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# ECONOMICS & MANAGEMENT

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## **NEW TRADE THEORY AND ECONOMIC INTEGRATION: A COMPREHENSIVE ANALYSIS**

**Parousis Evaggelos<sup>1</sup>**

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### ***Abstract***

*In this paper, an extensive examination is conducted to explore the connection between New Trade Theory (NTT) and Economic Integration. NTT, originally proposed by Paul Krugman during the 1970s and 1980s, and places emphasis on factors such as economies of scale, network effects, and imperfect competition as key determinants of trade patterns. The insights provided by NTT have had a significant impact on the process of economic integration, which involves the reduction or elimination of trade barriers and the coordination of economic policies among different nations. The paper delves into how NTT has transformed the conversation surrounding economic integration, with a particular focus on its implications for policy development and considerations related to welfare. NTT presents a challenge to conventional theories of international trade, such as the Ricardian model, by illustrating that countries can engage in trade even if they possess similar resources and technologies. This is achieved by placing emphasis on economies of scale, network effects, and imperfect competition. NTT offers valuable insights into the process of economic integration between nations. Therefore, policymakers should consider these insights when formulating and implementing economic integration agreements. Economic integration has the potential to foster competition, innovation, and productivity growth, which can ultimately result in overall welfare improvements. However, it is crucial for policymakers to also develop policies that ensure the equitable distribution of the benefits of economic integration across all segments of society.*

**Keywords:** *new trade; theory economic integration; economies of scale; network effects; imperfect competition.*

**JEL Codes:** *F02, F15, B50*

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### **Introduction**

The understanding of international trade has undergone a significant transformation thanks to the emergence of New Trade Theory (NTT). Developed by Paul Krugman during the 1970s and 1980s, NTT emphasizes the impact of economies of scale, network effects, and imperfect competition on trade patterns. In contrast, economic integration refers to the concerted efforts of countries to diminish trade barriers and coordinate economic policies.

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This study delves into the interplay between NTT and Economic Integration, investigating the influence of the former on the latter and the potential implications for global trade dynamics.

### **New Trade Theory: An Overview**

The concept of New Trade Theory posits that the manner in which countries engage in international trade can be understood by considering the benefits derived from economies of scale and network effects. According to Krugman's model, when a country is able to produce a wide range of goods, the average cost of those goods decreases, thereby granting a competitive edge to nations with substantial economies of scale. NTT also underscores the importance of imperfect competition, suggesting that companies may maintain monopolistic or oligopolistic positions in global markets, leading to trade between countries even in the absence of comparative advantage (Deraniyagala & Fine, 2001).

**Economies of Scale:** The reduction in average production costs that occurs when production is scaled up is known as economies of scale. These economies of scale are of great importance in the New Trade Theory (NTT) as they influence the patterns of trade between nations. By increasing the scale of production, firms are able to lower the average cost per unit, which enhances their competitiveness in global markets (Todorova, 2015). This phenomenon contributes to intra-industry trade, where countries specialize in producing different variations of similar products. As a result, NTT challenges traditional theories of international trade, such as the Ricardian model, by demonstrating that countries can engage in trade even if they possess similar resources and technologies. The role of economies of scale is crucial in determining how economic integration impacts trade patterns. Enhancing competitiveness and achieving greater overall welfare is possible for countries through the utilization of economies of scale. However, policymakers must exercise caution when formulating and executing strategic trade policies in order to achieve favorable results and prevent the negative consequences associated with protectionism. Further research should focus on investigating the interplay between New Trade Theory, economic integration, and economies of scale to offer policymakers valuable insights into the strategic considerations they should take into account. (Krugman, 1979; Krugman, 1980).

**Network Effects:** When a product or service gains more users, its value increases due to network effects. NTT examines how network effects contribute to the concentration of industries and economic activities in particular regions. This concentration leads to the formation of clusters, which further attract economic activity. Silicon Valley serves as a prime example, with its abundance of technology firms fostering an environment that promotes innovation and growth. NTT proposes that network effects also impact trade

patterns by promoting the clustering of economic activity in specific locations (Hübler, 2016).

NTT highlights the significance of imperfect competition in the realm of global trade. Within a market characterized by monopolistic competition, businesses have the ability to distinguish their products, enabling them to set prices that exceed marginal costs. This dynamic serves as motivation for companies to venture into international markets, irrespective of whether they possess a comparative advantage. Consequently, trade can transpire between nations, even in the absence of substantial disparities in factor endowments or technological advancements (Krugman, 1985).

### **Economic Integration: A Conceptual Framework**

The process of economic integration involves countries working together to remove trade barriers and coordinate economic policies. This can occur at various levels, from creating free trade areas to achieving complete economic and political union (Shishmanova, 2013). The primary goals of economic integration are to encourage economic cooperation, improve efficiency, and stimulate economic growth. The valuable insights provided by NTT play a significant role in shaping economic integration (Baldwin & Venables, 1995).

There are various levels of economic integration that countries can pursue. The first level is a Free Trade Area (FTA), where member countries eliminate tariffs and quotas on goods traded between them. However, each country still maintains its own tariffs on goods from countries outside the agreement. Moving up the ladder, a Customs Union takes it a step further by not only eliminating tariffs and quotas among member countries but also implementing a common external tariff on imports from non-member countries. A Common Market combines the features of a customs union with the free movement of factors of production, such as labor and capital, among member countries. An Economic Union goes even further by harmonizing economic policies, including monetary, fiscal, and social policies, among member countries. Finally, a Political Union represents the highest level of integration, creating a single political entity with a common government and institutions (Bhagwati & Panagariya, 1996).

### **Implications of NTT for Economic Integration**

The concept of NTT has far-reaching implications for the integration of economies, particularly in terms of policy formulation and considerations for welfare. When it comes to trade policy, NTT highlights the need to go beyond traditional measures like tariffs and quotas. Instead, there should be a focus on fostering economies of scale and network effects. This can be achieved through investments in education, infrastructure, and research



and development, which in turn drive innovation and productivity growth. Additionally, NTT suggests that industrial policy plays a vital role in promoting economic integration. Governments can strategically target specific industries or sectors to encourage the concentration of economic activity, leading to the emergence of regional or global hubs for innovation and production. Lastly, NTT underscores the significance of competition policy in regulating markets and preventing the abuse of market power (Tosheva, 2011). By promoting competition, countries can ensure that the benefits of economic integration are distributed fairly among all stakeholders (Mayes, 1978; Estevadeordal, Giordano & Ramos, 2014: 249-264).

### **Welfare Considerations**

The concept of consumer welfare is highlighted by NTT, which argues that economic integration has the potential to benefit consumers by offering a greater selection of products and reducing prices. Through the promotion of intra-industry trade, economic integration enables consumers to enjoy a broader array of goods and services at more affordable rates (Konari, 2017). Producers can also reap the rewards of economic integration through enhanced access to expansive markets and the advantages of economies of scale. When trade barriers are eliminated, firms can increase their production capabilities and extend their reach to a wider range of customers. The concept of overall welfare is multifaceted, as economic integration has the potential to generate both positive and negative outcomes. It is essential for policymakers to implement strategies that guarantee a fair distribution of the advantages of economic integration across all sectors of society, as recommended by NTT (Corden, 1997).

### **Case Studies**

European Union (EU): The European Union (EU) stands as a prime example of economic integration, having achieved remarkable success. Through the removal of trade barriers and the synchronization of economic policies, the EU has effectively established a unified market boasting a staggering 450 million consumers. NTT offers valuable perspectives on the journey of European integration, placing emphasis on the significant role played by economies of scale, network effects, and imperfect competition in molding trade dynamics within the EU.

North American Free Trade Agreement (NAFTA): The establishment of NAFTA in 1994 marked the creation of a free trade zone encompassing the United States, Canada, and Mexico. NTT played a significant role in shaping and executing NAFTA, with a particular focus on fostering economies of scale and network effects. Through the removal of tariffs

and quotas, NAFTA has facilitated the concentration of production and the development of localized centers of economic vitality.

## Conclusion

The implications of New Trade Theory (NTT) for economic integration are substantial, particularly when it comes to policy development and considerations of welfare. NTT sheds light on the dynamics of economic integration among nations by highlighting the importance of economies of scale, network effects, and imperfect competition. Policymakers need to incorporate the insights offered by NTT into their formulation and implementation of economic integration agreements. Economic integration, by fostering competition, innovation, and productivity growth, has the potential to generate overall welfare improvements. However, policymakers must also devise policies that ensure the equitable distribution of the benefits of economic integration across all segments of society.

## REFERENCES

- Baldwin, R., & Venables, A. (1995). Regional Economic Integration. In *Handbook of International Economics*, 3, pp. 1597–1644, <https://econpapers.repec.org/bookchap/eeeintchp/3-31.htm>
- Bhagwati, J., & Panagariya, A. (1996). *The Economics of Preferential Trade Agreements*. American Enterprise Institute. <https://www.aei.org/research-products/book/the-economics-of-preferential-trade-agreements/>
- Corden, W. M. (1997). *Trade policy and economic welfare*. Oxford University Press.
- Deraniyagala, S., & Fine, B. (2001). New trade theory versus old trade policy: a continuing enigma. *Cambridge journal of economics*, 25(6), 809-825. <https://www.jstor.org/stable/23600655>
- Estevadeordal, A., Giordano, P., & Ramos, B. (2014). *Trade and Economic Integration*. In *Routledge Handbook of Latin America in the World*, Routledge. <https://www.taylorfrancis.com/chapters/edit/10.4324/9781315753683-23/trade-economic-integration-antoni-estevadeordal-paolo-giordano-barbara-ramos>
- Helpman, E., & Krugman, P. (1985). *Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy*. The MIT Press. <https://mitpress.mit.edu/9780262580878/market-structure-and-foreign-trade/>
- Hübler, M. (2016). A new trade network theory: What economists can learn from engineers. *Economic modelling*, 55(C), 115-126. DOI: 10.1016/j.econmod.2016.02.009, <https://ideas.repec.org/a/eee/ecmode/v55y2016icp115-126.html>

