ESTABLISHMENT
41.	Food Industry & Packaging	SMTP
42.	Food Industry & Packaging	CHEHD NOUGAT
43.	Food Industry & Packaging	YUMMY FOOD
44.	Food Industry & Packaging	CHOCODADA
45.	Food Industry & Packaging	HAOUAS FOOD INDUSTRY
46.	Food Industry & Packaging	MAXI INDUSTRIES
47.	Food Industry & Packaging	IBRAHIM & SONS (IFRI)
48.	Food Industry & Packaging	AMAMRA CHIC MAGISTIQUE
49.	Food Industry & Packaging	EL MEDJAJIA

50.	Food Industry & Packaging	TAIBA FOOD COMPANY
51.	Food Industry & Packaging	OUICHEF LOGISTIC
52.	Food Industry & Packaging	LOTUS PLUS XL
53.	Food Industry & Packaging	SOBCO
54.	Food Industry & Packaging	VIVANTAL
55.	Food Industry & Packaging	ELBASSIKA
56.	Food Industry & Packaging	LALA SALHA CANNERY
57.	Food Industry & Packaging	AMETNA
58.	Food Industry & Packaging	CENTRAL CEREALS SUBSIDIARY
59.	Food Industry & Packaging	SAI BISCUITERIE
60.	Food Industry & Packaging	AGRI FOOD TRADING
61.	Food Industry & Packaging	DEVLOPACK
62.	Food Industry & Packaging	LOUIZA PASTRY
63.	Food Industry & Packaging	EL WAFI PACKAGING
64.	Food Industry & Packaging	YAKOUREN CHEESE FACTORY
65.	Food Industry & Packaging	L'OR BLANC CHEESE FACTORY
66.	Food Industry & Packaging	PRODALEX
67.	Food Industry & Packaging	MEDISEC
68.	Food Industry & Packaging	HAMZAOUI KENZA
69.	Food Industry & Packaging	EMAPLAST
70.	Food Industry & Packaging	NEW ERA CANNERY
71.	Food Industry & Packaging	RAWI
72.	Food Industry & Packaging	DAR EL IBRIK
73.	Food Industry & Packaging	CEVITAL AGRO-INDUSTRY
74.	Food Industry & Packaging	GERBIOR BENHAMADI GROUP
75.	Food Industry & Packaging	HAIOUZ
76.	Food Industry & Packaging	NINNY
77.	Food Industry & Packaging	SWAREEN
78.	Food Industry & Packaging	MISSIVA CAKE INGREDIENTS
79.	Food Industry & Packaging	THERA INFUSE
80.	Food Industry & Packaging	FPAC
81.	Food Industry & Packaging	PRO FILM
82.	Food Industry & Packaging	ISSOULA OLIVE
83.	Food Industry & Packaging	AMOUR MILLS
84.	Food Industry & Packaging	MINOSEB
85.	Food Industry & Packaging	NEW WORLD
86.	Food Industry & Packaging	FRUIOR
87.	Food Industry & Packaging	MEDDAHI AIMEN
88.	Food Industry & Packaging	TRIZTECH
89.	Food Industry & Packaging	SABRI AGRO INDUSTRIES
90.	Food Industry & Packaging	TRI-STARS PRODUCTS
91.	Food Industry & Packaging	GOURAYA LISMANE NABATI
92.	Food Industry & Packaging	TRAVEPS
93.	Food Industry & Packaging	OUCHERIF FOOD INDUSTRIES GROUP
94.	Food Industry & Packaging	TAHRAOUI
95.	Food Industry & Packaging	KHOUAS KNIAA BEVERAGES
96.	Food Industry & Packaging	RB CHOCOLATERIE
97.	Food Industry & Packaging	SNAX
98.	Food Industry & Packaging	MAGHREB CANNERY
99.	Food Industry & Packaging	LEPRO-PACK
100.	Food Industry & Packaging	EL YAMAMA FOOD
101.	Food Industry & Packaging	IPAC / SAMA
102.	Food Industry & Packaging	EL MENTOUJ
103.	Food Industry & Packaging	GENERAL EMBALLAGE
104.	Food Industry & Packaging	BOUKELLAL MOHAMMED TAHAR

