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The Mediating Role of Business Intelligence in the Relationship Between Entrepreneurial Competencies and the Competitive Advantage on Small Enterprises in Algeria

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Abstract:

This study investigates the mediation of business intelligence in the relationship between entrepreneurial competencies and the competitive advantage among small enterprises in the province of Algiers. The study was carried out using the quantitative method with exploratory and descriptive purposes. Exploratory research was conducted through in-depth interviews with five entrepreneurs. A descriptive survey involved the application of the questionnaire tool, and the target sample was the entrepreneurs of small enterprises, which numbered 92. The data was analyzed using statistical programs (Jamovi, Smart-PLS, Excel). The results revealed that business intelligence acts as a mediator between analytical, leadership, and marketing competencies in achieving the competitive advantage of small enterprises.

Keywords: Entrepreneurial competencies; Business intelligence; Competitive advantage; Small enterprises; Algeria.

JEL Classification: L26.

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Introduction

In the 21st century, the digital revolution that the world is witnessing has made high and fierce levels of competition depending on the speed of innovation, change, technological development, and competition at the national and international, which is no longer easy for entrepreneurs in small enterprises to withstand the increasing competitive environmental challenges. Therefore, the entrepreneurs seek to create their enterprises, achieve their goals, and face greater challenges to ensure their survival, development, and prosperity, especially in the era of business intelligence. They must intensify their knowledge and technical efforts, which reflects their ability in the entrepreneurial competencies to achieve a competitive advantage. To the best of our knowledge, there is currently limited understanding of the following research question: **Is business intelligence a mediator factor in the relationship between entrepreneurial competencies and the competitive advantage of small enterprises?**

The previous main question was divided into the following sub-questions:

1. What is the effect of entrepreneurial competencies and their dimensions (analytical competencies, leadership competencies, managerial competencies, marketing competencies, financial managerial competencies) on business intelligence?
2. What is the effect of entrepreneurial competencies and their dimensions (analytical competencies, leadership competencies, managerial competencies, marketing competencies, financial managerial competencies) on competitive advantage?
3. What is the effect of business intelligence on competitive advantage?
4. What is the effect of entrepreneurial competencies and their dimensions (analytical competencies, leadership competencies, managerial competencies, marketing competencies, financial managerial competencies) on the competitive advantage in the presence of business intelligence as a mediator between them?

To test the mediating effect of business intelligence statistically on the relationship between entrepreneurial competencies and competitive advantage. Hypotheses were prepared as shown below:

H1. There is an effect of entrepreneurial competencies and their dimensions on business intelligence.
H2. There is an effect of entrepreneurial competencies and their dimensions on competitive advantage.
H3. There is an effect of business intelligence on competitive advantage.
H4. Business intelligence mediates the relationship between entrepreneurial competencies and their dimensions and competitive advantage.

Based on the above discussion, the theoretical framework illustrates the relationships among the variables included in the research hypotheses as depicted in the independent variable entrepreneurial competencies and their dimensions (analytical competencies, leadership competencies, managerial competencies, marketing competencies, financial managerial competencies), the mediating variable business intelligence, and the dependent variable competitive advantage.

In this paper, we aim to shed light on these research gaps by investigating the entrepreneurial competencies associated with business intelligence that may lead to achieving a competitive advantage for small enterprises and whether business intelligence is a mediator linking these entrepreneurial competencies to the competitive advantage of small enterprises.

To address the topic of our research, we are based on some previous studies that have been conducted in a different environment, as we will present in the following the most important points that we have covered, in addition to trying and demonstrate the status of our current study from these studies.

Vijaya et al. (2015) examined the influence of entrepreneurial competencies on the performance of small and medium enterprises by building a causal model using data obtained from entrepreneurs of Odisha. This study is empirical research, employing a questionnaire as a research instrument, and collecting data from 159 small and medium manufacturing and exporting enterprises of Odisha. The study reveals that the owners of small and medium manufacturing and exporting enterprises of Odisha have fair competence in knowledge competencies but good competence in skill competencies. Besides, there are six elements of entrepreneurship competencies that significantly influence the competitive advantage. These elements are knowledge of strategic management, knowledge of business management, planning, skill, executing skills, interpersonal skills, and responsive skills (Vijaya & et al, 2015).

Syed et al. (2019) investigated the effect of entrepreneurs' competencies (opportunity, recognizing competency, strategic competency, organizing competency, relational competency, conceptual competency, and commitment competency) on the competitive advantage of microenterprises in Malaysia. This study adopted a cross-sectional research design and collected quantitative data from 300 randomly selected respondents from Peninsular Malaysia. The findings revealed significant positive effects of

organizing and commitment, competency on the competitive advantage with a significant negative effect of relationship competency on the competitive advantage (Syed & et al, 2019). The researchers argued that the most important factor which will determine the success of entrepreneurs in starting a business is their competencies in their core businesses. In reality, the most successful entrepreneurs develop several personal and professional competencies that help them achieve their goals and gain a competitive advantage. Moreover, most of the studies have been conducted outside the Algerian context. Hence, this provides a contextual gap that this study is going to address by looking at the effect of business intelligence mediation between entrepreneurial competencies and competitive advantage in Algeria. Despite research on entrepreneurial competencies of small enterprises having spanned across a few decades and in various fields, only a handful of academic studies have investigated the relationship between entrepreneurial competencies and competitive advantage. In addition, existing research shows a lack of interest in studying the use of business intelligence which is neglected. This study, therefore, fills the existing theoretical, empirical, and contextual gaps by assessing the effect of business intelligence mediation between entrepreneurial competencies and the competitive advantage in small enterprises in Algeria.

