The impact of business intelligence on improving the performance of Algerian institutions - a field study

أثر ذكاء الأعمال في تحسين أداء المؤسسات الجزائرية–دراسة ميدانية

Doc Benabdeslam Chafiaa[1,*], Pr.Boukrif Moussa[2,] Dr. Boukhdouni Ouahiba
[1] University of Bejaia,
[2] University of Bejaia,
[3] University of Blida 2

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Abstract :
Faced with increasingly fierce competition, it is increasingly difficult for companies to sell their products and services and maintain their competitive advantages in the long term. Hence the need for them to have a good perception of the developments, movements and practices of the main actors in their environment. Tools such as business intelligence and business intelligence address the above challenges. In this context, the purpose of this article is to propose a model analyzing the influence of business intelligence on the performance of non-hydrocarbon export joint ventures. The research strategy favored to achieve this objective was the field study with 33 non-hydrocarbon export companies in Algeria. The results have allowed to sketch out the existence of a significant performance watch activity. this relationship is characterized by the intarmed role of competitiveness.
Keywords: business intelligence, competitiveness, Performance, Algerian exporting companies excluding hydrocarbons, Smart PLS.

Résumé
Face à la concurrence de plus en acharnée,il est de plus en plus difficile pour les entreprises de vendre leurs produits et services et de conserver leurs avantages concurrentiels durablement. D'où la nécessité pour elles de disposer d'une bonne perception des évolutions, des mouvements et des pratiques des principaux acteurs de leur environnement. Des outils tels l'intelligence économique et la veille stratégique permettent de relever les défis susmentionnés. Dans ce contexte, l'objet de cet article est de proposer un modèle analysant l'influencer de la veille stratégique sur la performance des coentreprises exportatrice hors hydrocarbures. La stratégie de recherche favorisée pour atteindre cet objectif a été l'étude de terrain auprées de 33 entreprises exportatrices hors hydrocarbure algériennes. Les résultats ont permis d'ébaucher à l'existance d'un significatif des activitées de veille stratégique sur la performance . cette relation est caractérisé par le role intarmédiare de la compétitivité.
Mots-clés: La veille stratégique, La compétitivité, La performance, Les entreprises algériennes exportatrices hors hydrocarbures, Smart PLS.

* Benabdeslam Chafiaa

ملخص:.

في مواجهة المنافسة الشرسة المتزايدة، تزداد صعوبة المؤسسات لبيع منتجاتها وخدماتها والحفاظ على مزاياها التنافسية على المدى الطويل. و هذا يقضي بضرورة سهي هذه المؤسسات لتصور جيد للتطورات و الحركات و الممارسات للجهات الفاعلة الرئيسية في نفس بيئة الأعمال، و يمكن مواجهة هذه التحديات من خلال أدوات مثل الذكاء الاقتصادي و اليقظة الإستراتيجية نهدف من خلال هذا المقال إلى اقتراح نموذج لتحليل تأثير ذكاء الأعمال على أداء المؤسسات الجزائرية المصدرة خارج قطاع المحروقات .و لتحقيق هذا الهدف اعتمدنا علىدراسة ميدانية مع 33 مؤسسة جزائرية مصدرة خارج قطاع المحروقات

النتائج المتوصل إليها أثبتت وجود علاقة أنشطة ذكاء الأعمال على تحسين أداء المؤسسات و دور القدرة التنافسية في هذه العلاقة. .

الكلمات المفتاح: ذكاء الأعمال ، القدرة التنافسية ،الأداء ، المؤسسات الجزائرية المصدرة خارج قطاع المحروقات ، Smart PLS

I- Introduction :

Environment represents a major challenge for companies (PATEYRON E., 1998). According to François Brouard (2004) "The complexity generated by the proliferation of changes creates several uncertainties about the future". Hyper competition as well as the revolution in new technologies of information and communication mainly explain this fast evolution towards the complexity and permanence of change.

In order to be competitive, this context demands the company a great anticipation, adaptation and reactions. If this reality is well acknowledged at national scale, it will even be more acknowledged at international scale. It is true that International commitment is a development process that is not without risk and covers a complex reality. Thus, to become competitive companies, and especially those of emerging countries, must leave their local market and go transnational or international markets. However, going international requires a rigorous preparation. In this context deploying a business intelligence to provide the means to have all the information proves to be necessary. Having relevant information when making decisions and developing strategies is a major challenge for companies (PATEYRON E., 1998, Lesca, H. 1994). In this context, the implementation of information processes, such as business intelligence, proves to be indispensable.