105.	Food Industry & Packaging	IRISH CHEESE
106.	Food Industry & Packaging	GUESSAB ABDELOUAHAB
107.	Food Industry & Packaging	AFIA INTERNATIONAL ALGERIA
108.	Food Industry & Packaging	EL WIFAK WAFERS
109.	Food Industry & Packaging	DELY PACKAGING
110.	Food Industry & Packaging	HABIB
111.	Food Industry & Packaging	DJABALI NACEREDDINE
112.	Food Industry & Packaging	FORMADJA FOOD
113.	Food Industry & Packaging	CACT
114.	Food Industry & Packaging	UNIVERT MILK
115.	Food Industry & Packaging	UCCA / OAIC
116.	Food Industry & Packaging	BABYCOOL
117.	Food Industry & Packaging	ELMAKAREM
118.	Food Industry & Packaging	BILO BEE
119.	Food Industry & Packaging	SERINE INDUSTRY
120.	Food Industry & Packaging	DEITY CAKE
121.	Food Industry & Packaging	BENSOLTANE HICHEM
122.	Food Industry & Packaging	ADY FOOD
123.	Food Industry & Packaging	AHMANACHE NORDINE
124.	Food Industry & Packaging	SIPADES NOUARA
125.	Food Industry & Packaging	NAYA TRAITEUR
126.	Food Industry & Packaging	SWEELTY
127.	Food Industry & Packaging	MIRA AGRO
128.	Food Industry & Packaging	MATEG
129.	Food Industry & Packaging	PATURAGES D'ALGERIE
130.	Food Industry & Packaging	AGROLOG GROUP
131.	Food Industry & Packaging	SIZEN
132.	Food Industry & Packaging	MAGIMIX DE LEZZAR
133.	Food Industry & Packaging	DIAB CHEESE
134.	Food Industry & Packaging	ELTHIKA
135.	Food Industry & Packaging	BOILAIT
136.	Food Industry & Packaging	RABAH DELHOUM
137.	Food Industry & Packaging	IRNATENE YAMNA
138.	Food Industry & Packaging	TAYMA
139.	Food Industry & Packaging	DRAA BEN KHEDDA DAIRY
140.	Food Industry & Packaging	GRD LABELLE
141.	Food Industry & Packaging	COGB LABELLE
142.	Food Industry & Packaging	JUS LABELLE
143.	Food Industry & Packaging	WANIS LAIT
144.	Food Industry & Packaging	REMO AGRICOL
145.	Food Industry & Packaging	LE THEIERE
146.	Food Industry & Packaging	CAROVITAL
147.	Food Industry & Packaging	MOLTO BELLO BISCUITERIE
148.	Food Industry & Packaging	ZEFLUX SAFRAN
149.	Food Industry & Packaging	ABOULKACEM OIL MILL
150.	Food Industry & Packaging	EL-TWABLI
151.	Food Industry & Packaging	AURIVIS
152.	Food Industry & Packaging	SUPER KOKI
153.	Food Industry & Packaging	BISCOEST
154.	Energy, Chemistry, Petrochemicals & Cosmetics	ENSP GROUP
155.	Energy, Chemistry, Petrochemicals & Cosmetics	MADJOUR PLAST
156.	Energy, Chemistry, Petrochemicals & Cosmetics	SAIDAL GROUP

157.	Energy, Chemistry, Petrochemicals & Cosmetics	MADJOUR HICHAM IMP EXP
158.	Energy, Chemistry, Petrochemicals & Cosmetics	BAIT EL OTOUR EL ALAMIA
159.	Energy, Chemistry, Petrochemicals & Cosmetics	FERDI AWANI
160.	Energy, Chemistry, Petrochemicals & Cosmetics	HISPALAB LABORATORIES (PALC GROUP)
161.	Energy, Chemistry, Petrochemicals & Cosmetics	ASMIDAL
162.	Energy, Chemistry, Petrochemicals & Cosmetics	GHAZAL GPL
163.	Energy, Chemistry, Petrochemicals & Cosmetics	FLOREALTECH
164.	Energy, Chemistry, Petrochemicals & Cosmetics	PETRO BARAKA
165.	Energy, Chemistry, Petrochemicals & Cosmetics	TACHAAL
166.	Energy, Chemistry, Petrochemicals & Cosmetics	EL-GHAZOU
167.	Energy, Chemistry, Petrochemicals & Cosmetics	HUILERIE MECQA
168.	Energy, Chemistry, Petrochemicals & Cosmetics	AMIR CLEAN
169.	Energy, Chemistry, Petrochemicals & Cosmetics	LAMOA
170.	Energy, Chemistry, Petrochemicals & Cosmetics	BOUANIGA RABAH
171.	Energy, Chemistry, Petrochemicals & Cosmetics	LABORATOIRES VENUS SAPECO
172.	Energy, Chemistry, Petrochemicals & Cosmetics	SELLA INDUSTRIE
173.	Energy, Chemistry, Petrochemicals & Cosmetics	VIVACOS
174.	Energy, Chemistry, Petrochemicals & Cosmetics	PERFECT MAX INDUSTRY
175.	Energy, Chemistry, Petrochemicals & Cosmetics	ENGTP
176.	Energy, Chemistry, Petrochemicals & Cosmetics	GROUPE SONAREM
177.	Energy, Chemistry, Petrochemicals & Cosmetics	LUXOIL
178.	Energy, Chemistry, Petrochemicals & Cosmetics	UNIVERS DETERGENT AIGLE
179.	Energy, Chemistry, Petrochemicals & Cosmetics	LYMADA COS
180.	Energy, Chemistry, Petrochemicals & Cosmetics	LABO STAR COS
181.	Energy, Chemistry, Petrochemicals & Cosmetics	FADERCO
182.	Energy, Chemistry, Petrochemicals & Cosmetics	HOLDING ACS
183.	Energy, Chemistry, Petrochemicals & Cosmetics	CASTI COSMETIQUE
184.	Energy, Chemistry, Petrochemicals & Cosmetics	DARYBEL
185.	Energy, Chemistry,	SORFERT ALGERIE