The remainder of the article is structured as follows: After this introduction, in the next section, we present the theoretical foundation. We then explain the research methodology, while describing the data collection process and the measurement of the constructs. Following this, we present the data analysis and results. Finally, we conclude the paper by discussing the theoretical contributions and practical implications of the research while setting out the limitations and alternative paths for future research suggestions.

1- Entrepreneurial competencies

1-1 The concepts of entrepreneurial competencies

Generally, Competencies are defined as: “underlying characteristics of the individual: knowledge, skill, traits, motives, values, self-concept that leads to high performance according to pre-set criteria” (Hamdi, 2012).

The entrepreneurial competencies are represented in the various knowledge, capabilities, and skills that the entrepreneur possesses, which enables him to perform his business better.

1-2 The categories of entrepreneurial competencies

Based on the research of 134 owner-managers of SMEs, (Chandler & Jansen) (1992) propose a typology in three categories: the entrepreneurial competencies, the managerial competencies, and the technical-functional competencies. The competencies listed are as follows: the ability to identify

and exploit opportunities, ability to work intensively, ability to lead individuals, political ability to assert one's position in a business network, and technical ability. The (Baum) (1995) study of 363 entrepreneurs revealed competencies quite similar to those stated by (Chandler & Jansen): cognitive capacity, organizational capacity, decision-making capacity technical capacity, and ability to identify and implement opportunities (Laviolette & Christophe, 2006).

2-Business intelligence

2-1 The concepts of business intelligence

Business intelligence has become known in recent years as a new approach to collecting and analyzing data for business use. That induction references the topic indicates that business intelligence as a term was first put forward by (Hans Peter Lunch) in 1958, who was working in a company IBM in the computer and software industry, the idea that he adopted (Lunch) is about building an automated organization-wide information dissemination system and defining this term as a set of concepts and methods adopted to improve business decisions using fact-based support systems. In 1989 the idea he adopted was activated (Lunch) by the researcher (Howard Dresner) adopting the same definition he put forward (Lunch) (Pavkov & et al, 2016). Business intelligence refers to all the technologies that allow enterprises to analyze data for the benefit of their decision-making.

2-2 Business intelligence system component

When looking at business intelligence architecture provided by researchers in this field, it is possible to notice an agreement on the classification of business intelligence components into six categories essential. According to (Olszak & Ziemba) (Olszak & Ziemba, 2007):

2-2-1 ETL (extract transform load): is used to feed the data warehouse production databases, as the name suggests, an ETL:

-Extract: extracts data from different sources.

-Transform: transforms these to unify them under the same format.

-Load: loads the data into the data warehouse.

2-2-2 Data warehouses: a database collecting and managing all the data collected within the enterprises, as part of decision-making.

2-2-3 OLAP (online analytical processing): performs multidimensional analysis of business data and offers the ability for complex calculations, trends analyses, and sophisticated data modeling.

2-2-4 Data mining tools: refer to analyzing data from different perspectives and the fact to transforming this data into useful information, by establishing

relationships between data or spotting patterns, this information can then be used by businesses to increase revenue or reduce costs.

2-2-5 Reporting and ad hoc inquiring: designates a family of business intelligence tools intended to ensure the production, publication, and distribution of activity reports in a predetermined format.

2-2-6 Presentation layer: applications present the results in a synthetic or detailed manner, most often graphically according to their needs or the expectations of the entrepreneurs or managers: this can take the form of diagrams, maps, timelines, even infographics or original images.

3- Competitive advantage

3-1 The concepts of competitive advantage

For (Porter) "Competitive advantage arises mainly from the value that an organization has created for its customers where it can take the form of lower prices for competitors with equal benefits, or by providing unique benefits in the product to offset the price increase imposed" (Porter, 1985). The direct relation between customers' expected values, values offered by the enterprise, and those offered by the competitors determine the dimensions and conditions of competitive advantage. If the values presented by the enterprises are closer to customers' expected values compared to the values offered by competitors, it can be said that the firm has a competitive advantage over its competitors in one or more indices.

3-2 Achieving competitive advantages and types

The competitive advantages exist in enterprises that can create superior value, and how this value is created by lowering the cost structure or during product recognition. This is achieved through four key elements according to (Hosseini et al): efficiency, quality, open innovation, and accountability to customer needs (Hosseini & et al, 2018), namely as follows:

3-2-1 Efficiency & Competitive Advantage: is the optimal utilization of available resources, measured by the number of inputs used to produce specific units of output. The more efficient the enterprise, the less input is required to produce specific output and thus the enterprise is more competitive.

3-2-2 Quality & Competitive Advantage: the impact of high product quality on competitive advantage has two dimensions:

-The first dimension: the provision of high-quality products increases the value in the eyes of consumers. And that this realization of the value subsidizing gives the enterprise the option of charging a higher price for its products.