This communication is part of this reflection. It aims to study the informational behavior of SME exporters and in particular the relation between the practice of business intelligence and the export competitiveness of exporting companies excluding hydrocarbons.

The problematic posed in this research can be formulated as follows: To what extent will the practice of strategic intelligence influence the competitiveness of exporting companies excluding Algerian hydrocarbons?

In order to answer this research question, we structure this article in three parts. the first part will focus on the theoretical framework of the research, the second part will focus on the exposure of the methodology and research model and finally the third part on the analysis is the discussion of the results.

I .1. Business intelligence:

Today's rapidly changing business environment, the need for timely and effective business information is recognized as essential for organizations not only to succeed, but even to survive. Luhn (1958) provided one of the earliest definitions of BI, which emphasized the support (technological and organisational) for understanding information and its subsequent use to effectively guide business actions toward desired goals. In more recent times, "BI" is used commonly as an umbrella term to describe technologies, applications and processes for gathering, storing, accessing and analysing data to help its users make better decisions (Wixom and Watson, 2010). Benabdeslam C. (2018) stresses the importance of information technology in the strategic watch process. according to Benabdeslam C. (2019), Information and communication technologies are considered to be the vector of development of the information system and therefore of strategic intelligence.

In this article, business intelligence (BI) refers to a managerial philosophy and a tool used to help organizations manage and refine business information with the objective of making more effective business decisions (Ghoshal, S. and Kim,SK. 1986). The term BI can be used to refer to:

1. Relevant information and knowledge describing the business environment, the organization itself, and its situation in relation to its markets, customers, competitors, and economic issues
2. An organized and systematic process by which organizations acquire, analyze, and disseminate information from both internal and external information sources significant for their business activities and for decision making.

It could be concluded that BI assists in strategic and operational decision-making.

I .2. Business performance

Performance is multidimensional in nature. Business performance is defined here as the achievement of organizational goals related to profitability and growth in sales and markets share, as well as the accomplishment of general firm strategic objectives. The resource-based view (Wernerfelt, B.1984) helps to explain how firms derive competitive advantages by channelingresources into the development of new products, processes, and so forth. BI is a means for changing an organization, whether as a response to changes that occur in its internal or external environment or as a preemptive move taken to influence an environment. Because environments evolve.

Quinn and Rohrbaugh highlighted three dimensions of organizational performance: internal / external objectives, flexibility / control and means / results. This reflection on the concept of performance and on the different dimensions will make it possible to identify the performance indicators in order to be able to measure them. Two types of instruments have been identified to measure performance: measuring instruments (tangible variables) and indicators (intangible variables).

For performance measurement, the first step is to build the indicators. For this, Morin et al. (1994) identify four main currents of thought (Gauzente, C. 2000):

- The economic approach: classical-bureaucratic theories which favor economic criteria;
- The social approach: it derives from the contributions of the school of human relations which posed in particular the problem of the integration of individual and organizational objectives;

- The systemic approach: it defines the organization as a system whose purpose is survival. It highlights the capabilities of the organization: "efficiency Organizational is the degree to which an organization, as a social system with resources and means, fulfills its objectives without compromising its means and resources and without putting undue pressure on its members. "(Georgopoulos et al., 1957 in Gauzente, C. 2000);
- The political approach of the organization which essentially refers to the satisfaction of different external groups such as donors, supplies, customers, society and regulatory bodies;

According to Morin et al., 1994, four dimensions of performance make it possible to build the first organizational indicators. Among these dimensions are: the value of human resources, economic efficiency, legitimacy of the organization with external groups and sustainability organisation. Indicators are a measure, they are usually sets of information used regularly to measure change. They can use quantitative (raw data, comparable figures) and qualitative (opinions, values, yes / no) information. In our study we will refer to the serenity indicators of the organization of Morine et al 1994

I .3. Overview of previous studies

Subramanian, Kumar and Yauger (1994) had the purpose of awamining the existing link between the degree of evolution of the strategic intelligence system of companies as well as their performance on 331 hospitals. A longitudinal comparaison of the findings indicated the significant differences of four strategic intelligence systems going from the most primitive to the most developed. The results of their studies assirted that information ought not only be detained thanks to prospecive listening of the environment, but rather to know how to use it in the strategic decisions of companies.