	Petrochemicals & Cosmetics	
186.	Energy, Chemistry, Petrochemicals & Cosmetics	DEBBAGH ALLAOUA TELEGHMA PLAST
187.	Energy, Chemistry, Petrochemicals & Cosmetics	GARDEN CLEAN MESTER ET CIE
188.	Energy, Chemistry, Petrochemicals & Cosmetics	TOTALENERGIES LUBRIFIANTS ALGERIE
189.	Energy, Chemistry, Petrochemicals & Cosmetics	NIALL COSMETIQUE
190.	Energy, Chemistry, Petrochemicals & Cosmetics	TAHWEEL DZ
191.	Energy, Chemistry, Petrochemicals & Cosmetics	SANSIRO COSMETIC
192.	Energy, Chemistry, Petrochemicals & Cosmetics	ANIMAXY PRODUCTION
193.	Energy, Chemistry, Petrochemicals & Cosmetics	SONATRACH
194.	Energy, Chemistry, Petrochemicals & Cosmetics	ENTREPRISE NATIONALE DE GÉOPHYSIQUE (ENAGEO)
195.	Energy, Chemistry, Petrochemicals & Cosmetics	ENAFOR
196.	Energy, Chemistry, Petrochemicals & Cosmetics	ELFERDOUS
197.	Energy, Chemistry, Petrochemicals & Cosmetics	ICA CHIALI
198.	Energy, Chemistry, Petrochemicals & Cosmetics	CUICUL HB PHENOL
199.	Energy, Chemistry, Petrochemicals & Cosmetics	HENDE MESBAH O2 NATURE
200.	Energy, Chemistry, Petrochemicals & Cosmetics	LABONEDJMA
201.	Energy, Chemistry, Petrochemicals & Cosmetics	FIRAMAB
202.	Energy, Chemistry, Petrochemicals & Cosmetics	OSMANE
203.	Energy, Chemistry, Petrochemicals & Cosmetics	RAYANOX
204.	Energy, Chemistry, Petrochemicals & Cosmetics	TOSYALI IRON STEEL INDUSTRY ALGERIE
205.	Energy, Chemistry, Petrochemicals & Cosmetics	SOPALUX 2000
206.	Energy, Chemistry, Petrochemicals & Cosmetics	ENCC
207.	Energy, Chemistry, Petrochemicals & Cosmetics	ASRAR PARAPHARM
208.	Energy, Chemistry, Petrochemicals & Cosmetics	TREOX ALGERIE
209.	Energy, Chemistry, Petrochemicals & Cosmetics	PUB CAR
210.	Energy, Chemistry, Petrochemicals & Cosmetics	ENAC
211.	Energy, Chemistry, Petrochemicals & Cosmetics	UNIVER COSMETIQUE
212.	Energy, Chemistry, Petrochemicals & Cosmetics	WAFA DOUX
213.	Energy, Chemistry, Petrochemicals & Cosmetics	DESTINY KIDS

214.	Energy, Chemistry, Petrochemicals & Cosmetics	CIEL VERT
215.	Energy, Chemistry, Petrochemicals & Cosmetics	ESQUIROL PRODUCTION
216.	Energy, Chemistry, Petrochemicals & Cosmetics	NASSIMA KAHOUL
217.	Energy, Chemistry, Petrochemicals & Cosmetics	NAFTAL
218.	Energy, Chemistry, Petrochemicals & Cosmetics	SAPEDER ORAN
219.	Energy, Chemistry, Petrochemicals & Cosmetics	FRATER-RAZES
220.	Energy, Chemistry, Petrochemicals & Cosmetics	LAM ALITA
221.	Energy, Chemistry, Petrochemicals & Cosmetics	KAPPACHEMICALS
222.	Energy, Chemistry, Petrochemicals & Cosmetics	SARPI
223.	Energy, Chemistry, Petrochemicals & Cosmetics	CRYOTECH ALGERIE
224.	Energy, Chemistry, Petrochemicals & Cosmetics	SINARLA
225.	Energy, Chemistry, Petrochemicals & Cosmetics	AGRO TAIBA ELDJAZAIR
226.	Energy, Chemistry, Petrochemicals & Cosmetics	BIT BAIT ALGERIE
227.	Energy, Chemistry, Petrochemicals & Cosmetics	DJR IMPORT EXPORT
228.	Energy, Chemistry, Petrochemicals & Cosmetics	SALIBRA
229.	Energy, Chemistry, Petrochemicals & Cosmetics	ALGERIAN DESALINATION COMPANY
230.	Energy, Chemistry, Petrochemicals & Cosmetics	LDM GROUPE
231.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ENICAB
232.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	RAYLAN
233.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ACE MOBILE ALGERIE
234.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SACOMI
235.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	CONDOR
236.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	TIC IMPORT
237.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	MIDAD
238.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	LOTFI ELECTRONICS
239.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SONELGAZ
240.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	PRONTOPLAN
241.	ELECTRICAL, ELECTRONICS, AND HOME	SATEREX

	APPLIANCE INDUSTRY	
242.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	IRZIL SHOPPING
243.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	GROUPE INDUSTRIEL SIDI BENDEHIBA
244.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ENIEM
245.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	DIGIUS LINK ALGERIA
246.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	MOBYLAND
247.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	BIOLUX
248.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	NORTH AFRICA ELECTRONICS
249.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	STREAM SYSTEM (BOMARE COMPANY
250.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ETS TOUMI ABDELKADER
251.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SIRIUS ADVANCED TECHNOLOGY
252.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SINOVA HOME APPLIANCE
253.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ETKA POWER COMPANY
254.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ALMITECH
255.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SHARBO ALGERIE
256.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	PROTID SYSTEMS
257.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	BRANDT ALGERIE
258.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ELECTRO INDUSTRIES AZAZGA
259.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	TECHNOMODERNE TMS
260.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SM SALHI MOBILIER
261.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	BEEP
262.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	EDIEL
263.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	CABEL
264.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	BMS ELECTRIC AS EL BI
265.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	AMS TECH
266.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	MONO ELECTRIC
267.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	FABS
268.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	DHIRAR ELECTRECITE
269.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	ENIE