-The second dimension: the second effect of the quality of the competitive advantage comes from high efficiency, which leads to a significant reduction in costs by working on the integrity of the production process.

3-2-3 Open Innovation & Competitive Advantage: this encourages openness to external ideas that enterprises can attract, so this solution is a way to enhance their spread.

3-2-4 Accountability & Competitive Advantage: when the enterprise adopts accountability practices in its business and activities towards clients and guarantees them their requests and treats them with respect within a competitive environment, in addition to the absence of any negative practices in the enterprise's culture, this means that the enterprise is fully carried out its responsibility towards its customers.

These elements form the general basis for building a competitive advantage that any enterprise can adopt regardless of the nature of its activity, the products it produces, or the services it provides. To achieve a competitive advantage, an entrepreneur must be able to recognize various basic elements to achieve a competitive advantage.

4- Methods and Materials

The enterprises selected for this study are small enterprises in the province of Algiers, usually, the decision-makers targeted by the survey are the entrepreneurs or owners of the enterprises and are responsible for their activities, the choice of the entrepreneurs was justified, as they are considered able to understand the variables that were analyzed. In addition, the competitive advantage is studied and analyzed from the point of view of entrepreneurs, not customers. For data collection, the researchers did not use the probability sample method, the sample drawn was a convenience sample from small enterprises that use technology in their business, as convenience sampling is applied when samples with target characteristics are easily accessible. Therefore, the method of non-probability samples was used. A total of 103 small enterprises were identified for participation. Data collection was conducted in two phases: a pilot study and a questionnaire. First, five small enterprises were randomly selected from a database for pre-testing the questionnaires, to confirm that all questions were adequately understood by the respondents, based on the responses and subsequent interviews with the participants(entrepreneurs) in the pilot study. Minor modifications were made to the questionnaire for the next phase of data collection. Second, the questionnaire was distributed in Arabic and French, to guarantee conceptual equivalence across different language groups. In total, a final data set of 92 valid cases were obtained. Hence, those enterprises have been included in the study.

5- Results

5-1 Sample properties

To identify the distribution and description of the study sample according to personal variables, and data related to the enterprise, the frequencies, and percentages of the study individuals were calculated, and we used the program (Jamovi1.6.21). The results are shown in the following table:

Table N° (01): The sample's demographic characteristics

Description	Counts	% of Total	Cumulative %
Personal data			
1. Gender			
Male	59	64.1%	64.1%
Female	33	35.9%	100%
2. Age			
Less than 30 years	25	27.2%	27.2%
From 30 to 40 years	41	44.6%	71.7%
From 41 to 50 years	18	19.6%	91.3%
More than 50 years	08	8.7%	100%
3. Qualification			
Primary	00	0%	0%
Medium	00	0%	0%
High school	08	8.7%	8.7%
Professional formation	30	32.6%	41.3%
University	54	58.7%	100%
Enterprise data			
4. Business type			
E-commerce store	24	26.1%	26.1%
Building entrepreneurs	09	9.8%	35.9%
Service shipping	08	8.7%	44.6%
Service transportation & logistics	11	12%	56.5%
Digital marketing	05	5.4%	62%
Cosmetics	05	5.4%	67.4%
Travel consultant	07	7.6%	75%
Website developer	05	5.4%	80.4%
Communication & networking equipment	05	5.4%	85.9%
Paper bag design	06	6.5%	92.4%
Media channel	01	1.1%	93.5%
3D printing service	02	2.2%	95.7%
Service cloud	01	1.1%	96.7%
Kitchen furnishings	01	1.1%	97.8%
Fashion designer	02	2.2%	100%
5. Work experience			
Yes	26	26.1%	26.1%
No	68	73.9%	100%
6. Type of market			
online	70	76.1%	76.1%
offline	22	23.9%	100%

Source: Jamovi output

5-2 Measurement model

The outer measurement model is aimed to calculate the reliability, internal consistency, and validity of the observed variables together with unobserved variables. Consistency evaluations are based on single observed and construct reliability tests whereas convergent and discriminant validity is used for the assessment of validity.

The questionnaire comprised 78 items that included; in the first part of the questionnaire, demographic questions (6 items) were asked about gender, age, qualification, business type, work experience, and type of market. In the second part, items for measuring entrepreneurial competencies (24 items), business intelligence (28 items), and competitive advantage (20 items), are scored on a 5-point Likert scale (strongly agree, agree, medium agree, disagree, strongly disagree) and always were scored 5, 4, 3, 2, 1, respectively. The content validity of the questionnaire was confirmed by professors in the field of study and its structural validity was evaluated through exploratory and confirmatory factor analysis. The stability of the study tool, was confirmed using a set of measures, for testing the measurement model of the constructs, and whether they have adequate validity and reliability, a two-step analysis was applied. Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) are used for constructs' reliability and validity. We used the program (SmartPLS3). As revealed in Table 2.