- Koniari, E. (2017). Zones For Free Trade Between Balkan Countries And Europe In General During The Economic Crisis In Greece. *Entrepreneurship*, 5(2), 124-130. [https://ep.swu.bg/images/pdfarticles/2017/ZONES FOR FREE TRADE BETWEEN BALKAN COUNTRIES.pdf](https://ep.swu.bg/images/pdfarticles/2017/ZONES_FOR_FREE_TRADE_BETWEEN_BALKAN_COUNTRIES.pdf)
- Krugman, P. (1979). A model of innovation, technology transfer, and the world distribution of income. *Journal of Political Economy*, 87(2), 253–266. <http://dx.doi.org/10.1086/260755>, [https://econpapers.repec.org/article/ucpjpolec/v\\_3a87\\_3ay\\_3a1979\\_3ai\\_3a2\\_3ap\\_3a253-66.htm](https://econpapers.repec.org/article/ucpjpolec/v_3a87_3ay_3a1979_3ai_3a2_3ap_3a253-66.htm)
- Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *American Economic Review*, 70(5), 950–959. <https://www.aeaweb.org/aer/top20/70.5.950-959.pdf>
- Mayes, D. G. (1978). The effects of economic integration on trade. *JCMS: Journal of Common Market Studies*, 17(1), 1-25. <https://ideas.repec.org/a/bla/jcmkts/v17y1978i1p1-25.html>
- Shishmanova, M. (2013). Development To A More Effective Regional Policy. *Economics and Management*, 9(1), 57-67. <https://ideas.repec.org/a/neo/journal/v9y2013i1p57-67.html>
- Todorova, L. (2015). Determination Of The Risk Characteristics Of Commercial Enterprises-An Important Component Of Trade Policy At The Sale With Deferred Payment. *Entrepreneurship*, 3(1), 115-140. <https://ep.swu.bg/images/pdfarticles/2015pdf/DETERMINATION%20OF%20THE%20RISK%20CHARACTERISTICS%20OF%20COMMERCIAL.pdf>
- Tosheva, S. (2011). Trade And Economic Relations Between The Republic Of Bulgaria And The State Of Izrael. *Economics and Management*, 7(4), 9-14. <http://em.swu.bg/images/SpisanieIkonomikaupload/SpisanieIkonomika2011/TRADE%20AND%20ECONOMIC%20RELATIONS%20BETWEEN%20THE%20REPUBLIC%20OF%20BULGARIA%20AND.pdf>

## THE RELATIONSHIP BETWEEN INDUSTRIAL PRODUCTION AND GREEN GROWTH OF OECD COUNTRIES

Luljeta Sadiku<sup>1</sup>, Violeta Madzova<sup>2</sup>

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### **Abstract**

*Industrial advancement is the key pillar of countries' economic development. In addition to this, sound industrial policies are equally important for countries' industrialization, and paramount to these policies is their alignment with the principles of sustainable development, particularly in promoting a transition towards a green economy. Central to this transition is the simultaneous pursuit of enhancing human well-being and fostering economic growth while mitigating environmental risks. Accordingly, the main purpose of this study is to make an empirical analysis on the relationship between industrial activity with the green growth factor, namely production-based CO<sub>2</sub> emissions. The study includes OECD countries for the period 1990-2021. To examine the relationship between industry and an environmental and resource productivity variable, the panel regression models are employed. The results reveal that there is a significant positive relationship between value added in industry and production-based CO<sub>2</sub> emissions. Therefore, policy interventions should aim to dissociate industrial growth from carbon emissions through targeted measures such as technological innovation, resource efficiency, and regulatory frameworks promoting cleaner production practices. These findings highlight the urgency for governments to integrate sustainability considerations into their industrial policies to foster green growth and ensure a resilient and environmentally sustainable future.*

**Keywords:** industry; green growth; environmental sustainability; panel regression; OECD  
**JEL Codes:** L60, Q50, C33

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### **Introduction**

Industrial production involves the large-scale transformation of raw materials into finished goods, driving economic growth and technological advancement (Krugman, 2009; Rodrik, 2008; Rodrik, 2011; Gordon, 2016). However, the traditional industrial production model has been closely linked to environmental degradation, characterized by heavy reliance on fossil fuels, high energy consumption, and the generation of pollutants.

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Historically, the industrialization process primarily prioritized profit maximization within a so-called competitive market environment, largely neglecting environmental concerns (Moore, 2017). This attitude particularly prevailed in developing countries, often prioritizing profit maximization without due consideration for the environment and well-being of the population. Many countries have pursued production expansion without adequate attention to environmental sensitivity, driven by the fear of falling behind in competitiveness.

Although the Industrial Revolution brought positive changes to the industrialized world, it undeniably negatively impacted the environment. Reduction of natural resources, carbon emissions, pollution, and associated human health problems resulting directly from industrial achievements have had devastating consequences. The impacts of global warming are already an undeniable reality confronting humanity every day, resulting in escalating worldwide environmental concerns (Manzurova and Pashova, 2019).

Thus, industrial practices must undergo a transformation towards more environmentally sustainable approaches. This shift emphasizes promoting sustainable development and embracing the concept of "green growth" rather than prioritizing profit maximization at any cost.

The idea of green growth represents a paradigm shift, seeking to harmonize industrial productivity with sustainability. It advocates for the development and adoption of eco-friendly technologies, the utilization of renewable energy sources, and efficient resource management to foster economic growth while minimizing environmental impact. Implementing this new industrial revolution requires the adoption of green growth policies that not only stimulate economic growth and development but also ensure that natural assets continue to provide the resources and environmental services crucial for our well-being (OECD, 2014). Therefore, the aim of this study is to empirically estimate the relationship between industrial value added and production-based CO<sub>2</sub> emissions for OECD countries, because these countries typically have advanced industrial sectors that are major contributors to CO<sub>2</sub> emissions.

## **Literature Review**

As the process of industrialization evidently affected the environment and threatened sustainable development and green growth in the global framework, there was a large and diverse body of literature which assesses the link between economic growth and environmental pollution. This relationship is regarded as one of the most significant empirical connections in environmental economics. Numerous studies have explored the interplay between various development indicators and environmental metrics, employing diverse methodologies and focusing on different regions. Many of these studies examine

the Environmental Kuznets Curve (EKC) hypothesis, which posits that during a country's development, environmental quality initially worsens with rising per-capita income up to a certain point, after which it improves as income continues to increase. This relationship between economic growth and environmental degradation is graphically represented as an "inverted U-shaped" curve. The phenomenon was first noted by Kuznets (1955), who proposed an inverted U-shaped relationship between economic growth and income inequality.

The critical validation of the Environmental Kuznets Curve (EKC) hypothesis was provided by Grossman and Krueger (1991). Their analysis of the relationship between various environmental indicators and a country's per capita income revealed a similar inverted U-shaped correlation between economic growth and environmental degradation.

Following the influential paper by Grossman and Krueger (1991), many researchers have tested the Environmental Kuznets curve hypothesis using different model specifications, time span, explanatory variables in various countries or regions. One of these studies prepared by Dasgupta et al. (1995), developed environmental policy and performance indices for a group of 31 countries. Employing cross-country regressions, they find a very strong and continuous association between these indices and per capita income. Further study analysis made by Hettige et al. (1998) uses panel data for the period of 1975-1994 to investigate the relationship between industrial pollution and economic development within the Kuznets curve framework. They find that manufacturing share follows a Kuznets-type curve.

Dinda and Coondo (2006) examine the nature of causality between per capita CO<sub>2</sub> emission and per capita GDP using unit root tests, cointegration and error correction model for a cross country annual panel data set covering 88 countries for the period of 1960-1990. They show the existence of a cointegrating vector between the variables of interest. The same year, Yörük and Zaim (2006) investigate the relationship between environmental efficiency and income by constructing an environmental efficiency index for OECD countries and establishing an environmental Kuznets curve. Their results support the evidence of a positive relationship.

On the other hand, Bacon and Bhattacharya (2007) analysed many countries' CO<sub>2</sub> emissions for 1994-2004. They conclude that emissions per capita are positively but only moderately correlated with GDP per capita. Their findings fail to support the existence of Kuznets Curve phenomenon.

Investigating the relationship between industrial value-added and CO<sub>2</sub> emissions for developing and developed countries, Çelik and Deniz (2009) concluded that both developing and developed countries have higher levels of CO<sub>2</sub> emissions as their industry value-added increases. However, the coefficient's magnitude for developed countries is

notably lower compared to that of developing countries. This suggests that the rate of causing air pollution in developed countries is presumably lower than in developing countries. Their empirical analysis further indicates that developed countries tend to exercise relatively more caution in terms of environmental protection compared to developing countries.

Alam and Kabir (2013) observed that economic growth contributes to environmental sustainability by reducing carbon emissions. Similarly, Shahbaz et al. (2013) identified economic growth as the main driver of CO<sub>2</sub> emissions and suggested reducing emissions even at the cost of economic growth by investing in environmentally friendly technologies. Chang and Hao (2017) confirmed a positive interaction between environmental performance and economic growth in both OECD and non-OECD countries. However, they noted that increased output and consumption come with environmental costs, including higher consumption of non-renewable resources and increased pollution. Ardakani and Seyedaliakbar (2019) and Xie and Liu (2019) supported this view, asserting that economic growth below a certain threshold can lead to higher carbon emissions, while growth beyond this point improves the environmental quality. Wang et al. (2019) found that investment and economic growth together enhance the environmental quality, advocating for emission reduction policies that focus on efficient energy use, clean technology investments, and improved labor standards to control emissions.

The impact of economic growth on environmental degradation was also analyzed in relation to the development level of countries. De Angelis et al. (2019) determined that developing countries have high pollution rates, while developed countries are the main contributors to CO<sub>2</sub> emissions, though their emissions are decreasing.

In response to environmental degradation, developed nations such as the US and Western European countries have implemented policies falling under the "scale effect" to reduce carbon emissions. This is primarily achieved through investments in technological innovation, addressing capital consumption, and enforcing policies aimed at simultaneously enhancing economic growth and environmental protection (Paramati et al., 2017). In Eastern Europe, however, CO<sub>2</sub> emissions continue to rise unabated, as the nation's focus is oriented towards promoting tourism for the purpose of employment generation, income, and economic development, without due consideration for environmental consequences (Paramati et al., 2017).