270.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	SONARIC
271.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	EIMEI
272.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	HB TECHNOLOGIES
273.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	MERSAL
274.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	AKSA GENERATEURS ALGERIE
275.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	EMIRE
276.	ELECTRICAL, ELECTRONICS, AND HOME APPLIANCE INDUSTRY	GMI ALGERIE
277.	CONSTRUCTION & MAJOR WORKS	COSIDER TRAVAUX PUBLICS
278.	CONSTRUCTION & MAJOR WORKS	ELVA CERAM
279.	CONSTRUCTION & MAJOR WORKS	GROUPE INDUSTRIEL DES CIMENTS D'ALGERIE GICA/CETIM
280.	CONSTRUCTION & MAJOR WORKS	BAMA CERAM
281.	CONSTRUCTION & MAJOR WORKS	CERAM DECOR
282.	CONSTRUCTION & MAJOR WORKS	NOUVELLE TUILERIE IZERKHEF
283.	CONSTRUCTION & MAJOR WORKS	EL BORDI MATERIELS ET ENGINS
284.	CONSTRUCTION & MAJOR WORKS	PRIMOC PROMOTION
285.	CONSTRUCTION & MAJOR WORKS	BATICOMPOS
286.	CONSTRUCTION & MAJOR WORKS	METAL STRUCTURE
287.	CONSTRUCTION & MAJOR WORKS	PEINTURE MIDY 2
288.	CONSTRUCTION & MAJOR WORKS	GIL DIVINDUS
289.	CONSTRUCTION & MAJOR WORKS	HADDAD RAHIM
290.	CONSTRUCTION & MAJOR WORKS	NECHMA AGGLOS
291.	CONSTRUCTION & MAJOR WORKS	INNOVA CERAM
292.	CONSTRUCTION & MAJOR WORKS	ILOOK
293.	CONSTRUCTION & MAJOR WORKS	HOLDING SNS
294.	CONSTRUCTION & MAJOR WORKS	GAM MITAL
295.	CONSTRUCTION & MAJOR WORKS	SNIM STEEL
296.	CONSTRUCTION & MAJOR WORKS	NATRA INTERNATIONAL
297.	CONSTRUCTION & MAJOR WORKS	ENMTP

298.	CONSTRUCTION & MAJOR WORKS	SNC METAL
299.	CONSTRUCTION & MAJOR WORKS	SANITARY LUXE ROBINETTERIE (SLR)
300.	CONSTRUCTION & MAJOR WORKS	SOCIETE NORD AFRICAIN ASPHALT
301.	CONSTRUCTION & MAJOR WORKS	WIDA SERVICE
302.	CONSTRUCTION & MAJOR WORKS	BLOCTECH-SOLUTIONS
303.	CONSTRUCTION & MAJOR WORKS	VMS INDUSTRIE
304.	CONSTRUCTION & MAJOR WORKS	ALGERIA HAM MOTORS
305.	CONSTRUCTION & MAJOR WORKS	PLANETE FILTRE INDUSTRIE
306.	CONSTRUCTION & MAJOR WORKS	TECHNO CAST GROUP
307.	CONSTRUCTION & MAJOR WORKS	CTS
308.	CONSTRUCTION & MAJOR WORKS	NTW INDUSTRIE
309.	CONSTRUCTION & MAJOR WORKS	NSA EQUIPEMENT
310.	CONSTRUCTION & MAJOR WORKS	USINETECH
311.	CONSTRUCTION & MAJOR WORKS	MMDININDUSTR
312.	CONSTRUCTION & MAJOR WORKS	JEMMY INDUSTRY
313.	CONSTRUCTION & MAJOR WORKS	SMEI MAMMERI ET FILS
314.	CONSTRUCTION & MAJOR WORKS	FUTUR MOTORS ALGERIE
315.	CONSTRUCTION & MAJOR WORKS	SATEREX / IRIS TYRES
316.	CONSTRUCTION & MAJOR WORKS	TECHNIMATIC
317.	CONSTRUCTION & MAJOR WORKS	BPI/ENH DOUDAH
318.	CONSTRUCTION & MAJOR WORKS	ALPHAS
319.	CONSTRUCTION & MAJOR WORKS	KANDA GROUP
320.	CONSTRUCTION & MAJOR WORKS	ECONOMIE MODERNE AUTO
321.	CONSTRUCTION & MAJOR WORKS	TIRSAM
322.	CONSTRUCTION & MAJOR WORKS	2M-INDUSTRIES
323.	CONSTRUCTION & MAJOR WORKS	2MP INDUSTRY
324.	CONSTRUCTION & MAJOR WORKS	DURDUR DISQUE
325.	CONSTRUCTION & MAJOR WORKS	SOREMEP
326.	CONSTRUCTION & MAJOR	ENTREPRISE DE