Table N° (02): Construct reliability and validity test

Main Constructs	Cr. Alpha	CR	AVE
(AC)	0.969	0.976	0.891
(LC)	0.929	0.947	0.784
(MC)	0.970	0.978	0.918
(MrkC)	0.903	0.928	0.721
(FMC)	0.939	0.953	0.804
(BI)	0.938	0.945	0.899
(CA)	0.899	0.913	0.749

Source: SmartPLS output

Table N° (03): Discriminant validity of measurement items

Main Constructs	(AC)	(BI)	(CA)	(FMC)	(LC)	(MC)	(MrkC)
(AC)	**0.944**						
(BI)	0.916	**0.948**					
(CA)	0.645	0.797	**0.865**				
(FMC)	0.696	0.725	0.792	**0.896**			
(LC)	0.877	0.883	0.571	0.673	**0.885**		
(MC)	0.860	0.859	0.517	0.637	0.911	**0.958**	
(MrkC)	0.626	0.749	0.695	0.701	0.658	0.676	**0.849**

Source: SmartPLS output

***Abbreviation for the factors:** (AC) analytical competencies, (LC) leadership competencies, (MC) managerial competencies, (MrtC) marketing competencies, (FMC) financial managerial competencies, (BI) business intelligence, (CA) competitive advantage. Diagonal values in bold represent the square root of the (AVE) index.

We note that all the values of the Cronbach Alpha coefficients exceeded 0.8, as the total value of this parameter was 0.91, which means that the measuring instrument has good stability and high stability if the tool is re-employed again under the same conditions, it is also characterized by great internal coordination between the items and the axes that compose it, in addition to composite reliability (CR) index it is also an indicator of construction reliability. Composite reliability values greater than 0.7 are an indication of a reliable and homogeneous structure. Moreover, the average variance extracted (AVE) index for each structure exceeds the minimum value of 0.50 indicating that the dimensions have sufficient affinity validity, as they indicate that the construct explains more than 50 % of the indicator's variance, thus providing acceptable item reliability. The discriminant validity was evaluated by comparing the relationship between the construct and the square root of the (AVE) index. The square root of (AVE) index for all combinations shown along the diagonal is greater than the discriminant relationship between any pair of them indicating that the model meets the measurement requirements of convergent validity. Based on the above evaluation results, the measurement model for the construction of reliability and validity has been accepted and met the recommended values.

5-3 Structural Model

We confirmed that the measurement model was valid and reliable. The next step was to measure the inner structural model outcomes. This included observing the model's predictive relevancy and the relationship between the constructs. The path coefficient (ß value) and T-statistic value, the coefficient of determination (R^2), Effect Size (f^2), the predictive relevance of the model (Q^2), and the goodness-of-Fit (GOF) index are the key standards for evaluating the inner structural model. Before moving to the structural model, the level of collinearity in the structural model must be examined using the variance inflation factor in the following way:

(VIF)Variance Inflation Factor $_{(i)} = 1/ (1-R^2 (_i))$ (Hair & et al, 2017)

The variance inflation factor (VIF) is often used to evaluate the collinearity of the formative indicators. (VIF) values of 5 or above indicate critical collinearity issues among the indicators of formatively measured constructs, in addition to another measure called tolerance that can be calculated in the following way:

$$\textbf{Tolerance} = (1-R^2)$$

As the results shown in the following table were reached:

Table N° (04): Evaluation of the relationship of multicollinearity

Competitive advantage is a dependent variable			**Business intelligence is a dependent variable**		
Variables Latentes	**Tolerance**	**VIF**	**Variables Latentes**	**Tolerance**	**VIF**
Analytical competencies	0.440	2.272	Analytical competencies	0.234	4.265
Leadership competencies	0.825	1.211	Leadership competencies	0.398	2.507
Managerial competencies	0.253	3.942	Managerial competencies	0.515	1.940
Marketing competencies	0.335	2.981	Marketing competencies	0.417	2.393
Financial managerial competencies	0.392	2.548	Financial managerial competencies	0.392	2.545
Business intelligence	0.731	1.367			

Source: SmartPLS output

The variance inflation factor (VIF) was examined to identify multicollinearity issues. Table 4 showed that multicollinearity is not an issue among the exogenous latent constructs, since all (VIF) values were bellowed 5(VIF<5). Thus, multicollinearity is not a threat in this study. In addition to the tolerance values, it is (0.2) for all independent variables, this is another indication of the absence of the issue of multicollinearity.

5-4 The path coefficients (ß) and T-statistics of research hypotheses

To test the significance of the path coefficient and the T-statistics values, and the hypotheses of the study, we use the (SmartPLS3) program, a structural equation modeling (SEM) software. Linear and additive causal models are tested theoretically using third-generation multivariate analysis tools, and an unknown group can be modeled using (Bootstrapping) methods setting with 500 subsamples, mean replacement for missing values, and two-tailed test for hypothesis testing, and the level of significance is tested using statistic (T) values and (P) values.