The works of Daft, Sormunen and Parks (1988) focused on a study of 50 manufacturing companies. They tempted to study the uncertainty perceived from external sectors, the means through which the company directors obtain information on those sectors. They showed that the most performing companies frequently watch their environment and deploy their surveillance on several environments, comparing to their less performing competitors. In this study, performance had been measured by the profitability of companies.

Beal (2000) assirts that deploying business intelligence in a larger manner allows business managers to acquire a better knowledge of its environment and the threats and the opportunities which it impregnates. In return, this allows the managers to better adjust their strategic response, their structures, their processes and their conditions of performance.

Thereby, according to Beal (2000), this position depends on the information obtentained on several environments: technological environment, competitive, commercial, political, soci al and economical. The works of Beal (2000) follow the same path as the ones of Daft, Sormunen and Parks (1988). This author (Beal) suggests that the high frequence of the strategic watch activities also allows to exploit opportunities and surround the threats which may appear in the external environment of businesses.

The work of Denis and Depelteau (1985) had the purpose of checking the impact resulting from the use of information sources on the expansion of the diversification of exportations. The study operate on 31 companies, the authors forms two groups (new exporters and experienced exporters). For every group, three levels of performance have been distinguished (weak, medium

and fast). Performance is measured by the growth rate of the last five years of exportations. The results demontrated that the more exporting entrepises extend their sources of information and frequently take part at business fairs and missions, the more performant they are.

According to the study of Julien and Ramangalahy (2003) on Quebecer exporting 366 SMEs, a relationship between the use of sources of information and the peformance of exporting SMEs had been determined. The results of their inquiry revealed that that relation was not direct but is rather characterized by the mediating role of competitivenes. Thus, significant relations of causality between the use of sources of information and the sample SMEs competitiveness had been proven.

The article of Amabile S. and al (2011) had the purpose of studying exporting SMEs business intelligence practices and their level of engagement internationally. The authors had conducted a study on 180 manufacturing-exporting SMEs. The results show that the sensitivity of leaders towards information, which is influenced by the level of the international engagement of their business, plays central role in the organization of their business strategy practices.

According the works previously mentioned, the impact of business intelligene on performance is rarely studied entirely, in particular the topic of its influence on export comptetitiveness. Previous studies had approached the impact of business intelligence on performance only partially, focusing on one of business intelligence dimensions. Whereas, the approch we are following is to gather certain dimensions of business intelligence, and study their impact on export competitiveness.

To this end, we have advanced the following hypothesis: **The most successful companies are those that carry out business intelligence activities.**From this general hypothesis, two other secondary hypotheses are thus tested :

The first hypothesis (H1) postulates that non-hydrocarbon exporting companies are more competitive when the behavior of business intelligence is developed. This hypothesis is subdivided into four sub-hypotheses:

H1.1. Companies that frequently analyze their external environment have better quality production.

H1.2. Companies that frequently analyze their external environment are more innovative

H1.3.Businesses that spread the business intelligence activities to several environments have better quality production

H1.4.The companies that expand the business intelligence activities to several environments are more innovative

The second hypothesis (H2) suggests that the most competitive companies are the best performing. This hypothesis is subdivided into two sub-hypotheses:

H2.1. the quality of production positively influences the performance of the company

H1.1. innovation positively influences business performance

I.2.1. - The structural model

The literature review allowed us to propose this model (appendix 01). In this work, we support the fact that the sensitivity of the manager towards information is one of the factors which determines competitiveness of exporting companies, and that the sensivity of the manager towards information is determined upstream by the practice of business intelligence. Knowledge creation is used in our model as an actual mediating variable.

I .2.2.- The variables of our theoretical model.

Throughout our literature review, we retained a set of manifesting variables in order to permit us to measure our latent variables. (Appendix 01).