	WORKS	CHAUDRONNERIE BENMOUHOUB BELKACEM
327.	CONSTRUCTION & MAJOR WORKS	DAR EDDIAF MOTORS EQUIPEMEN
328.	CONSTRUCTION & MAJOR WORKS	MOBILI STYL
329.	CONSTRUCTION & MAJOR WORKS	STELLANTIS EL DJAZAIR
330.	CONSTRUCTION & MAJOR WORKS	UNIA DZ
331.	CONSTRUCTION & MAJOR WORKS	RAFNOU METAL
332.	CONSTRUCTION & MAJOR WORKS	KNH CAR INDUSTRY
333.	CONSTRUCTION & MAJOR WORKS	FR METAL
334.	CONSTRUCTION & MAJOR WORKS	ABENS EQUIPEMENTS SERVICE
335.	CONSTRUCTION & MAJOR WORKS	POWER FITNESS AND SPORTS NUTRITION
336.	CONSTRUCTION & MAJOR WORKS	TPA
337.	CONSTRUCTION & MAJOR WORKS	BOUREZZA RIADH (BRICHILLER)
338.	CONSTRUCTION & MAJOR WORKS	GROUPE AMARA ACIER
339.	CONSTRUCTION & MAJOR WORKS	SNC FIAQ BENHAMOUCHE ET CIE
340.	CONSTRUCTION & MAJOR WORKS	FERROVIAL
341.	CONSTRUCTION & MAJOR WORKS	PMAT
342.	CONSTRUCTION & MAJOR WORKS	MAGHREB TRUCK COMPANY
343.	CONSTRUCTION & MAJOR WORKS	RAGNAR
344.	CONSTRUCTION & MAJOR WORKS	MORSI SLIMANE
345.	CONSTRUCTION & MAJOR WORKS	STEEL INOX
346.	CONSTRUCTION & MAJOR WORKS	EEF
347.	CONSTRUCTION & MAJOR WORKS	GOLDEN FLAME
348.	CONSTRUCTION & MAJOR WORKS	SUNPACK
349.	CONSTRUCTION & MAJOR WORKS	MIRAF
350.	CONSTRUCTION & MAJOR WORKS	ENTREPRISE NATIONALE DES PRODUITS DE L'ÉLECTROCHIMIE
351.	CONSTRUCTION & MAJOR WORKS	RENAULT ALGERIE
352.	CONSTRUCTION & MAJOR WORKS	KLEIN FAB
353.	CONSTRUCTION & MAJOR WORKS	IKAM AUTO INDUSTRIE ALGÉRIE

354.	CONSTRUCTION & MAJOR WORKS	SO-BIKE TRICYCLE ALGERIE
355.	CONSTRUCTION & MAJOR WORKS	ENTREPRISE MOKRANE HAMID
356.	CONSTRUCTION & MAJOR WORKS	MAG
357.	CONSTRUCTION & MAJOR WORKS	GIGA GRAPHIC
358.	CONSTRUCTION & MAJOR WORKS	OPDZ
359.	CONSTRUCTION & MAJOR WORKS	FRAMNET
360.	CONSTRUCTION & MAJOR WORKS	ALFATRON
361.	MANUFACTURING INDUSTRY	DWM DECO
362.	MANUFACTURING INDUSTRY	NOOM CORPORATE
363.	MANUFACTURING INDUSTRY	L'ALGERIENNE DES INDUSTRIES TEXTILES TAYAL
364.	MANUFACTURING INDUSTRY	LEATHER INDUSTRY FILIALE DU HOLDING GETEX
365.	MANUFACTURING INDUSTRY	HADJIR SAMIRA
366.	MANUFACTURING INDUSTRY	LE MONDE DU CONFORT
367.	MANUFACTURING INDUSTRY	NTW INDUSTRIE
368.	MANUFACTURING INDUSTRY	SINAATEC BY MADAR
369.	MANUFACTURING INDUSTRY	EL ITEKANE FABRICATION DE MEUBLES
370.	MANUFACTURING INDUSTRY	TAPIDOR FABRICATION TAPIS ET MOQUETTE
371.	MANUFACTURING INDUSTRY	BOUMERDASSI NAWEL
372.	MANUFACTURING INDUSTRY	ART OF KNITTING
373.	MANUFACTURING INDUSTRY	ZON KIN
374.	MANUFACTURING INDUSTRY	LAIDI SMAIL
375.	MANUFACTURING INDUSTRY	DJAITH SABAH / HADIA TEXTILE
376.	MANUFACTURING INDUSTRY	GUESSOUM MAROUA
377.	MANUFACTURING INDUSTRY	BADACHE CHAHRAZED
378.	MANUFACTURING INDUSTRY	LA LITERIE PARFAITE
379.	MANUFACTURING INDUSTRY	NASA CONFORT
380.	MANUFACTURING INDUSTRY	DIGITEC HARDWARE
381.	MANUFACTURING INDUSTRY	MASTER FACTORY
382.	MANUFACTURING INDUSTRY	VAGUS CUIR
383.	MANUFACTURING INDUSTRY	KEBIR KEBIR
384.	MANUFACTURING INDUSTRY	ANGORA BY SHADOW TAPIS
385.	MANUFACTURING INDUSTRY	AMEUBLEMENT BOUCHAIR
386.	MANUFACTURING INDUSTRY	MGC COMMUNICATION ET PUB
387.	MANUFACTURING INDUSTRY	FLY SOFT
388.	MANUFACTURING INDUSTRY	RACHID DJEDDAH
389.	MANUFACTURING INDUSTRY	SAFOUANE MOHAMED
390.	MANUFACTURING INDUSTRY	BIO CHARME
391.	MANUFACTURING INDUSTRY	LA FOIRE DU MEUBLE
392.	MANUFACTURING INDUSTRY	NAFITPAPER
393.	MANUFACTURING INDUSTRY	OVER PAP
394.	MANUFACTURING INDUSTRY	PORTES KOUDRI
395.	MANUFACTURING INDUSTRY	RÉPLIQUE DZ
396.	MANUFACTURING INDUSTRY	TRENDY DECO
397.	MANUFACTURING INDUSTRY	LE MONDE DE TEXTILE
398.	MANUFACTURING INDUSTRY	IDEN HOME