Table N° (05): The path coefficients (ß) and hypothesis testing

Paths	β	SE	T-value	P-value	Decision
(AC)→ (BI)	0.539	0.113	4.786	0.000	Supported**
(AC)→ (CA)	-0.305	0.138	2.204	0.028	Supported*
(LC)→ (BI)	0.260	0.109	2.384	0.017	Supported*
(LC)→ (CA)	-0.359	0.114	3.151	0.002	Supported**
(MC)→ (BI)	-0.014	0.135	0.104	0.917	Unsupported
(MC)→ (CA)	-0.378	0.114	3.324	0.001	Supported**
(MrkC)→ (BI)	0.238	0.087	2.730	0.007	Supported**
(MrkC)→ (CA)	0.025	0.077	2.320	0.000	Supported**
(FMC)→ (BI)	0.017	0.056	0.297	0.767	Unsupported
(FMC)→ (CA)	0.498	0.121	4.130	0.000	Supported**
(BI)→ (CA)	1.341	0.161	8.349	0.000	Supported**

Source: SmartPLS output

Note:
Significant at the p<0.05 level.
** Significant at the p**< 0.01 level.

The path coefficients in the PLS and the standardized β coefficient in the regression analysis were different. Through the β value, the significance of the hypothesis was tested. The β denoted the expected variation in the dependent constructs for a unit variation in the independent constructs. The greater the beta coefficient (β), the stronger the effect of exogenous latent constructs on the endogenous latent construct. Table 5 showed that the construction-related factor had the topmost path coefficient of β = 1.341 when compared to another β value in the model, which showed that it had a greater value of variance and a high effect on affecting the competitive advantage. The direct and indirect pathway coefficients show that the structural model relationship is statistically significant. We note that all statistical values (T) are greater than 1.96 and (P) values are less than 0.05 at the level of significance of 0.01 for each non-standard compromise contribution to the latent variables, except for some paths: (MC)→(business intelligence), (FMC)→(business intelligence), this indicates the existence of statistical function causal relationships, according to the path analysis, which enabled to test the hypotheses (the main and sub) between variables.

5-5 The coefficient of determination (R^2)

This coefficient is a measure of the model's predictive power and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values, the value of R^2 for the universal the model here is good (88.3) %, while the analytical competencies, leadership competencies, managerial competencies, marketing competencies and finally financial managerial competencies (90.4) % explain the variance on business intelligence.

Table N° (06): R-Square of the endogenous latent variables

Construct's relation	R^2	Results
Business intelligence	0.904	high
Competitive advantage	0.883	high

Source: SmartPLS output

5-6 Effect size (f^2)

The f^2 is the degree of the impact of each exogenous latent construct on the endogenous latent construct. When an independent construct is deleted from the path model, it changes the value of the coefficient of determination (R^2) and defines whether the removed latent exogenous construct has a significant influence on the value of the latent endogenous construct. The f^2 values were 0.35(stronger effect), 0.15 (moderate effect), and 0.02 (weak effect) (Cohen, 1988). The effect size of business intelligence on competitive advantage is a good value, while the effect size for the construction of marketing competencies is unacceptable, in addition, analytical leadership, and managerial competencies on competitive advantage are moderate, considering that business intelligence is a dependent variable, we find that the effect size of managerial and financial managerial competencies is unacceptable, and the effect size of marketing competencies on business intelligence is moderate. Furthermore, all the six independent latent constructs in this study participated relatively to the greater R^2 value of 88.3% in the dependent variable. And we explain this in the following table:

Table N° (07): Effect size (f^2)

Exogenous Latent Variable	Effect size f^2 Competitive advantage is a dependent variable	Results	Exogenous Latent Variable	Effect size f^2 Business intelligence is a dependent variable	Results
(AC)	0.096	Moderate	(AC)	0.572	Strong
(LC)	0.135	Moderate	(LC)	0.094	Moderate
(MC)	0.176	Moderate	(MC)	0.000	No effect
(MrkC)	0.002	No effect	(MrkC)	0.242	Moderate
(FMC)	0.832	Strong	(FMC)	0.001	No effect
(BI)	1.484	Strong			

Source: SmartPLS output

5-7 Predictive relevance (Q^2)

Q^2 shows how well the data collected empirically can be reconstructed with the help of the model and the PLS parameters. The predictive measure for the block is based on the following parameters:

$$\mathbf{Q^2} = 1 - \frac{\sum_D ED}{\sum_D \mathrm{OD}} = 1 - \frac{SSE}{SSO}$$

E = The sum of squares of prediction error.

O = The sum of squares error using the mean prediction.
D = Omission distance. (Akter & et al, 2011)

(Chin) 1998 suggests that a model demonstrates good predictive relevance when its Q^2 value is larger than zero (Kwong, 2016). It shows that Q^2 values in this study model were equal to 0.349 and 0.283, which was higher than the threshold limit, and supports that the path model's predictive relevance was adequate for the endogenous construct. The following table (8) summarizes the results:

Table N° (08): Construct cross validated redundancy

Endogenous Latent Variable	SSO	SSE	Q^2=1-(SSE/SSO)
Business intelligence	2576	1676.864	0.349
Competitive advantage	1840	1319.808	0.283

Source: SmartPLS output

5-8 Goodness of fit of the model (GOF)

The Goodness of fit index is defined as the geometric mean of the average communality (AVE values) and average R^2 value (s) for all endogenous constructs: $\mathbf{GOF}=\sqrt{\overline{\boldsymbol{AVE}} \times \overline{\boldsymbol{R^2}}}$, the Gof values lie between 0 and 1, where values of 0.10 (small), 0.25 (medium), and 0.36 (large) indicate the global validation of the path model. (Akter & et al, 2011) The model's goodness of fit is calculated as follows:

Table N° (09): Goodness-of-Fit index calculation

Endogenous constructs	AVE	R^2
(AC)	0.891	
(LC)	0.784	
(MC)	0.918	
(MrkC)	0.721	
(FMC)	0.804	
(BI)	0.899	0.904
(CA)	0.749	0.883
Average value	0.82371429	0.8935
AVE×R^2	0.73598871	
Gof	**0.857**	

Source: SmartPLS output

From table 9 it is observed that the GOF index for this study model was measured as 0.857 indicating more than (0.36 large), which showed that empirical data fits the model satisfies and has good predictive relevance for all of the endogenous variables.