Thus, business intelligence practices represent a set of independent (illustrative) variables,containing the following dimensions: the extent of business intelligence activities, the frequency of business intelligence activities and the quality of information (Daft, Sormunen and Parks (1988), Beal (2000)). Concerning export competitiveness, representing a mediating variable, it contains the following dimensions: innovation, the quality of exported products and information and communication technologies (LACHAAL, L (2001), Duncan and Weiss (1979), Drucker (1985)). Export performance, representing dependent variables (to be explained), it contains the following dimensions: Profitability, Market position, Achievement of objectives abroad and Growth of their exports.

II– Methods and Materials:

The research methodology we have used is based on impirical data gathered through a questionnaire. We have make a sample of 33 exporting companies excempt Algerian hydrocarbons, and this, well reasoned. The survey has been set from July 2017 to july 2018 from a preliminary contact with company executives except Algerian hydrocarbons. The questionnaire used to conduct the survey contains about 50 main questions. The questions asked to company executives are about their perceptions, the used items to the measurement of manifesting variables are represented on Likert Scale ranging from 1 to 5.

Finally, our data base holds a certain amount of missing data and this for many reasons due essentially to confidentiality requirements, to non-exisisting data or to the neutrality of the company executive. The missing data as well as the reduced size of our sample constitute a priori two methodological weaknesses.

To verify our hypotheses we are going to use partial least squares modeling (PLS). The principle is to perform a regression of a variable to explain **y** (competitiveness in our case) on explicative variables **x** (business intelligence in our case).

We are going to perform the analysis of data in two steps. The first step aims to **verify/check the empirical properties of the conceptual model** in order to ensure that each dimension can be considered as a single value when testing the search pattern. The properties to verify are: the internal consistency of the measures (meaning, their unidimensiality and reliability) and the validity (convergent and discriminant) of constructs. The second step constists in **testing the relations between the constructs and the model** (Julien and Ramangalahy, 2003 ; Rivard and *al*., 2006).

- **Unidimentionality**

The unidimentionality of blocs means that altough the diversity manifesting variables they translate one single and same latent variable. In other words, the manifesting variables which measure a construct must be unidimensional so that latent variables are treated as one unique value. The hypothesis of unidimensionality in our study is going to be measured by **the Alpha of Gronbach** et **the Rho of dillongoldstein.**

- **Reliability:**

Homogeneity is existing among the manifesting vaiables comparing to the latent ones. In other words, there is a strong correlation between every manifesting variable meaning that the latter share a common construct (latent variable). Reliability is thus evalulated by the percentage of variance and the growth level must excceed 70%.

- **The convergent validity:**

It ensures the convergence of the measures. It verifies whether the obtained measured of the same object using intrument A are close to the measures obtained using instrument BI. Statically, the correlations between the manifesting variables and their construct must exceed 0.7.

- **The discriminant validity:**

This test is verified in case the manifesting variables are more linked to their own latent variables comparing to other latent variables of the model. One latent variable must better explain its wn manifesting variables than other latent variables. To ensure the condition of the discriminant validity, the AVE (*Average Variance Explain*) of every latent variable must exceed each latent variable must be superior to the square of the correlation between this latent variable and the other latent variables.

III- Results and discussion :

III .1. Empirical properties of the conceptual model checking process:

At first, to ensure the condition of the discriminant validity and the convergent validity, we have revealed the correlations between between every manifesting variable and its latent variable.

According to figure 02 (appendix 03), one manifesting variable (EX-PROF).show correlations lower to 0.7. This variable has been deleted. In fact, to ensure the condition of the convergent validity, the correlations between the manifesting variables and their construct must be superior to 0.7 at ultimate value. As we observe on figure (03) (appendix 03). below, all the taken variables in our model ensure the condition of divergent validity. Meaning, all the coefficients are superior to 0.7 .

III .2.Unidimensionality

According to the table (3) (appendix) above, the values of l'alpha of Gronbac and rho of dillon goldstein is, superior to the representativity limit (superior to 70%), and the main components analysis method show that the model is unidimensional, which means that although the manifesting variables are diverse they report one single and same latent variable. As a result, our model's latent variables can be considered one unique variable.

Concerning the reliability of the measures (see table 3 appendix), it has been measued by the indicator « composite rellliability » for every single latent variable. Only reliability levels superior to 0.7 are accepted. As observed in table (3) (appendix), the results obtained by every construct are superior to this limit which indicates that the used meathods are correctly set. More to the point, a strong existing correlation between every variable has led to shaing a common construct (latent variable).