399.	MANUFACTURING INDUSTRY	EL WAFA
400.	MANUFACTURING INDUSTRY	KOUNT TEXTILE
401.	MANUFACTURING INDUSTRY	DAMENE LIL NASSIDJ
402.	MANUFACTURING INDUSTRY	ADENA
403.	MANUFACTURING INDUSTRY	AL LAMIAA LI SINAAT ALHADITHA
404.	MANUFACTURING INDUSTRY	SANICOMPOSE
405.	SERVICES	BSWAA EVENTS
406.	SERVICES	MADAR HOLDING
407.	SERVICES	DINAMIQUE
408.	SERVICES	GS1 ALGERIA
409.	SERVICES	GAM ASSURANCES
410.	SERVICES	ATM MOBILIS
411.	SERVICES	CNRC
412.	SERVICES	MEDIA-EXPERT
413.	SERVICES	GROUPE LOGITRANS
414.	SERVICES	BAOSEM
415.	SERVICES	GLOBAL PROFESSIONAL CONSULTING
416.	SERVICES	STALL EXPO EVENT
417.	SERVICES	INATEL/AL-ELEC
418.	SERVICES	INVEST DESIGN CONSULTING
419.	SERVICES	AMS TECH
420.	SERVICES	OPTIMUM TELECOM ALGERIE
421.	SERVICES	GROUPE LOGITRANS
422.	SERVICES	BANQUE DE L'AGRICULTURE ET DU DEVELOPPEMENT RURAL - BADR
423.	SERVICES	ALGERIE TELECOM
424.	SERVICES	ANPT
425.	SERVICES	SOCIETE GENERALE ALGERIE
426.	SERVICES	GROUP SF COMMUNICATION
427.	SERVICES	VITTORIA VIAGIO
428.	SERVICES	SKY TRAINING AVIATION
429.	SERVICES	BERTI ÉDITIONS
430.	SERVICES	FORMATIC EXPO
431.	SERVICES	CONSULTING INOVATION
432.	SERVICES	OMEDIA
433.	SERVICES	TALYSSE MEDIA
434.	SERVICES	IGHILI
435.	SERVICES	MN AGENCY
436.	SERVICES	ONO MEDIA
437.	SERVICES	WATANIA MEDIA
438.	SERVICES	GROUPE SERVICES PORTUAIRES SERPORT
439.	SERVICES	GROUPE TELECOM ALGERIE
440.	SERVICES	LA FOURMI
441.	SERVICES	L'AGENCE ALGERIENNE DE PROMOTION DE L'INVESTISSEMENT - AAPI
442.	SERVICES	CENTRE DE DEVELOPPEMENT DES TECHNOLOGIES AVANCEES - CDTA
443.	SERVICES	LEADER CONCEPT
444.	SERVICES	AGROLIGNE

Appendix 3: Post hoc Tests

Multiple Comparisons

Dependent Variable: Recognize the value of information

Scheffe

(I) Diploma	(J) Diploma	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bd	Md	,21820	,12164	,525	-,1628	,5992
	Ing	,28274	,15690	,520	-,2086	,7741
	MG	-,16667	,41511	,997	-1,4667	1,1334
	Ph.D.	,14583	,41511	,998	-1,1542	1,4459
Md	Bd	-,21820	,12164	,525	-,5992	,1628
	Ing	,06454	,14586	,995	-,3923	,5213
	MG	-,38487	,41107	,927	-1,6722	,9025
	Ph.D.	-,07237	,41107	1,000	-1,3597	1,2150
Ing	Bd	-,28274	,15690	,520	-,7741	,2086
	Md	-,06454	,14586	,995	-,5213	,3923
	MG	-,44940	,42284	,889	-1,7736	,8748
	Ph.D.	-,13690	,42284	,999	-1,4611	1,1873
MG	Bd	,16667	,41511	,997	-1,1334	1,4667
	Md	,38487	,41107	,927	-,9025	1,6722
	Ing	,44940	,42284	,889	-,8748	1,7736
	Ph.D.	,31250	,57140	,990	-1,4770	2,1020
Ph.D.	Bd	-,14583	,41511	,998	-1,4459	1,1542
	Md	,07237	,41107	1,000	-1,2150	1,3597
	Ing	,13690	,42284	,999	-1,1873	1,4611
	MG	-,31250	,57140	,990	-2,1020	1,4770