Many scholars' further analyses show that excessive energy consumption negatively impacts green growth, whereas the utilization of renewable energy enhances it. This underscores that while high energy consumption poses challenges to green growth, the prevalence of renewable energy in the energy mix, fosters positive contributions to both green growth and environmental sustainability. Examining the factors that influence green

growth across 123 developing and developed countries recorded in the OECD database from 2000 to 2017, Aye and Edoja (2017) discovered that economic growth negatively impacts carbon emissions in the developing nations. The study's outcomes indicate that robust economic development fosters sustainable growth and economic prosperity, aligning with the notion that countries with a high GDP per capita possess sufficient resources to support initiatives for green growth. This underscores the importance of adopting economic development policies geared towards increasing GDP, as it emerges as a crucial determinant for achieving both green growth and sustainability objectives. In a similar vein, Tawiah et al. (2021) conducted an analysis focused on achieving environmental sustainability alongside economic growth and development by 2030. They utilized data from 123 developed and developing nations to investigate the determinants of green growth. Their findings revealed variations in the impact of these determinants between developed and developing countries. This suggests that nations at different stages of development will need tailored strategies to attain the Sustainable Development Goals by 2030. Moreover, in the study undertaken by Waheed et al. (2019), an exhaustive examination was conducted concerning the correlation between economic growth, intertwined with energy consumption, and carbon emissions, both at the individual country level and across regions and multiple countries. Specifically, they scrutinized 24 studies focusing on single countries and 21 multi-country articles investigating the link between economic growth and carbon emissions from 2007 to 2019. The results of this survey revealed that the majority of studies supported a unidirectional relationship from economic growth to carbon emissions.

In a separate review, Mardani et al. (2019) examined 175 articles focusing on the correlation between economic growth and CO<sub>2</sub> emissions from 1995 to 2017. Their observation of a bidirectional relationship between economic growth and CO<sub>2</sub> emissions led to the acknowledgment that economic growth might also face adverse effects in the process but with limited level of statistical significance to confirm it. They proposed the reduction of carbon emissions by implementing constraints on economic growth. Over the years, numerous scholars have pointed out diverse factors influencing environmental degradation, including economic growth, globalization, renewable energy consumption, fossil fuel use, financial development, energy utilization, and foreign direct investment (Adebayo and Odugbesan 2021a; Bekun et al., 2021a; Kihombo et al., 2021).

Particularly noteworthy is the extensive discourse surrounding the swift development of renewable energy and its impact on environmental quality and economic growth (Bekun et al., 2021b; Adebayo and Kirikkaleli, 2021; Tawiah et al. 2021; Udemba et al., 2020).

Regarding climate change, the utilization of renewable energy sources is believed to significantly contribute to environmental sustainability by mitigating the levels of



greenhouse gas emissions (Solarin et al., 2017; Kirikkaleli and Adebayo, 2020; Yuping et al., 2021). Consequently, by endorsing the use of sustainable energy, nations can enhance environmental sustainability and contribute to the establishment of a globally sustainable and cleaner environment.

Aiming to determine the contribution of innovation and financial development to Green growth in BRICS-T countries, Arzova and Şahin, (2023) conducted panel data analysis spanning from 2001 to 2019. The empirical findings reveal that the growth of national income and foreign direct investments positively contribute to green growth while personnel expenditure negatively impacted the green growth.

### **Methodology and Data**

The methodology of this study consists of panel regression analysis that investigate the relationship between industrial production and production-based CO2 emissions, with a focus on understanding their implications for green growth. The methodology encompasses three distinct regression techniques: pooled, fixed effects, and random effects models. Initially, pooled ordinary least squares (OLS) regression is utilized to estimate the general association between industrial production and CO2 emissions across OECD countries, assuming a common regression coefficient and intercept. Subsequently, fixed effects regression is employed to account for time-invariant unobserved heterogeneity at the country level by incorporating country-specific intercepts, thus controlling for potential confounding factors that remain constant over time. Additionally, random effects regression is applied to address both time-invariant and time-varying unobserved heterogeneity across countries, treating country-specific effects as random variables with a specific distribution. The general form of the panel regression equation can be expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \alpha_i + \varepsilon_{it}$$

Where  $Y_{it}$  represents the dependent variable (production-based CO2 emissions) for country  $i$  at time  $t$ .  $X_{it}$  is the independent variable of interest (industry value added index) for country  $i$  at time  $t$ .  $\alpha_i$  represent the country-specific fixed effects.  $\beta_1$  is the coefficient of interest, representing the marginal effects of  $X_{it}$  on  $Y_{it}$ .  $\varepsilon_{it}$  is the error term, representing unobserved factors affecting the dependent variable. Also, socio-economic, and policy-related indicators are included in the model, as control variables. These control variables encompass factors such as: environmental tax to capture the policy framework imposed by the governments; renewable energy supply (% of total energy supply), development of environment related technologies, real GDP index, inflation and population aiming to account for potential confounding factors that may influence the relationship between

industrial activity and environmental outcomes. By incorporating these control variables, the analysis seeks to provide a more comprehensive understanding of the dynamics between industrial development, environmental sustainability, and economic green growth within the context of OECD countries. Thus, the specified regression model is of the following form:

$$CO2EMS_{it} = \beta_0 + \beta_1 IND_{it} + \beta_2 RGDP_{it} + \beta_3 INF_{it} + \beta_4 ENV TAX_{it} + \beta_5 RENENERG + \beta_6 ENVTECH_{it} + \beta_7 POP_{it} + \alpha_i + \varepsilon_{it}$$

The dependent variable production-based CO2 emission is used as a proxy of green growth, as it is so classified by the OECD database of green growth indicators. It is under the environmental and resource productivity indicators that indicate whether economic growth is becoming greener (OECD, 2023). By using production-based CO2 emissions as a proxy for green growth, the analysis becomes directly relevant to policy discussions and evaluations in the context of environmental sustainability. Advocating investment in research, development and deployment of clean and green infrastructure is of particular importance for countries, for this reason as potential determinants to green growth are considered the development of environment related technologies and renewable energy supply.

### The data

The study utilizes annual data spanning the period from 1990 to 2021, sourced from the OECD's Green Growth Indicators Database. This dataset encompasses information pertaining to 38 member countries of the Organisation for Economic Co-operation and Development (OECD). Table 1 provides descriptions of variables used in the regression analysis which definitions are based on the database documentation of OECD green growth indicators.

*Table no. 1 - Variables' description*

<b>Variables</b>	<b>Indicator</b>	<b>Proxy indicator</b>
<b>IND</b>	Percentage of total value added contributed by the industry sector. This includes value added from mining, manufacturing, construction, and utilities such as electricity, water, and gas.	Economic development
<b>RGDP</b>	Real GDP, index 2000=100	
<b>INF</b>	GDP deflator. The GDP deflator is expressed as an index 2015=100	

<b>CO2EMS</b>	Production-based CO2 emissions are expressed as an index with values in 2000 normalised to equal 100.	Environmental and resource productivity
<b>ENVTAX</b>	Environmentally related tax revenue, % total tax revenue	Environmental policy
<b>RENENERG</b>	Percentage of total energy provided by renewable sources. This includes energy from hydroelectric, geothermal, solar (both thermal and photovoltaic), wind, and marine (tide, wave, ocean) sources, along with combustible renewables like solid and liquid biomass, biogas, and renewable municipal waste.	Environmental and resource productivity
<b>ENVTECH</b>	Environment related technologies, % all technologies	Technology and Innovation
<b>POP</b>	Population growth rate	Population

*Source:* Author's calculations

Table 2 provides descriptive statistics of used variables in the regression model summarizing key statistics such as mean, standard deviation and the minimum and maximum values. This helps to have a clear picture on the characteristics, average trends and variability of the data used in the regression models. For instance, it can be observed a relatively low standard deviation in population growth rate, that indicates similar population growth rates across countries, conversely a high standard deviation in real GDP index, production-based CO2 emissions, implies that they varied considerably across countries. Based on the number of observations it can be clearly noticed that the panel is unbalanced, merely it was used the moving average method (with factor 2) to fill in those missing observations.

*Table no. 2 - Descriptive Statistics*

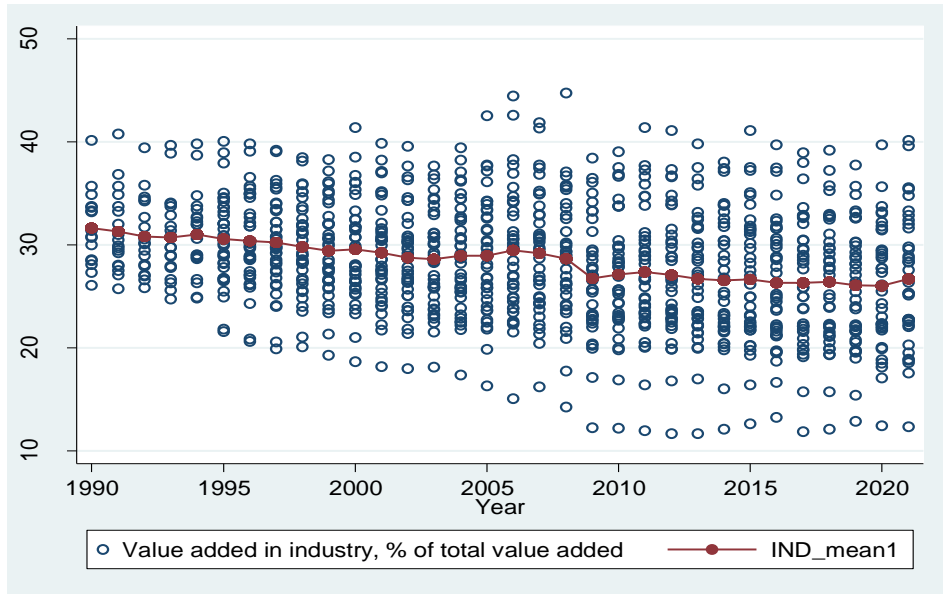
<b>Variable</b>	<b>Observations</b>	<b>Mean</b>	<b>St.Deviation</b>	<b>Min</b>	<b>Max</b>
IND	1101	28.30867	5.666455	11.64	44.77
RGDP	1209	117.5357	34.65298	50.26	279.53
INF	1204	80.35531	25.67203	0.07	235.62
CO2EMS	1216	101.9925	23.62515	48.61	335.42
ENVTAX	1105	1.248908	3.5731	0.254	3.2811
RENENERG	1216	16.13017	16.33436	0.28	89.75
ENVTECH	1139	9.871624	5.078904	0	50
POP	1216	-0.436	0.8804	-3.5805	1.0926

*Source:* Author's calculations

Figure 1 below displays the mean of value added in industry (% of total value added) over years of OECD countries. Each point in the graph represents the average of

value added in industry across OECD countries in the panel for each year. In this case one can observe a slightly decreasing trend in the means of value added in industry, over years.