In addition, the average variance extracted (AVE) for every construct is superior to 50% (see table 3) (appendix), which means that more than half of the construct variance is not due to errors in measuring. Thus, we can confirm the good concistancy of our internal model.

III .3.Discriminant validity

In table (4) (appendix), it is obervable that the VMEs square roots values corresponding to the constructs are superior to the coefficients of correlations between the constructs. According to the findings in the values of the rhos and VMEs, we can argue that the models satify the one-dimensional conditions, the reliability as well as the validity (convergent and discriminant), and also are fully ready to be tested.

III 4.-Discussion and analysis of results

It is reported in the model that the values linking the extent of business intelligence activities to the other two variable (innovation and the quality of exported products) are positive and significant. They are 0.374 and 0.534 respectively. This allows us to validate our two research hypotheses (H 1.2) and (H 1.2). This observation allows us to conclude that the more BI practices are extended to several environments, the more competitive the exporting companies. That is to say that business intelligence provides relevant information on different areas influences managers' strategies.

Regarding the hypothesis of the impact of the frequency of BI activities on the quality of exported products (H 2.1) is positive and significant. The causal coefficient is (0.158). However, the impact of the frequency of BI activities on innovation (H 2.2) is negative. The causal coefficient is (-0.056). These Results allow us to partially validate the hypothesis that business intelligence activities positively influence the competitiveness of companies. the regression coefficients linking the quality of exported products and innovation with the variable export performance are respectively (0.350) and (0.028).

These Results allow us to validate the hypothesis that the most competitive companies a We conclude that export competitiveness is linked to the behavior of managers towards information. managers improve their strategic orientation and the international development of their business

through the integration of information when making decisions. Our results join those of Reilly and Barnard who suggest that a company that has the capacity to exploit and integrate information in its decision-making processes is more efficient.

Finally, our results confirm our general hypothesis. In fact, there are indirect links between on one side the frequency of business intelligence activities and performance is on the other hand between the extent of business intelligence activities in several environments and the performance of the company with respective coeficiants 0.116 and 0.057. Our results show that Business Intelligence is more or less heavily used by companies

. Also, our results show a certain interest of exporters towards different business intelligence practices. These companies are aware of the need to open up to the external environment, to monitor and follow its development in order to adapt and anticipate possible developments, to deal with potential threats but above all to put an end to any opportunity.

Our results indicate that the practice of business intelligence has a positive influence on corporate competitiveness and business performance. This influence is characterized by the mediating role of competitiveness.

Business intelligence then accompanies the transformation of the company by regularly distilling new knowledge refining the orientations thanks to a better understanding of the economic, societal and technological environment.

Business intelligence is one of the best ways to collect the data needed to help innovate, and to develop new, original and sophisticated solutions and offers. In this context, the day before supports innovation by making it possible to identify and improve know-how or new and innovative uses that can be exploited by the market.

Regarding the quality of production, business intelligence keeps an eye on the behavior of competing companies. Business intelligence presents itself as an essential alternative in the perspective of retaining a certain sales force, optimizing the quality of services and products and increasing customer loyalty

We deduce from our results that the practice of business intelligence is one of the determinants of the competitiveness of non-hydrocarbon exporting companies. Our results go in the same direction as the results found by AMABILE S., et al (2011). and Charles Franklin Edmond Ramangalahy (2001).re more efficient.

IV- Conclusion:

The question asked in this research is related to the influence of business intelligence activities on business performance.

In addition, our study shows that performance in foreign markets can be maintained for the practice of business intelligence activities in the companies in our research sample.

The tests carried out using the PLS method confirm the similarities of all the research hypotheses that we have advanced. Positive and highly significant causal relationships were observed between, strategic intelligence and competitiveness on the one hand, and the competitiveness and international performance of the sampled companies on the other.

The results indicate that the performance of targeted exporting SMEs is determined by the information available to them through the practice of Business Intelligence, this relationship is characterized by the intermediary role of competitiveness.