5-9 Business intelligence as a mediator

Path coefficients were estimated by Bootstrapping in the structural model between formulations without the interaction of the mediator, where the results showed that all the direct paths are statistically significant, except the fourth and sixth paths (leadership competencies- competitive advantage,

managerial competencies -competitive advantage), and the following table shows that:

Table N° (10): Direct effect without mediation

Paths	B	(SE)	T-value	P-value	Decision
(AC)→ (CA)	0.387	0.187	2.063	0.040	Supported*
(LC)→ (CA)	-0.014	0.187	0.075	0.940	Unsupported
(MC)→ (CA)	-0.386	0.199	1.935	0.054	Unsupported
(MrkC)→ (CA)	0.291	0.146	2.003	0.046	Supported*
(FMC)→ (CA)	0.606	0.169	3.581	0.000	Supported**

Source: SmartPLS output

5-10 Total effect

In this stage we include business intelligence as a mediator because we need the importance of indirect paths to verify that business intelligence mediates the relationship between (analytical competencies -business intelligence), (leadership competencies- business intelligence), (managerial competencies -business intelligence), (marketing competencies-business intelligence), (financial managerial competencies-business intelligence).To analyze and evaluate the role of the mediating variable (business intelligence) between the independent variable (entrepreneurial competencies) and the dependent variable (competitive advantage), we use methods (Preacher & Hayes) (Preacher & Hayes, 2008) as one of the most popular and used methods, and to make sure of the importance of these indirect paths, the sample table was copied from Bootstrapping and the calculation was performed according to Excel, and we use the following table(11):

Table N° (11): Total effect with mediated interaction (business intelligence)

Paths	B	(SE)	T-value	P-value	Decision
(AC)→ (BI)	0.539	0.113	4.786	0.000	Supported**
(AC)→ (CA)	0.418	0.202	2.070	0.039	Supported*
(LC)→ (BI)	0.260	0.109	2.384	0.017	Supported*
(LC)→ (CA)	0.010	0.193	0.052	0.002	Supported**
(MC)→ (BI)	-0.014	0.135	0.104	0.917	Unsupported
(MC)→ (CA)	-0.397	0.216	1.836	0.067	Unsupported
(MrkC)→ (BI)	0.238	0.087	2.730	0.007	Supported**
(MrkC)→ (CA)	0.344	0.154	2.232	0.026	Supported*
(FMC)→ (BI)	0.017	0.056	0.297	0.767	Unsupported
(FMC)→ (CA)	0.520	0.164	3.179	0.002	Supported**
(BI)→ (CA)	1.341	0.161	8.349	0.000	Supported**

Source: SmartPLS output

Through the previous table, we found that there is an indirect significant effect of the mediator ($ß_{MX} \times ß_{MY}$) statistic significant):
(Analytical competencies→business intelligence→competitive advantage), (leadership competencies→business intelligence→competitive advantage),

(marketing competencies→business intelligence→competitive advantage), based on the results, we can conclude that all three mediations are significant at t-value >1.96 and p-value <0.05. While there is no significant indirect effect of the mediator between (managerial competencies→business intelligence→competitive advantage) and (financial managerial competencies→business intelligence→competitive advantage). Next, we also need to calculate the 95%bootstrapped confidence interval bias using the following formula:

Lower Limit (LL) a*b-z(SE) (z value, for 0.05 level is 1.96)

Upper Limit (UL) a*b+z(SE)

To find out the mediating effect, we do some calculations according to Excel:

Table N° (12): The effect of the mediating variable business intelligence 1

Paths	IV-Mediator	DV-Mediator				Bootstrapped Confidence Interval	
	Path a	Path b	Indirect effect	SE	T-value	LL 95%	UL95 %
(AC)→ (BI)→(CA)	0.539	1.341	0.723	0.160	4.523	0.409	1.036
(LC)→ (BI) → (CA)	0.260	1.341	0.349	0.160	2.176	0.035	0.662
(MC)→ (BI)→ (CA)	-0.014	1.341	-0.019	0.177	0.106	-0.328	0.328
(MrkC)→ (BI)→ (CA)	0.238	1.341	0.319	0.122	2.617	0.080	0.558
(FMC)→ (BI)→ (CA)	0.017	1.341	0.023	0.075	0.300	-0.124	0.169

Source: Excel output

If the confidence interval does not include zero, it is statistically confident that the effect differs from zero (the presence of an effect of the mediator variable), through the previous table, we notice that the zero is the median of the confidence interval for the path (managerial competencies→business intelligence→competitive advantage) and (financial managerial competencies→business intelligence→ competitive advantage), because these two paths did not fulfill the first condition, thus we conclude that there is no significant effect of the mediator variable, as for the other paths, they achieved the first condition. Through the second condition, we notice that the confidence interval does not include zero, it is statistically confident that the effect differs from zero (the presence of an effect of the median variable), for the rest paths. The Bootstrapping analysis has shown that all three indirect effects, ß=0.723, ß=0.349, and ß=0.319, are significant with t-value of 4.523, 2.176, and 2.617. The indirect effects 95%: [LL = 0.409, UL = 1.036], [LL = 0.035, UL = 0.662], and [LL = 0.080, UL = 0.558], do not straddle a 0 in between indicating there is mediation. We can also use (SmartPLS3) to find out the effect of mediating variables.