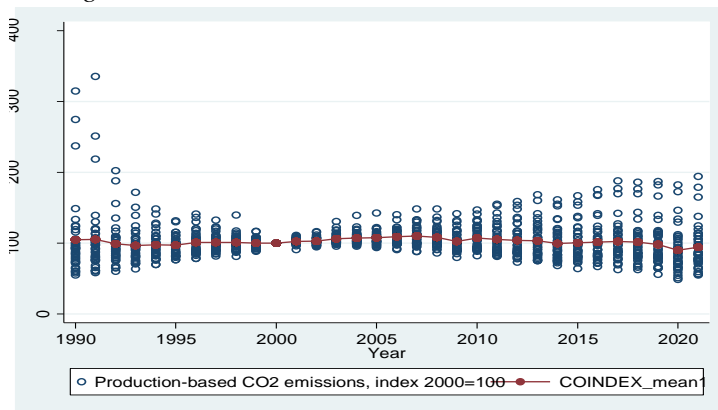
Figure no. 1 Value added in industry (% of total value added) of OECD countries.



Source: Author's calculations

Figure 2 presents the mean of production-based CO2 emissions for detecting any heterogeneity across years, thus one can conclude that the means of this variable do not deviate significantly from the overall trend; however, a decline in the last few years can be observed.

Figure no.2 Production Based CO2 emissions, index.



Source: Author's calculations

## **Empirical Findings**

The regression results reveal that industry value added is associated with a significant increase in production-based CO<sub>2</sub> emissions and this relationship is statistically significant under the three regression techniques i.e. Pooled OLS, Random and Fixed effects (these results are in line with the findings of Çelik and Deniz, 2009). While Pooled OLS suggests no significant relationship between environmental tax and CO<sub>2</sub> emissions, both Fixed Effects and Random Effects models show a significant negative relationship. This indicates that higher environmental taxes are associated with lower CO<sub>2</sub> emissions when accounting for individual-specific effects. Both Pooled OLS and Random effects models indicate a significant negative association between environmental technology and CO<sub>2</sub> emissions. However, this relationship is not statistically significant under Fixed Effects, suggesting potential individual-specific effects influencing the relationship. Under Fixed and Random Effects, there is a highly significant negative relationship between renewable energy and CO<sub>2</sub> emissions, indicating that higher usage of renewable energy sources is associated with lower CO<sub>2</sub> emissions (see also, Solarin et al., 2017; Kirikkaleli and Adebayo, 2021). As highlighted by Shahbaz et al. (2021), investments in renewable energy sources are often considered less carbon-intensive than traditional energy. The creative initiatives for renewable energy serve as a steady foundation for the states' sustainable development (Suchikova and Nestorenko, 2017). As a result, an increased usage of renewable energy in OECD countries leads to a decrease in the reliance on fossil fuels for electricity generation. Consequently, there is a corresponding reduction in CO<sub>2</sub> emissions associated with electricity production. This relationship is reinforced by the fact that renewable energy technologies continue to advance.

All estimation methods show a significant positive association between real GDP and CO<sub>2</sub> emissions. This suggests that higher economic output, as measured by real GDP, is associated with increased CO<sub>2</sub> emissions. So, as real GDP increases, so does industrial production, transportation, and consumption of goods and services. These activities often rely heavily on fossil fuels, such as coal, oil, and natural gas, which are significant sources of CO<sub>2</sub> emissions when burned for energy. The variables, such as inflation and population growth rate, are omitted from the models as they both were statistically insignificant in the three regression models.

Table no.3 - Panel regression results

Variables	Pooled OLS	Fixed Effects	Random Effects
IND	0.3986706*** (0.000)	0.170224*** (0.000)	0.7754663*** (0.000)
ENVTAX	0.0459637 (0.197)	-0.5447734*** (0.000)	-0.4370186*** (0.000)
ENVTECH	-0.3295364*** (0.003)	-0.0487609 (0.150)	-0.3672552*** (0.000)
RENENERG	-0.0971403 (0.146)	-1.960016*** (0.000)	-0.2785409** (0.019)
RGDP	0.2702647 (0.000)	0.3889488*** (0.000)	0.3206542*** (0.000)
Constant	24.99324 (0.000)	61.592 (0.124)	24.99324 (0.010)
R squared	0.212	-	-
Hausman test	-	chi2(5) = 38.63 Prob > chi2 = 0.000	-
Heteroscedasticity Test	-	Chi2(38) = 2.982 Prob > chi2 = 0.159	-
Serial correlation Wooldridge test	-	Prob > F = 0.301	-

Source: Author's calculations

Note:\*\*\* indicates statistical significance at the 1% level and \*\* indicates statistical significance at the 5% level.

The Hausman test is used to determine whether the fixed effects model or the random effects model is more appropriate for the regression analysis. The null hypothesis (H0) of the Hausman test is that the preferred model is the random effects model. The alternative hypothesis (H1) is that the fixed effects model is preferred. In this case, the p-value for the Hausman test is reported as 0.000, which is less than any conventional significance level (such as 0.05 or 0.01). Therefore, we reject the null hypothesis at any reasonable significance level, and we favour the fixed effects model for this regression analysis. This implies that there are individual-specific effects (or unobserved heterogeneity) present in the data that are better captured by the fixed effects model.

Diagnostic tests were performed for the fixed random model and based on the results of heteroskedasticity-robust standard errors, known as Huber/White test, we cannot reject the null hypothesis of homoscedasticity. Thus, the results are efficient and unbiased. Moreover, the Wooldridge test for autocorrelation in panel data was performed and the

results imply no first order autocorrelation, which means that the errors are independent of each other over time (see results at Table 3). Consequently, the estimated coefficients are likely to be unbiased and efficient, and the standard errors and hypothesis tests can be considered as valid.

## **Conclusions**

The aim of this study was to estimate the relationship between industrial activity and green growth. The production-based CO<sub>2</sub> emissions index was used as a proxy variable of green growth. It is a key environmental indicator, and as such, tracking changes in CO<sub>2</sub> emissions can provide insight into the environmental sustainability of economic activities. Green growth, as defined by sustainable development goals, seeks to promote economic growth while ensuring environmental sustainability. Since CO<sub>2</sub> emissions are closely linked to environmental degradation, a reduction in CO<sub>2</sub> emissions signifies progress towards green growth objectives. The results suggest a positive relationship between value added in industry and production-based CO<sub>2</sub> emissions. The results also imply that policy interventions such as environmental taxes and investments in environmental technology could potentially mitigate CO<sub>2</sub> emissions. The significance and direction of the coefficients vary across estimation methods, emphasizing the importance of considering individual-specific effects. The positive association between real GDP and CO<sub>2</sub> emissions highlights the challenge of decoupling economic growth from environmental impacts, suggesting the need for sustainable development strategies. However, further analysis and consideration of additional variables and model specifications may be necessary for a comprehensive understanding of the factors influencing CO<sub>2</sub> emissions.

## **REFERENCES**

- Adebayo, T.S. & Odugbesan, J.A. (2021a). Modelling CO<sub>2</sub> emissions in South Africa: empirical evidence from ARDL based bounds and wavelet coherence techniques. *Environmental Science and Pollution Research*. 28(1), 1-13. DOI:10.1007/s11356-020-11442-3
- Adebayo T.S. & Kirikkaleli D. (2021b). Impact of renewable energy consumption, globalization, and technological innovation on environmental degradation in Japan: application of wavelet tools. *Environment, Development and Sustainability: A Multidisciplinary Approach to the Theory and Practice of Sustainable Development*, Springer. 23(11), 16057-16082. DOI: 10.1007/s10668-021-01322-2.

- Alam, M.S. & Kabir, N. (2013). Economic growth and environmental sustainability: Empirical evidence from East and South-East Asia. *International Journal of Economics and Finance*, 5, 86–97. DOI: 10.5539/ijef.v5n2p86.
- Ardakani, M. & Seyedaliakbar, M. (2019). Impact of energy consumption and economic growth on CO2 emission using multivariate regression. *Energy Strategy Reviews*, 26/100428. <https://doi.org/10.1016/j.esr.2019.100428>.
- Arzova, S. B. & Şahin, B. (2023). Macroeconomic and financial determinants of green growth: an empirical investigation on BRICS-T countries. *Management of environmental quality: an international journal*, 506-524. DOI: 10.1108/meq-07-2023-0210.
- Aye G.C. & Edoja P.E. (2017). Effect of economic growth on CO2 emission indeveloping countries: evidence from a dynamic panel threshold model. *Cogent Econ Finance* 5(1), 1379239. DOI: 10.1080/23322039.2017.1379239.
- Bacon R.W. & Bhattacharya, S. (2007). Growth and CO2 Emissions How Do Different Countries Fare? *World Bank Working Paper* 113, <https://documents1.worldbank.org/curated/en/777121529433693727/pdf/WPS8477.pdf>
- Bekun, F. V., Gyamfi, B. A., Onifade, S. T., & Agboola, M. O. (2021a). Beyond the Environmental Kuznets Curve in E7 Economies: Accounting for the Combined Impacts of Institutional Quality and Renewables. *Journal of Cleaner Production*, 314(10), 127924. DOI:10.1016/j.jclepro.2021.127924
- Bekun, F. V., Alola, A. A., Gyamfi, B. A., & Yaw, S. S. (2021b). The Relevance of EKC Hypothesis in Energy Intensity Real-Output Trade-Off for Sustainable Environment in EU-27. *Environ Sci Pollut Res Int*, 28(37), 51137–51148. DOI:10.1007/s11356-021-14251-4
- Chang, C.P. & Hao, Y. (2017). Environmental performance, corruption and economic growth: global evidence using a new data set. *Applied economics*, 49(5), 498-514. DOI: 10.1080/00036846.2016.1200186
- Dasgupta, S., Mody, A. & Roy, S. (1995). Environmental regulation and development: a cross-country empirical analysis (English). *Policy, Research working paper*. <http://documents.worldbank.org/curated/en/722831468740697649/Environmental-regulation-and-development-a-cross-country-empirical-analysis>
- De Angelis, M., Stuver, A., Fraboni, F., Prati, G., Puchades, V.M., Fassina, F., De Waard D. & Pietrantoni, L. (2019). Green wave for cyclists: Users’ perception and preferences. *Applied Ergonomics*, 76, 113-121, ISSN 0003-6870, <https://www.vubp.cz/genesis/cc/ae/applied-ergonomics-april-2019.pdf>
- Dinda, S. & Coondo, D. (2006). Income and emission: a panel data-based cointegration analysis. *Ecological Economics*, 57, 167-181.