Multiple Comparisons

Dependent Variable: Recognize the value of information

Scheffe

(I) Years of experience	(J) Years of experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 5 yrs	between 6-10 yrs	,31778	,15457	,125	-,0655	,7011
	More than 11 yrs	,17092	,11699	,347	-,1192	,4611
between 6-10 yrs	Less than 5 yrs	-,31778	,15457	,125	-,7011	,0655
	More than 11 yrs	-,14686	,16598	,677	-,5585	,2648
More than 11 yrs	Less than 5 yrs	-,17092	,11699	,347	-,4611	,1192
	between 6-10 yrs	,14686	,16598	,677	-,2648	,5585

Multiple Comparisons

Dependent Variable: Acquisition of information

Scheffe

(I) Diploma	(J) Diploma	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bd	Md	,16228	,13345	,830	-,2557	,5802
	Ing	,14796	,17212	,946	-,3911	,6870
	MG	,13095	,45540	,999	-1,2952	1,5571
	Ph.D.	,48810	,45540	,886	-,9381	1,9143
Md	Bd	-,16228	,13345	,830	-,5802	,2557
	Ing	-,01432	,16002	1,000	-,5155	,4868
	MG	-,03133	,45096	1,000	-1,4436	1,3810
	Ph.D.	,32581	,45096	,971	-1,0865	1,7381
Ing	Bd	-,14796	,17212	,946	-,6870	,3911
	Md	,01432	,16002	1,000	-,4868	,5155
	MG	-,01701	,46388	1,000	-1,4698	1,4357
	Ph.D.	,34014	,46388	,969	-1,1126	1,7929
MG	Bd	-,13095	,45540	,999	-1,5571	1,2952
	Md	,03133	,45096	1,000	-1,3810	1,4436
	Ing	,01701	,46388	1,000	-1,4357	1,4698
	Ph.D.	,35714	,62685	,988	-1,6060	2,3203
Ph.D.	Bd	-,48810	,45540	,886	-1,9143	,9381
	Md	-,32581	,45096	,971	-1,7381	1,0865
	Ing	-,34014	,46388	,969	-1,7929	1,1126
	MG	-,35714	,62685	,988	-2,3203	1,6060

Multiple Comparisons

Dependent Variable: Acquisition of information

Scheffe

(I) Years of experience	(J) Years of experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 5 yrs	between 6-10 yrs	,08561	,16903	,880	-,3336	,5048
	More than 11 yrs	,22370	,12794	,221	-,0936	,5410
between 6-10 yrs	Less than 5 yrs	-,08561	,16903	,880	-,5048	,3336
	More than 11 yrs	,13809	,18151	,749	-,3121	,5882
More than 11 yrs	Less than 5 yrs	-,22370	,12794	,221	-,5410	,0936
	between 6-10 yrs	-,13809	,18151	,749	-,5882	,3121

Multiple Comparisons

Dependent Variable: Assimilation of information

Scheffe

(I) Diploma	(J) Diploma	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Bd	Md	,13492	,12976	,897	-,2714	,5413
	Ing	,06009	,16736	,998	-,4640	,5842
	MG	,03968	,44279	1,000	-1,3470	1,4264
	Ph.D.	,25397	,44279	,988	-1,1328	1,6407
Md	Bd	-,13492	,12976	,897	-,5413	,2714
	Ing	-,07483	,15559	,994	-,5621	,4124
	MG	-,09524	,43848	1,000	-1,4685	1,2780
	Ph.D.	,11905	,43848	,999	-1,2542	1,4923
Ing	Bd	-,06009	,16736	,998	-,5842	,4640
	Md	,07483	,15559	,994	-,4124	,5621
	MG	-,02041	,45104	1,000	-1,4330	1,3921
	Ph.D.	,19388	,45104	,996	-1,2187	1,6064
MG	Bd	-,03968	,44279	1,000	-1,4264	1,3470
	Md	,09524	,43848	1,000	-1,2780	1,4685
	Ing	,02041	,45104	1,000	-1,3921	1,4330
	Ph.D.	,21429	,60950	,998	-1,6945	2,1231
Ph.D.	Bd	-,25397	,44279	,988	-1,6407	1,1328
	Md	-,11905	,43848	,999	-1,4923	1,2542
	Ing	-,19388	,45104	,996	-1,6064	1,2187
	MG	-,21429	,60950	,998	-2,1231	1,6945

Multiple Comparisons

Dependent Variable: Assimilation of information

Scheffe

(I) Years of experience	(J) Years of experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Less than 5 yrs	between 6-10 yrs	,09244	,16532	,855	-,3175	,5024
	More than 11 yrs	,08880	,12513	,778	-,2215	,3991
between 6-10 yrs	Less than 5 yrs	-,09244	,16532	,855	-,5024	,3175
	More than 11 yrs	-,00363	,17753	1,000	-,4439	,4366
More than 11 yrs	Less than 5 yrs	-,08880	,12513	,778	-,3991	,2215
	between 6-10 yrs	,00363	,17753	1,000	-,4366	,4439