Table N° (13): The effect of the mediator variable business intelligence 2

Paths	B	(SE)	BC	T-value	P-value	2.5%	97.5%	Decision
(AC)→(BI)→ (CA)	0.723	0.160	0.017	4.523	0.000	0.458	1.086	Supported**
(LC)→(BI)→ (CA)	0.349	0.160	-0.012	2.176	0.030	0.044	0.676	Supported*
(MC)→ (BI)→(CA)	-0.019	0.177	-0.013	0.106	0.916	-0.354	0.342	Unsupported
(MrkC)→(BI)→ (CA)	0.319	0.122	-0.005	2.617	0.009	0.102	0.579	Supported**
(FMC)→ (BI) → (CA)	0.023	0.075	-0.003	0.300	0.765	-0.161	0.148	Unsupported

Source: SmartPLS output

Note:
BC = Bias Corrected.

For the two paths: (Managerial competencies→business intelligence→competitive advantage) and (financial managerial competencies→business intelligence→competitive advantage), we note that (sig=0.916> 0.05) and (sig=0.765> 0.05).Thus, we conclude that there is no significant effect of the mediating variable on these two pathways, as for the other paths: (Analytical competencies→business intelligence→competitive advantage), (leadership competencies→business intelligence→competitive advantage), (marketing competencies→business intelligence→competitive advantage), we note that (sig=0.000< 0.01) and (sig=0.030< 0.05), (sig=0.009<0.01) respectively. We conclude statistically confident that the effect differs from zero. The results showed that business intelligence partially mediates the relationship between (Analytical competencies, leadership competencies, marketing competencies) and competitive advantage.

5-11 VAF

Determines the extent to which the mediation process explains the dependent variable's variance. For a simple mediation, the proportion of mediation is defined as (Ramayah & et al, 2018) :

$$VAF = \frac{a * b}{a * b + c'} \times 100$$

We can compute the value of VIF for the paths which have demonstrated that the mediator has a significant effect:

-(Analytical competencies→business intelligence→competitive advantage):
VAF=(a*b)/(a*b+c')×100 = 0.723/(0.723+0.418)×100 = **63.36%**

-(Leadership competencies→business intelligence→competitive advantage):
VAF=(a*b)/(a*b+c')×100 = 0.349/(0.349+0.010)×100 = **97.21%**

-(Marketing competencies→business intelligence→competitive advantage):
VAF=(a*b)/(a*b+c')×100 = 0.319/(0.319+0.344)×100 = **48.11%**

In general, the rule is if the VAF is less than 20% (VAF<20%), it means there is no mediation. In a situation which the VAF is larger than 20% and less than 80% (20%⩽VAF⩽80%) could be characterized as a typical partial mediation, and the VAF above 80% indicates a full mediation (VAF>80%). Thereby, we can determine that the mediation result from the above equations, for the first and thirds paths could be characterized as a typical partial mediation because the VAF value of 0.6336 or 63.36% and 48.11% are in the range of VAF being larger than (20%⩽VAF⩽80%) respectively. For the second path, the VAF above 97.21% is a full mediation (VAF>80%).

5-12 Hypothesis testing

Based on the description in the theory research framework, the hypotheses are tested according to the tables (5, 11, and 13) as follows:

H1. There is an effect of entrepreneurial competencies and their dimensions on business intelligence. Where the first hypothesis was divided into the following sub-hypotheses:

H1.1. There is a statistically significant effect of analytical competencies on business intelligence (P = 0.000 < 0.01) accept H1.1.

H1.2. There is a statistically significant effect of leadership competencies on business intelligence (P = 0.017 < 0.05) accept H1.2.

H1.3. There is no a statistically significant effect of managerial competencies on business intelligence (P = 0.917 > 0.05) reject H1.3.

H1.4. There is a statistically significant effect of marketing competencies on business intelligence (P = 0.007 < 0.01) accept H1.4.

H1.5. There is no statistically significant effect of financial managerial competencies on business intelligence (P = 0.767 > 0.05) reject H1.5.

H2. There is an effect of entrepreneurial competencies and their dimensions on competitive advantage. Where the second hypothesis was divided into the following sub-hypotheses:

H2.1. There is a statistically significant effect of analytical competencies on competitive advantage (P = 0.028 < 0.05) accept H2.1.

H2.2. There is a statistically significant effect of leadership competencies on competitive advantage (P = 0.002 < 0.01) accept H2.2.

H2.3. There is a statistically significant effect of managerial competencies on competitive advantage (P = 0.001 < 0.01) accept H2.3.