[https://econpapers.repec.org/article/eeecolec/v\\_3a57\\_3ay\\_3a2006\\_3ai\\_3a2\\_3ap\\_3a167-181.htm](https://econpapers.repec.org/article/eeecolec/v_3a57_3ay_3a2006_3ai_3a2_3ap_3a167-181.htm)

- Hettige, H., Muthukumara, M. & Wheeler, D. (1998). Industrial Pollution in Economic Development: Kuznets Revisited, *World Bank Publications*, Volume 1876. <https://ideas.repec.org/p/wbk/wbrwps/1876.html>
- Grossman, G.M. & Krueger, A.B. (1991). Environmental Impacts of a North American Free Trade Agreement National Bureau of economic research. *NBER working papers series*, No. W3914. [https://www.nber.org/system/files/working\\_papers/w3914/w3914.pdf](https://www.nber.org/system/files/working_papers/w3914/w3914.pdf)
- Gordon, R. J. (2016). *The Rise and Fall of American Growth: The U.S. Standard of Living since the Civil War*. Princeton University Press.
- Kihombo S., Saud S., Ahmed, Z. & Chen, S. (2021). The effects of research and development and financial development on CO2 emissions: evidence from selected WAME economies. *Environmental Science and Pollution Research*, 28(37), 51149–51159. DOI: 10.1007/s11356-021-14288-5
- Kirikaleli, D. & Adebayo, T.S. (2021). Do public–private partnerships in energy and renewable energy consumption matter for consumption-based carbon dioxide emissions in India? *Environmental Science and Pollution Research*. 28, 30139–30152, <http://dx.doi.org/10.1007/s11356-021-12692-5>
- Krugman, P. (2009). *The Return of Depression Economics*. W.W. Norton & Company.
- Kuznets, S. (1955). Economic growth and income inequality. *Am. Econ. Rev.* 45 (1), 1–28. <https://assets.aeaweb.org/asset-server/files/9438.pdf>
- Manzurova, R., Pashova, R. (2019). Environmentally Responsible Behavioral Intention: A Condition for Competitiveness of the Tourist Enterprise Empirical Study in Bulgaria. *Economics and Management*. 16(1), 126-136. <http://em.swu.bg/images/SpisanieIkonomikaupload/Spisanieikonomika2019/ENVIRONMENTALLY%20RESPONSIBLE%20BEHAVIORAL%20INTENTION%20A.pdf>
- Mardani, A., Streimikiene, D., Cavallaro, F., Loganathan, N. & Khoshnoudi, M. (2019). Carbon dioxide (CO2) emissions and economic growth: A systematic review of two decades of research from 1995 to 2017. *Science of The Total Environment*. 14(1), 649. 31-49. DOI 10.1017/j.scitotenv.2018.08.223
- Moore, J. W. (2017). The Capitalocene, Part I: On the Nature and Origins of Our Ecological Crisis. *The Journal of Peasant Studies*, 44(3), 594-630. <https://doi.org/10.1080/03066150.2016.1235036>
- OECD (2014). Green Growth Indicators 2014, OECD Green Growth Studies, *OECD Publishing*, <http://dx.doi.org/10.1787/9789264202030-en>

- OECD (2023). *Database documentation*. OECD Green Growth Indicators.
- Paramati, S.R., Apergis, N. & Ummalla, M. (2017). Financing clean energy projects through domestic and foreign capital: The role of political cooperation among the EU, the G20 and OECD countries. *Energy Economics*, 6, 62-71. DOI: 10.1016/j.eneco.2016.11.001, <https://ideas.repec.org/a/eee/eneeco/v61y2017icp62-71.html>
- Paramati, S.R, Shahbaz, M & Alam, M.S. (2017). Does tourism degrade environmental quality? A comparative study of Eastern and Western European Union. *Transparent Environment*, 50, 1–13, <https://discovery.dundee.ac.uk/en/publications/does-tourism-degrade-environmental-quality-a-comparative-study-of>
- Rodrik, D. (2011). *The Globalization Paradox: Democracy and the Future of the World Economy*. W.W. Norton & Company.
- Rodrik, D. (2008). *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*. Princeton University Press.
- Udemba, E., Hasan G., Festus V.B. & Kirikkaleli, D. (2020). Economic performance of India amidst high CO2 emissions. *Sustainable Production and Consumption*, 27. 52-60, <https://doi.org/10.1016/j.spc.2020.10.024>
- Shahbaz, M., Topcu, B., Sümerli, S. & Vinh, V. X. (2021). The effect of financial development on renewable energy demand: The case of developing countries. *Renewable Energy*, 178, 1370-1380, <https://doi.org/10.1016/j.renene.2021.06.121>
- Solarin, S.A., Al-Mulali, U., Musah, I. & Ozturk, I. (2017). Investigating the pollution haven hypothesis in Ghana: An empirical investigation. *Energy. Elsevier*. Vol. 124(C), 706-719. <https://doi.org/10.1016/j.energy.2017.02.089>
- Suchikova, Y. & Nestorenko, T. (2017). Evaluation of Economic Efficiency of Renewable Energy Innovative Projects for Sustainable Development of Urban Ecosystems. *Economics and Management*. Vol. 13, Issue 2. pp 19-28. <http://em.swu.bg/images/SpisanieIkonomikaupload/FullText/em.2017.br.2.pdf>
- Tawiah, V., Zakari, A., & Adedoyin, F. F. (2021). Determinants of green growth in developed and developing countries. *Environmental Science and Pollution Research*. 28, 39227–39242. <https://doi.org/10.1007/s11356-021-13429-0>
- Waheed, R. Sarwar, S. & Wei, C. (2019). The survey of economic growth, energy consumption and carbon emission. *Energy Reports*, 5, 1103–1115. <https://doi.org/10.1016/j.egyr.2019.07.006>, [https://web.archive.org/web/20220626072429id\\_/https://www.econstor.eu/bitstream/10419/243655/1/1683551036.pdf](https://web.archive.org/web/20220626072429id_/https://www.econstor.eu/bitstream/10419/243655/1/1683551036.pdf)

- Wang, Q, Jiang XT, Ge S, Jiang R (2019) Is economic growth compatible with a reduction in CO2 emissions? Empirical analysis of the United States. *Resources Conservation and Recycling*, 151, 104443, DOI:10.1016/j.resconrec.2019.104443
- Xie, Q., Xu, X. & Liu, X. (2019). Is there an EKC between economic growth and smog pollution in China? New evidence from semiparametric spatial autoregressive models. *Journal of Cleaner Production*, 220, 873–883. DOI 10.1016/j.jclepro.2019.02.166
- Yörük, B. & Zaim, O. (2006). The Kuznets curve and the effect of international regulations on environmental efficiency. *Economics Bulletin*. 17 (1): 1-7. <https://ideas.repec.org/a/ebl/ecbull/eb-05q20008.html>

## THE IMPACT OF ENERGY CONSUMPTION ON ECONOMIC GROWTH IN ALGERIA (1983-2022)

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### **Abstract**

*This analytical and econometrical study aims to shed light on the impact of energy consumption on economic growth in Algeria, by using the Algerian data for each G.D.P. as an indicator of real economic growth, on the one hand, and the per capita energy consumption, on the other. We try to understand the evolution of G.D.P. This is to determine the extent of intervention in energy consumption to increase output from 1983 to 2022. Finally, applying econometric techniques starts with the Augmented Dickey-Fuller (A.D.F.) test for stationary, then the Johansen-Juselius cointegration and Granger causality test based on VECM. This paper's significant findings consist of a long-run relationship between G.D.P. and E.C. and a unidirectional causality relationship from E.C. to G.D.P. in both the short and long run; furthermore, in the long run, energy consumption positively influences economic growth in Algeria.*

**Keywords:** energy consumption; economic growth; causality; co-integration; Algeria.

**JEL Codes:** C41; C44; C62; O13.

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### **Introduction**

Energy has played and continues to play a significant role in economic development and the well-being of individuals and social groups worldwide. At the same time, access to energy is a subject of increasing concern to the international community since it is essential to the completion of any production process and, therefore, to a country's economic and social development. This means that economic growth simultaneously leads to growth in energy needs. Modern societies use more and more energy for industry, services, homes, and transport.

Furthermore, the direction of the relationship between energy consumption and economic growth remains a subject of debate; some research highlights the impact of energy consumption on economic growth, while another, on the contrary, highlights the

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impact of financial development on the level of energy consumption. Regardless, a link between the two phenomena remains established. In our case, we propose to study this link (in the case of Algeria) without priori indicating the direction of the link. In other words, we are interested in verifying whether there is a link between energy consumption and economic growth in Algeria. Hence, the central question of our work is:

**Is there a causal link between energy consumption and economic growth in Algeria?**

To answer the question, we formulated the following hypotheses:

- **Hypothesis 1:** Algeria has a unidirectional relationship between energy consumption and economic growth.
- **Hypothesis 2:** A bidirectional relationship exists between energy consumption and economic growth in Algeria.
- **Hypothesis 3:** There is no causal relationship between energy consumption and economic growth in Algeria.