Multiple Comparisons

Dependent Variable: Transformation of information

Scheffe

(I) Diploma	(J) Diploma	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Bd	Md	,08991	,15182	,986	-,3856	,5654
	Ing	,04167	,19582	1,000	-,5716	,6549
	MG	,00000	,51810	1,000	-1,6226	1,6226
	Ph.D.	,25000	,51810	,994	-1,3726	1,8726
Md	Bd	-,08991	,15182	,986	-,5654	,3856
	Ing	-,04825	,18205	,999	-,6184	,5219
	MG	-,08991	,51305	1,000	-1,6967	1,5168
	Ph.D.	,16009	,51305	,999	-1,4467	1,7668
Ing	Bd	-,04167	,19582	1,000	-,6549	,5716
	Md	,04825	,18205	,999	-,5219	,6184
	MG	-,04167	,52775	1,000	-1,6944	1,6111
	Ph.D.	,20833	,52775	,997	-1,4444	1,8611
MG	Bd	,00000	,51810	1,000	-1,6226	1,6226
	Md	,08991	,51305	1,000	-1,5168	1,6967
	Ing	,04167	,52775	1,000	-1,6111	1,6944
	Ph.D.	,25000	,71316	,998	-1,9834	2,4834
Ph.D.	Bd	-,25000	,51810	,994	-1,8726	1,3726
	Md	-,16009	,51305	,999	-1,7668	1,4467
	Ing	-,20833	,52775	,997	-1,8611	1,4444
	MG	-,25000	,71316	,998	-2,4834	1,9834

Multiple Comparisons

Dependent Variable: Transformation of information

Scheffe

(I) Years of experience	(J) Years of experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Less than 5 yrs	between 6-10 yrs	,05515	,18834	,958	-,4119	,5222
	More than 11 yrs	,34966	,14255	,053	-,0039	,7032
between 6-10 yrs	Less than 5 yrs	-,05515	,18834	,958	-,5222	,4119
	More than 11 yrs	,29452	,20225	,350	-,2071	,7961
More than 11 yrs	Less than 5 yrs	-,34966	,14255	,053	-,7032	,0039
	between 6-10 yrs	-,29452	,20225	,350	-,7961	,2071

Multiple Comparisons

Dependent Variable: Exploitation of information

Scheffe

(I) Diploma	(J) Diploma	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bd	Md	,20029	,12476	,632	-,1904	,5910
	Ing	,09603	,16091	,986	-,4079	,6000
	MG	-,22778	,42573	,991	-1,5611	1,1055
	Ph.D.	,37222	,42573	,943	-,9611	1,7055
Md	Bd	-,20029	,12476	,632	-,5910	,1904
	Ing	-,10426	,14959	,975	-,5727	,3642
	MG	-,42807	,42158	,904	-1,7484	,8922
	Ph.D.	,17193	,42158	,997	-1,1484	1,4922
Ing	Bd	-,09603	,16091	,986	-,6000	,4079
	Md	,10426	,14959	,975	-,3642	,5727
	MG	-,32381	,43366	,967	-1,6819	1,0343
	Ph.D.	,27619	,43366	,982	-1,0819	1,6343
MG	Bd	,22778	,42573	,991	-1,1055	1,5611
	Md	,42807	,42158	,904	-,8922	1,7484
	Ing	,32381	,43366	,967	-1,0343	1,6819
	Ph.D.	,60000	,58601	,902	-1,2353	2,4353
Ph.D.	Bd	-,37222	,42573	,943	-1,7055	,9611
	Md	-,17193	,42158	,997	-1,4922	1,1484
	Ing	-,27619	,43366	,982	-1,6343	1,0819
	MG	-,60000	,58601	,902	-2,4353	1,2353

Multiple Comparisons

Dependent Variable: Exploitation of information

Scheffe

(I) Years of experience	(J) Years of experience	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 5 yrs	between 6-10 yrs	,21765	,15978	,398	-,1786	,6139
	More than 11 yrs	,04054	,12094	,945	-,2594	,3405
between 6-10 yrs	Less than 5 yrs	-,21765	,15978	,398	-,6139	,1786

	More than 11 yrs	-,17711	,17158	,588	-,6026	,2484
More than 11 yrs	Less than 5 yrs	-,04054	,12094	,945	-,3405	,2594
	between 6-10 yrs	,17711	,17158	,588	-,2484	,6026

List of Acronyms

AC: Absorptive Capacity

AI: Artificial intelligence

BI: Business Intelligence

CI: Competitive Intelligence

DDDM: Data-Driven Decision-Making

DM: Data mining

DW: DATA WEARHOUSES

EI: Economic intelligence

ES: Environmental Scanning

ETL: Extract, Transform, Load

HS: Horizon Scanning

IBM: international Business Machines Corporation

ICT: Information and Communication Technology

IMC: decision model (Intelligence, Modeling, Choice)

IMC: Intelligence, Modeling, Choice

IO: Industrial Organization

IS: Information system

IT system: Information Technology

KM: Knowledge Management

MB: Megabyte (Digital Data)

NLP: Natural Language Processing

OECD: Organization for Economic Cooperation and Development

OLAP: Online Analytical Processing

PC: Personal Computer

SAP: Systems, Applications and Products for data processing

SCIP: Competitive Intelligence Professional Association

SMEs : Small and medium-sized enterprises

VAS-IC: Veille Anticipative Stratégique - Intelligence Collective.

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