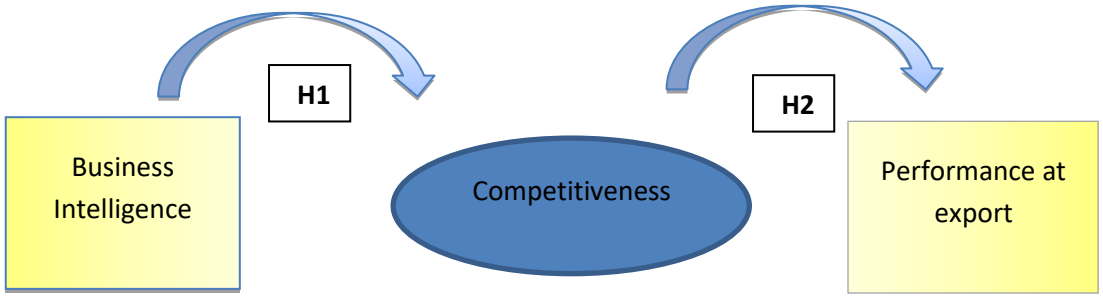
Our results should only be understood in relation to the limits of research. On a theoretical level, the latter poses certain limits mainly linked to the failure to take into account other dimensions of international engagement: organizational structure, international experience, etc.

In terms of business intelligence practice, other variables could be added: organizational means, sources of information, etc. In terms of results, the limitations of this research also concern the study sample and call into question the generalization of the results obtained to all exporting companies.

Our research opens up interesting avenues of investigation. Indeed, it would be interesting to think of completing our quantitative study of the causal relationship between the dimensions of strategic intelligence and those of the internationalization of SMEs through qualitative research techniques such as interviews and / or observations. The use of these techniques will help to cover some of the unspoken aspects of our research.

V- Appendices:

Figure (1): Causality network and research hypotheses



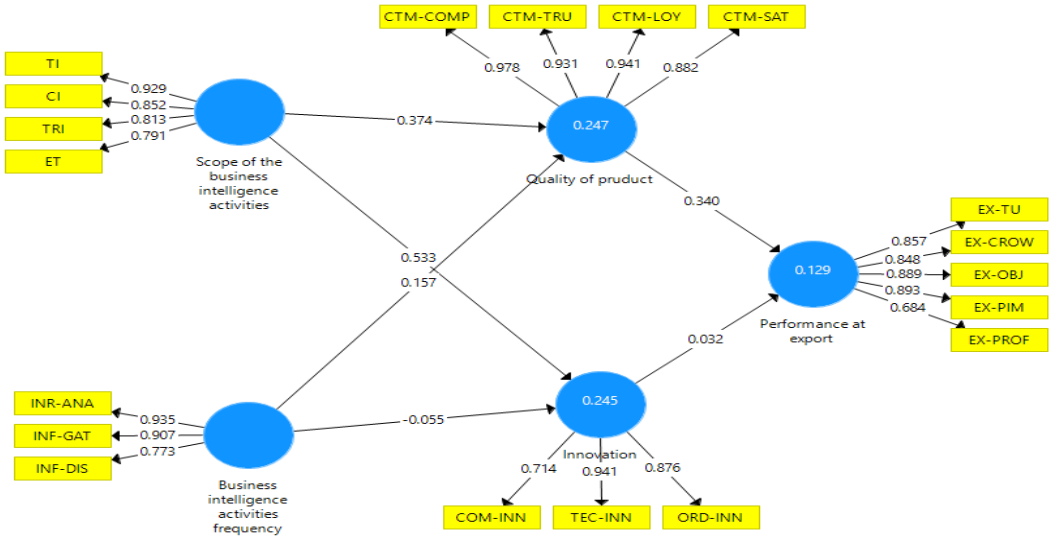
The Source : realized by us.

Table (2) : Representation of manifesting variables and latent variables.