To verify these hypotheses and carry out our work, we adopted a research methodology with a double methodological approach: an exploratory approach to the literature (initially) to identify the theoretical and empirical relationship between energy consumption and economic growth, to identify the variables and measures used to study this relationship and to highlight the evolution and trend of the two phenomena in the case of Algeria. A verification process (in a second step) consists of verifying (in the Algerian context) the existence or not of a relationship between the level of energy consumption and economic growth, i.e. to confirm or refute our hypotheses stated above. This second approach is based on statistical modelling.

**Definitions of energy**

The ability to work or produce heat is the general definition of energy, according to Subhes C. Bhattacharyya. Typically, heat is produced by burning a fuel, which is a material with intrinsic energy that produces heat when burned. Other methods of producing heat include absorbing solar radiation or heat from rocks underneath the earth's surface. (Subhes C., 2011).

Comparably, the ability (or potential) to perform work (referred to as potential energy, as in water held in a dam) or its manifestation in terms of conversion into motive power (referred to as kinetic energy, as in the case of wind or tidal wave) can be represented by the capacity to do work. Since energy is not always seen as it is, it is difficult to define the concept. In other words, systems require energy in order to operate ; that is, they need effort in order to produce an effect (Başkan Takaoğlu, 2024).

## **Energy typology**

Subhas C. Bhattacharyya confirms that energy can be obtained from various sources; it is customary to classify them under different categories as given below:

Primary energy is used to designate a source of energy extracted from a stock of natural resources or captured from a resource flow that has not undergone any transformation or conversion other than separation and cleaning (A.I.E. 2004). Examples include coal, crude oil, natural gas, solar energy, and nuclear energy.

Secondary energy is all the power obtained by transforming or converting a primary energy. Thus, petroleum products or electricity are secondary energies because they require refining or electrical generators to produce them. Electricity and heat can be obtained as primary and secondary energies.

### **Renewable and non-renewable energy**

- Renewable energy: energy is said to be renewable from a permanently renewed natural source, as opposed to non-renewable energy, whose stocks are depleting (Zohuri, Mossavar-Rahmani, & Behgounia, 2022).
- Nicknamed "clean energy" or "green energy", their exploitation generates very little waste and polluting emissions, but their energy power is much lower than that of non-renewable energies.
- **Non-renewable energy**: these are primary energies that cannot be reconstituted on a human time scale after their use. Oil, natural gas and coal are non-renewable energies (Awodumi & Adewuyi, 2020).
- Fossil fuels, which include coal, oil, and gas, and their origins in living, plant, or animal forms, contain carbon, the combustion of which provides energy and generates carbon dioxide. The amount of carbon in fossil energy is not a tiny proportion existing on earth.

### **Measures of economic growth**

- G.D.P., or Gross Domestic Product, measures the wealth created by a country in a year; that is, it indicates the value of a country's production of goods and services in a year (Biljana , 2023).
- G.D.P. is an aggregate that adds up the wealth created in the country by its productive agents. Thus, a company produces wealth at the microeconomic level, and G.D.P. measures the wealth created at the macroeconomic level by the entire country. Measuring growth through G.D.P. across countries allows for international and historical comparisons. However, G.D.P. has enormous

drawbacks that many economists denounce; this is why some suggest using other aggregates. It is measured by adding market G.D.P. and non-market G.D.P.

- Market G.D.P. covers all market production of companies established in a territory and the wealth created by their productive activity. Market production is production sold at a price covering at least the cost of production. It is, therefore, a production carried out by a production organization with a profit motive: financial or non-financial companies or companies.

On the other hand, endogenous growth theories consider growth as an economic phenomenon. Growth results from investments made by agents motivated by gain. The economy's growth rate is determined by the behaviour of agents and by macroeconomic variables. These different ways of presenting endogenous growth underline the new models' break with the neoclassical growth theory. The renewal of growth theories is based on the achievements of industrial economics, as was the case at the beginning of the 1980s with the renewal of international trade theories. It, in turn, sheds new light on the relationships between growth theory and cycle theory, or the problems of development, the main characteristics of endogenous growth: the presence of increasing returns to scale, the forms of competition which allow a decentralized balance, the sources of growth ( Ralle, 2003).

### **The Impact of Energy Consumption on Economic Growth.**

The increase in energy consumption is the effect of economic growth. Therefore, there is a double correlation between economic growth and energy consumption: a correlation over time (energy-consumed increases in parallel with production measured by G.D.P.) and a correlation in space (the most developed countries are also those with the highest energy consumption) (Warsame, Alasow, & Salad, 2024). According to an American study, the main obstacle to economic growth lies in the quantity of available energy (Honoré, 2014).

A study on the links between economic growth and the overall quantity of available energy, published in the journal "Biosciences", establishes a strong correlation between these two data globally and within a country (Sodik , et al., 2023). Given the importance of energy in the economy, countries with abundant energy resources are more privileged than other countries. They can be considered wealthy if they are exploited precisely and economically (Liuyi , Rui , & Xinran , 2022).

In developed countries, economic growth is sensitive to any variation in energy consumption. This could be attributed to the nature of the financial structure, where the industrial fabric is entirely developed and consumes too much energy (Nicholas M, 2023). Since these countries do not have significant reserves, satisfying this growing demand is

accompanied by foreign currency outflows to support energy supply expenses. Hence, they are called upon to follow an energy-saving policy that is much more effective. For this, several studies have been carried out in these countries (Oluyomi A, Afolabi , Martha , & Adekunle , 2020).

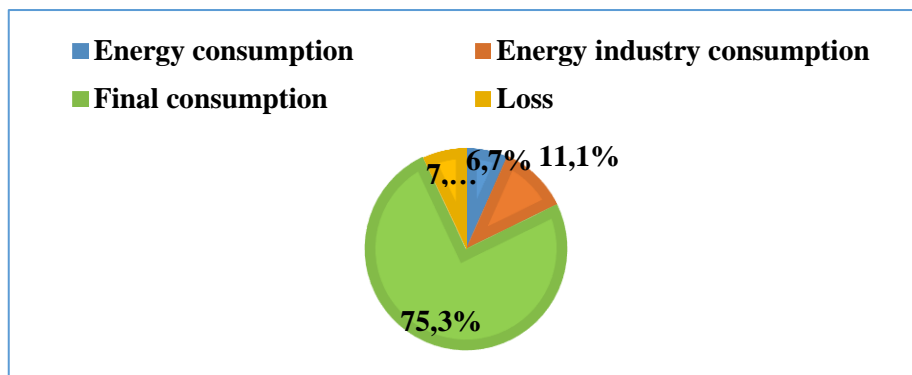
### **Evolution of national energy consumption by aggregates 1980-2019**

Overall energy consumption (including losses) is the sum of final consumption, non-energy consumption and that of energy industries, reaching 66902 KTEP (Ministry of Energy and Mines, National Energy Balance 2019).

According to the national energy balance for the year 2019, national energy consumption is taken into four groups, namely:

- Non-energy consumption (C.N.E.): indicates the quantities consumed as raw materials in the petrochemical and other industries.
- Consumption of energy industries (C.I.E.) concerns transformation units, transport infrastructures, and all energy products consumed in energy-producing industries.
- Final consumption (C.F.) concerns all energy products consumed by end users (industry, household, etc.).
- Overall consumption (C.G.): The three previous aggregates and losses during transport and distribution.

*Figure no. 1 Distribution of national energy consumption by aggregates for the year 2019*



Source: Ministry of Energy and Mines, National Energy Balances “2022”

The structure of national energy consumption remains dominated by the "final consumption" aggregate throughout 1980-2022 (according to the national energy balances of the Ministry of Energy and Mines). It reached 75.3% in 2022, followed by energy



industry consumption (11.1%), then losses at (7%), and finally non-energy consumption at (6.7%). We can illustrate the distribution of global energy consumption by aggregates for 2022 in (Figure 1).

Final consumption represents 75.3% of overall consumption, and it is essential and becomes a critical element that defines an indicator of driving forces and shows trends in final energy consumption. It aims to consider any initiative to reduce or rationalise energy consumption and improve energy efficiency for the various end users.

### Evolution of final energy consumption by form and sector:

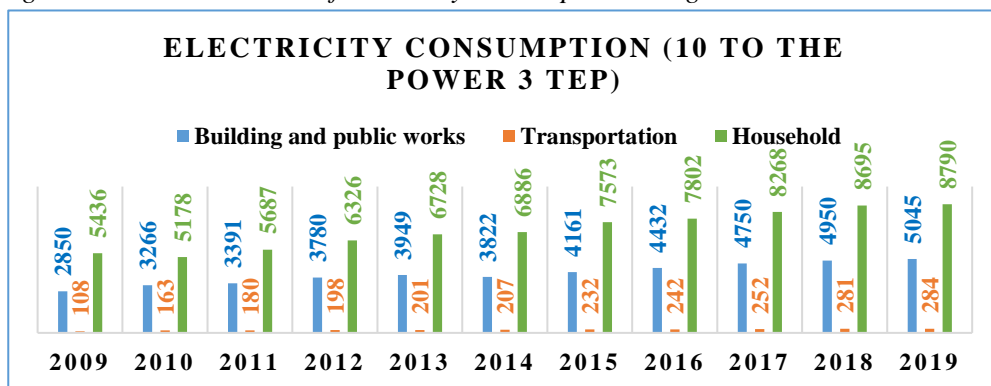
According to the Ministry of Energy and Mines, the 2019 national energy balance shows that final consumption is identified in three sectors. On the one hand, industry, construction and public works, then the transport sector and finally, the household and another consumer sector. Furthermore, Algeria's primary forms of energy are electricity, natural gas, petroleum products and finally liquefied (L.P.G.).