H2.4. There is a statistically significant effect of marketing competencies on competitive advantage (P = 0.000 < 0.01) accept H2.4.

H2.5. There is a statistically significant effect of financial managerial competencies on competitive advantage (P = 0.000 < 0.01) accept H2.5.

H3. There is a statistically significant effect of business intelligence on competitive advantage (P = 0.000 < 0.01) accept H3.

H4. Business intelligence mediates the relationship between entrepreneurial competencies and their dimensions and competitive advantage. Where the fourth hypothesis was divided into the following sub-hypotheses:

H4.1. There is a statistically significant effect of the mediator variable (business intelligence) between analytical competencies and competitive advantage ($P = 0.000 < 0.01$) accept H4.1.

H4.2. There is a statistically significant effect of the mediator variable (business intelligence) between leadership competencies and competitive advantage ($P = 0.030 < 0.05$) accept H4.2.

H4.3. There is no statistically significant effect of the mediator variable (business intelligence) between managerial competencies and competitive advantage ($P = 0.916 > 0.05$) reject H4.3.

H4.4. There is a statistically significant effect of the mediator variable (business intelligence) between marketing competencies and competitive advantage ($P = 0.009 < 0.01$) accept H4.4.

H4.5. There is no statistically significant effect of the mediator variable (business intelligence) between financial managerial competencies and competitive advantage ($P=0.765 > 0.05$) reject H4.5.

Discussion

The findings from this study suggest that analytical competencies, leadership competencies, and marketing competencies are three competencies that lead to the competitive advantage of small enterprises in the province of Algiers. As for managerial competencies, financial managerial competencies and the mediating role of business intelligence are insufficient to achieve a competitive advantage. As far as the theoretical contributions of this paper are concerned, the study contributes to our understanding of some related constructs that have not been explored in-depth in previous literature relating to entrepreneurial competencies and business intelligence in small enterprises. In doing so, the findings supplement a small research base of studies empirically examining the role of business intelligence mediation between the entrepreneurial competencies of entrepreneurs and the achievement of competitive advantage in small enterprises. Our results indicated that the competitive advantage of small enterprises is achieved through the entrepreneurs' possession of analytical competencies and their ability to analyze data and information to choose among the best business decisions and predict future trends, by using business intelligence to accurately analyze and visualize data in real-time. It is explained why there is

a strong relationship between leadership competencies and competitive advantage, as the rapid era of the world demands a new leadership style with leadership competencies that proactively manage changes and take advantage of opportunities. Therefore, entrepreneurs are forced to use business intelligence, which gives sufficient time the ease of contacting employees and providing the information they need for their tasks promptly. The marketing competencies of the entrepreneurs play an important role in extracting data and transforming it into actionable visions. This information helped to better understand customers' needs, demands and complaints, as this information also leads entrepreneurs to determine the best time to reach their customers and through which channels.

Conclusion

This research study provides theoretical and application evidence on the relationship between the mediating role of business intelligence, entrepreneurial competencies, and competitive advantage. This study indicates that the use of business intelligence is positively correlated with the analytical, leadership, and marketing competencies of entrepreneurs in small enterprises, which in turn plays a role to achieve a competitive advantage. These effects are supported by the results, which confirm that business intelligence has become a major gear in the work of small enterprises. Nowadays, entrepreneurs are no longer ignorant of the challenges raised by the uses of business intelligence that change the way they do business and help these enterprises to innovate and increase productivity and simplify operations to achieve a competitive advantage. The study recommended that the entrepreneurs should develop a comprehensive approach to employee training and adapt working methods that focus on new technologies to achieve a competitive advantage. Second, every entrepreneur must better define the digital workforce and refine and assess the training needs of each member of their team to achieve a competitive advantage. Third, the entrepreneurs must foster a culture of innovation shared among employees along with talent management practices that remain essential to achieving continuous competitive advantage. Fourth, entrepreneurs must recruit and develop talent to combine their contribution to the enterprise resource package to gain a competitive advantage. Fifthly, entrepreneurs should develop a specialized automated software solution to control financial transactions such as budgeting, bookkeeping, and billing. Sixth, entrepreneurs must automate routine financial processes to avoid manual errors. Several limitations that may provide directions for future research are worth noting. First, the effect of other potential competitive advantages that might apply to small enterprises has not been considered. This can help understand which factors affect the relationships under analysis. Second, the

study was limited to the level of the province of Algiers only and did not include other provinces that would enhance the generalizability of the results. Third, the research fails to demonstrate that variables such as managerial competencies and financial managerial competencies can achieve the relationship between business intelligence and competitive advantage. So, in the future, these constructs should be further investigated to identify their effect. Fourth, regarding methodological issues, the sampling method might be of concern. The selection of participants sample was not purely random. As explained in the research methodology, the participants taking part in the field study were selected based on convenience sampling. For future studies, researchers may consider expanding the model by studying the determinants of each competitive advantage or exploring competitive advantages (such as international relations network advantage, digital governance, and intellectual property) that may contribute to the competitive advantage of small enterprises. Future research may also look deeper into the moderation relationships between the constructs of business intelligence. Additionally, researchers may consider conducting a comparative study between small enterprises and startups.

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