Latent variables of the model **ξ j = (1 to 5)**	**Manifesting variables of the model**	**Name of the manifesting veriables** **Xjh**
Scope of the business intelligence activities	Competitive Intelligence Technological Intelligence Trade Intelligence Environmental Intelligence	CI TI h= (1 to 4) TRI EI
Business intelligence activities frequency	Information Gathering Information Analysis Infrmation Distribution	INF-GAT INF-ANA h= (1 to 3) INF-DIS
Performance at export	Turnover Profitability Position in the market Realization of objectives abroad Growth of their exportations	EX-TUR EX-PROF EX-PIM h= (1 to 5) EX-OBJ X-GROW
Innovation	Product Innovation Process Innovation Technological Innovation Commercial Innovation	PRD-INN PROC-INN TEC-INN h= (1 to 4) COM-INN
Quality of pruduct	Customer Loyalty Customer Trust Customer Complaints Customer Satisfaction	CTM-LOY CTM-TRU h= (1 to 4) CTM-COMP CTM-SAT
Representativity mode	Réflectif Xjh= λjhξj +εjh	ξ j= (1 to 5)

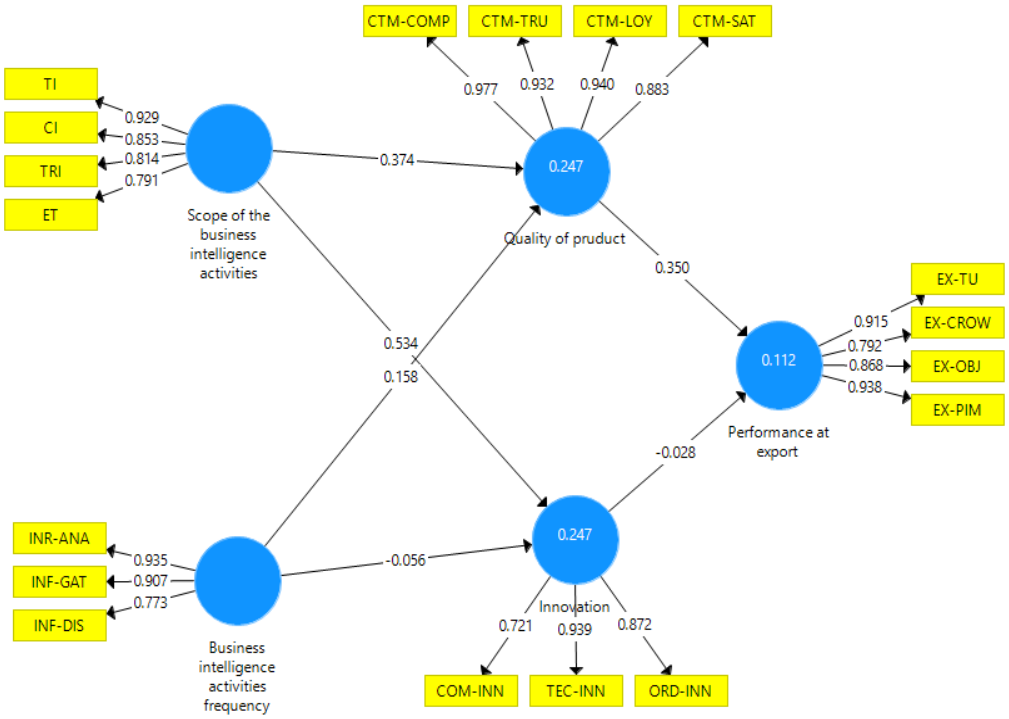
He source: Realized by us through literature review

gure (2): Correlations between manifest and latent variables



The source: Realized using Smart PLS software version 3

Figure (3) Correlations between manifest and latent variables



The source: Realized using Smart PLS software version 3

Table 3.- Unidimensionality

	Alpha de Cron...	rho_A	Fiabilité comp...	Average Varian...
Business intelli...	0.844	0.873	0.907	0.765
Innovation	0.802	0.830	0.884	0.721
Performance at...	0.916	0.975	0.932	0.774
Quality of prud...	0.950	0.955	0.964	0.871
Scope of the b...	0.869	0.878	0.911	0.720

He source : Realized by us using Smath PLS Softwware version 3

Table 4.- Discriminant validity

	Business intelli...	Innovation	Performance a...	Quality of pru...	Scope of the b...
Business intelli...	0.875				
Innovation	0.320	0.849			
Performance at...	0.269	0.168	0.880		
Quality of prud...	0.421	0.560	0.334	0.933	
Scope of the b...	0.704	0.495	0.468	0.485	0.848

He source : Realized by us using SMART PLS Software version 3

Table 5.- R^2

	R^2	R Carré Ajusté
Innovation	0.247	0.196
Performance at...	0.112	0.053
Quality of prud...	0.247	0.197

He source: Realized using Smart PLS software version 3

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