### Changes in electricity consumption by sector of activity between 1980-2022

Algeria is making enormous efforts to provide energy due to the growing need of citizens for electricity, and access is becoming a challenge for social and economic development.

For electricity, the installed capacity is 18,000MW until the end of 2022, and the coverage of the country by the electricity network is at a comfortable rate of 98% (according to the Ministry of Energy and Mines, the national energy balance of the year 2019, Algeria press service). And according to the public operator SONELGAZ, the total number of subscribers has reached nearly 10 million electricity customers.

Figure no. 2 The evolution of electricity consumption in Algeria between 2009 and 2019



Source: Ministry of Energy and Mines, National energy balances “2009 -2019”

According to the figure above (Figure No. 2), electricity consumption for the three sectors increased constantly between 2009 and 2018.

For the household sector and other consumers, the evolution of electrical energy consumption between 2009 and 2018 saw an increase from (5,436 KTEP) in 2009 to (8,790 KTEP) in 2019, with an increase of 161.69%.

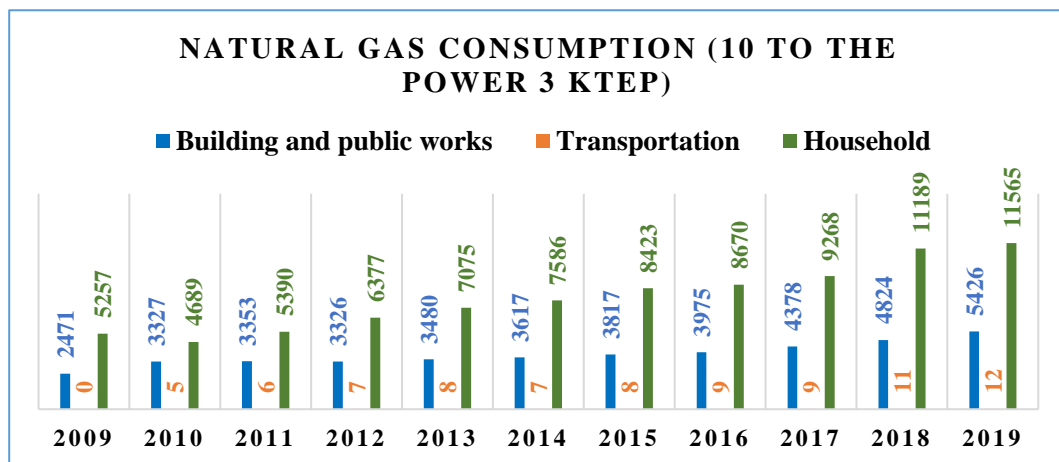
Meanwhile, for the industry, building and public works (I.BTP) sector, there was a perpetual increase of (177.01%) from 2009 to 2019, from (2,850 KTEP) to 5,045 KTEP) in 2019.

Concerning the transport sector, the evolution of electrical energy consumption increased by 262.96% from 2009 to 2019, with growth from 0.108 KTEE in 2009 to 0.284 KTOE in 2019.

### Evolution of natural gas consumption by sector of activity (C.G.N.)

Domestic consumption of natural gas began with the discovery of the HASSI R'MEL deposit (its commissioning in 1961), with an annual rate of approximately 140 million m3. (Khelifa, 2023). The public operator SONELGAZ announced that the total number of subscribers had passed 6 million customers for this type of energy (gas).

Figure no. 3 Natural gas consumption by sector of activity in Algeria between 2009-2019



Source: National energy balances of the Ministry of Energy and Mines “2009-2019”

According to the Ministry of Energy and Mines' national energy balances, the final consumption of natural gas during the period from 2009 to 2019 was constantly growing.

For the household sector and other consumers, the evolution of natural gas consumption notes a perpetual increase during 2009-2019, going from 5257 KTEP in 2009 to 11565 in 2019 with a growth of 45.45%.

Likewise, the consumption of natural gas in the industry, building and public works sector recorded growth of 45.56% during 2009 - 2019, compared to 2471 KTEP in 2009 and reached 5426 KTEP in 2018.

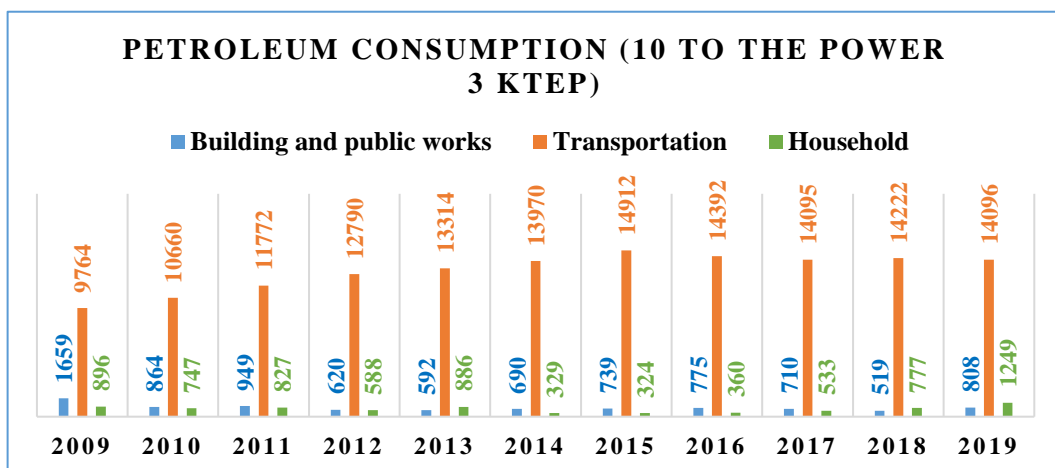
For the transport sector, natural gas consumption will start in 2010 with 0.005 KTEP to reach 0.012 KTEP in 2018 with an increase of 41.66%.

**Evolution of consumption of petroleum products by sector of activity during 2009-2019 (C.P.P):**

Algeria has markets for fuels and petroleum-derived products (gasoline, diesel, etc.), mainly owned by the public company NAFTAL, a subsidiary of the SONATRACH group.

According to (Figure No. 4) below, the consumption of petroleum products from 2009 to 2019 experienced a perpetual increase.

Figure no. 4 The evolution of the consumption of petroleum products by sector of activity



Source: Ministry of Energy and Mines, National energy balances “2009 – 2019”

For the industry, buildings and public works sector, the change in consumption of petroleum products for the period 2009-2018 decreased from 1.659 KTEP in 2009 to 0.808 KTEP in 2019, with a drop of 48.70%.

Concerning the transport sector, the evolution of consumption is not stable, with irregular increases or decreases; it experienced a rise of 9,764 KTEP in 2009 and reached 14,912 KTEP in 2015 and notes a reduction in 14,392KTOE in 2016, came 14,096 KTOE in 2019, while it recorded over the period "2009 -2019" a rate of 62.29%. For the household sector, the evolution of consumption is not stable with irregular increases or decreases.

## **Algerian Energy Policy**

We will present security and the choices of an energy policy, then the state of play of renewable energies, energy efficiency and the energy transition in Algeria. Finally, the link between hydrocarbon energy and economic growth in Algeria.

### **Security and choice of an energy policy**

Algeria has enormous potential for renewable and non-renewable energy resources, which it aspires to develop. It specifies the foundations and directions of its energy policy to develop the exploitation of different energy resources. The various sectoral consultation processes have led to the development of a global energy policy framework in Algeria, which shows the role of this sector in achieving the social and economic development of the country, while taking into account the challenges posed by the preservation of the environment and the trend towards investment in alternative energies to achieve energy efficiency (Mines, 2014).

The Algerian government has framed energy policy with a set of laws and legislation in line with the different orientations specified in its energy strategy to develop and regulate them, and they are as follows (Ghezloun, Oucher, & Chergui, 2012):

- Specify and set the conditions of the national energy management policy, which includes all measures and activities applied to rationalize the use of renewable energies by the environmental system.
- Achieve sustainable development and preserve non-renewable energy resources while meeting diverse national energy needs and improving productivity.
- Enhance oil and gas production by creating more industrial-added value and employment.
- The use of particular energy efficiency measures linked to devices that use electricity, gas and petroleum products with the realization of their thermal insulation process (Transition énergétique en Algérie, 2020).
- Promote and develop renewable energies to gradually reduce the national consumption of petroleum products, ensure the supply of the entire national territory with electricity and gas, and guarantee the best conditions of safety and quality.

### **National Energy Transition Program 2020 (PNTE)**

The energy transition is essential in the government's action plan, which focuses on "the triptych of economic renewal based on food security, the energy transition and the digital economy". The energy transition program aims, in addition to the diversification of energy sources through the development of renewable energies, to promote energy

efficiency as a complementary action of great importance (Dib, 2012). The country thus aims to gradually free itself from dependence on conventional resources and initiate a dynamic for the emergence of green and sustainable energy, available locally and in abundance, such as solar power. The approach is based on the following considerations:

- The preservation of fossil resources and their valorization;
- Sustainable development and environmental protection;
- Controlling the costs of creating renewable energy installations.

### **Regarding the development of renewable energies**

A program for developing renewable energies with a capacity of 16,000 MW by 2035, exclusively based on photovoltaic solar power, has been submitted as one of the centrepieces of the energy transition in Algeria, according to the Ministry of Energy. Thus, 15,000 MWp are intended to be produced exclusively by solar power plants connected to the national electricity network, of which a first tranche of 4,000 MWp is to be produced by 2024 while the remaining 1,000 MWp are to be deployed autonomously at horizon 2030 (Bouzmit, Pablo-Romero, & Sánchez-Braza, 2020).

On another level, hybridising electricity production based on conventional resources (diesel and gas) in the country's south with photovoltaic solar power was also presented as a priority for developing off-grid renewable energies (autonomous production).

### **Under the energy efficiency policy:**

The firm measures that the government plans to implement in terms of energy efficiency are aimed at drastically reducing waste. It was recommended to encourage this trend, the implementation of which, at the level of the different sectors of activity, will be focused on the following measures ((MEM), Mars 2011):

- The establishment of a national program for the conversion of tourist vehicles to LPGc and the development of C.N.G. for public transport vehicles;
- Equipping the public lighting network and the various buildings housing national administrative services with low-consumption devices;
- The establishment of a regulatory framework prohibiting the import and production of energy-consuming equipment.

### **The Evolution Between G.D.P., Hydrocarbon and HH GDP in Algeria**

The energy sector occupies a special place in the economy because it constitutes an essential source of wealth on which the Algerian economy depends mainly on the hydrocarbon sector, which contributes significantly to economic growth.

The increase in international oil and gas prices allows Algeria to enjoy a comfortable financial situation. Therefore, the Algerian economy is rentier, and economic growth is highly dependent on oil and gas prices. Today, this dependence is seen as a weakness because it remains dependent on international oil prices. In other words, the entire Algerian economy is subject to fluctuations in the oil and gas markets, as shown in the table and figures below.

*Table no. 1 - Comparative evolution between G.D.P, hydrocarbon and HH GDP in Algeria*

	<b>PIB</b>	<b>PIB H</b>	<b>PIB H%</b>	<b>PIB HH</b>	<b>PIB HH %</b>
<b>2011</b>	9968	3109,1	31,19	6858,9	68,81
<b>2012</b>	11991,6	4180,4	34,86	7811,2	65,14
<b>2013</b>	14588,5	5242,5	35,94	9434	64,68
<b>2014</b>	16208,7	5536,4	34,16	10672,3	85,84
<b>2015</b>	16643,8	4698	38,23	11675,8	70,15
<b>2016</b>	17205,1	4657,8	27,07	12547,3	72,93
<b>2017</b>	16712,7	3134,2	18,75	13578,4	81,25
<b>2018</b>	17504,6	3025,6	17,28	14489	82,77
<b>2019</b>	18575,8	3699,7	19,70	14876,1	80,10
<b>2020</b>	20259,9	4457,8	22	15711,3	75,55
<b>2021</b>	20284	3910,1	19,28	16374	80,72

*Source:* Based on data from the National Statistics Office (O.N.S.)

To eliminate the effect of the added value created by other sectors without that of hydrocarbons, we have broken down the G.D.P. into two parts: hydrocarbon G.D.P. (H G.D.P.) and non-hydrocarbon G.D.P. (HH GDP) with  $GDP = H\ GDP + HH\ GDP$

G.D.P. H: The added value created by the hydrocarbon sector depends on the quantity of oil exported and the prices set by the world oil market.

GDP HH: This is the added value created by the non-hydrocarbon sector (agriculture, investments, services, industries, etc.).

### **The link between hydrocarbon energy and economic growth in Algeria**

The relationship between energy consumption and economic growth is very close. Energy is an essential element of the economy and a significant factor of production. The energy sector in Algeria plays a central role in the country's economic development, and its mission is to ensure that energy needs are covered thanks to revenues from the exports of these hydrocarbons. Hydrocarbons alone represent 60 % of the budget and 98% of export revenues (Siouane, 2021).

Hydrocarbon production generated substantial revenues for the country between 1995 and 1998, reaching 60 billion DA of the state budget, or 18 to 20% of G.D.P. (Mondiale, 2008).

Two thousand two hydrocarbon exports totalled \$18 billion, while imports linked to sector operations stood at approximately \$2 billion. However, the extreme dependence of the State on these resources for four decades has determined three negative consequences, which structurally affect the entire economy. The first consequence is that the creation of industrial jobs could be higher due to low labour intensity in hydrocarbon production. The second consequence is that fluctuations in oil prices lead to significant volatility in the balance of payments, budgetary revenues, and the money supply, which is a considerable source of fragility for the economy as a whole. The third consequence is the rent, resulting from this hyper-profitable sector; it has allowed Algeria to have financial resources far superior to those of its neighbours, and this capacity continues to offer the country the financial means for rapid economic growth (Cherfi, 2010).

### **Econometric Study of the Impact of Energy Consumption on Economic Growth: Data on Algeria (1983-2022)**

To know the relationship between the variables of the phenomenon studied, it is necessary to determine the dependent variable and the different external variables explaining the standard phenomenon studied.

Dependent variable: The economic growth rate is expressed in current prices of the local currency, and we call it (G.D.P.)

Variables explained: Certain variables were identified to explain the standard phenomenon, the statistical data of which was available from the Economic Development Indicators and downloaded directly from the World Bank website ranging from 1983 to 2017, and updated until April 2022:

- Energy consumption (in KTEP per barrel), which we designate by the symbol (E.C.).
- Consumption of renewable energy (current prices in KTEP currency: thousand tonnes of oil equivalent), symbolized by the symbol (CERN).

Through this study, we also try to rely on the logarithmic model, which is considered one of the best models to address the problem of linearity between the variables of the study and the problem of variance. We can use the logarithmic model to calculate the elasticities linked to the variables of the time series studied.

$$GDP_t = C_0 + C_1 * EC_t + C_2 * CERN_t + \varepsilon_t$$

Knowing that:

$C_0$ ,  $C_1$ , and  $C_2$ : They express the model parameters and estimation using the least squares method, which is considered the best method for estimating the capabilities of standard models.

$\epsilon$ : It expresses the value of the random error resulting from measurement errors or from the calculation error of the standard model by neglecting certain external variables that we cannot sometimes measure, mainly qualitative variables such as adult governance, business climate, democracy and other variables that can explain the estimated model.

**Estimation of the model equation using Eviews. 12:**

*Table no. 2 - Estimation of the model equation*

Dependent Variable: <b>G.D.P.</b>					
Method: Least Squares					
Date: 06/09/21 Time: 09:19					
Sample: 1983 2022					
Included observations: 39					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	<b>C</b>	5,75-E+10	1,65E+10	3,478854-	0,0013
	<b>EC</b>	,4089641	359254,4	11,38369	0,0000
	<b>CERN</b>	1,43E+11	6,74E+10	2,119905	0,0410
	R-squared	0.806309		Mean dependent var	9.70E+10
	Adjusted R-squared	0.795548		S.D. dependent var	5.91E+10
	S.E. of regression	2.67E+10		Akaike info criterion	50.93089
	Sum squared resid	2.58E+22		Schwarz criterion	51.05885
	Log-likelihood	990.1523		Hannan-Quinn criteria.	50.97680
	F-statistic	74.93131		Durbin-Watson stat	0.479684
	Prob(F-statistic)	0.000000			

Source: Established by the student using Eviews software.12

According to the table above and the results of the estimation of the linear model, we can write the regression equation in the following form;

$$GDP = -57453074543.3 + 4089640.89815 * EC + 142970813548 * CERN$$

**Study the quality of the linear model**

**First - the economic study**

In the previous table relating to the outputs of the Eviews .12 program, we note that:

Regarding the coefficient of energy consumption (Ec), its sign is positive, i.e. there is a direct relationship between this variable and the level of economic growth, which is consistent with economic theory, i.e. an increase in the level of consumption would increase economic activity, according to the estimated equation, an increase in energy consumption of one unit would contribute to the level high economic growth 4089641 unit.

Concerning the renewable energy consumption coefficient (CERN), we note through the program outputs that its sign is positive, i.e. there is a positive relationship between this



variable and growth rates, which is consistent with economic theory because increasing the volume of renewable energy consumption by one unit would contribute to the increase in the volume of G.D.P. by 1.43E+11

## Second: the statistical study

### Significant study of the model

We test the overall significance of the estimated model using the coefficient of determination as well as the Fisher test through the following two hypotheses:

**H0:** The model is not appropriate (i.e. the external variables do not explain the phenomenon studied)

**H1:** The model is appropriate (i.e. the external variables explain the phenomenon studied)

First, we extract the tabular value corresponding to the Fisher statistic and compare it with the calculated one. The number of observations is 39 views.

Tabular value:  $F_{(n-k-1)} = F_{(39-2-1)} = F_{36}$

*Table no. 3 - Fisher test results*

	Au niveau de 1%	Au niveau de 5%	prob
$F_{tab}$	5,25	3,26	<b>0,0000</b>
$F_{cal}$	74,93131		

*Source:* Established by the student using Eviews software.12

The table makes it evident that, at the 1% and 5% levels, the value of the computed Fisher statistic is higher than the tabular Fisher's, or that ( $F_{cal} > F_{tab}$ ). As a result, we support the alternative hypothesis—that is, that the model is appropriate and that the examined external variables help to explain economic growth rates—and reject the null hypothesis.

The determination rate ( $R^2 = 0.80$ ), which is close to one, and this means that the independent variables explain 80% of the dependent variable (G.D.P.) and keep 20% for the other variables, which can explain the model except that it is Most of the time, these are qualitative variables that cannot be measured.

### The meaning of parameter testing

The following hypotheses about the estimated parameters are tested in order to determine the relevance of the estimated model parameters and the impact of the interpreted variables on the dependent variable:

$$H_0: C_0 = C_1 = C_2 = 0$$

$$H_1: C_0 \neq C_1 \neq C_2 \neq 0$$

The test (t-stat) results for the estimated model can be illustrated by the following table, in which we explain the calculated values for the estimated parameters and t tabular values, as well as the lowest probability level at a significance level of 5%. The tabular value of a statistic (t-stat) that we extract from a student table has the same meaning and

degree of freedom ( $np$ );  $n$  represents the number of observations, and  $p$  represents the number of estimated parameters of the model. It is equal to ( $np = 39 - 3 = 36$ ), and the following table explains it.

*Table no. 4 - Parameter testing*

	The settings	T Calculated	T Tabulated	T Tabulated	Prob
			At the 1% level	At the 5% level	
Constante	C0	-3,478	-4,219	-3,53	<b>0,0013</b>
Ec	C1	11,38	-4,219	-3,53	<b>0,0000</b>
CERN	C2	2,119	-4,219	-3,53	<b>0,0411</b>

*Source:* Established by myself using Eviews software.12

In the table above, we note the following:

- Regarding the coefficient of the constant variable (C0), we note that the calculated value is less than the tabular value, that is,  $T_{cal} \leq T_{tab}$  at all levels, and with this, we will accept  $H_0$  and reject the alternative hypothesis, that is to say that the constant I.S. is significant in the estimated model and with an error probability of 0.0013.
- Regarding the E.C. coefficient (C1), we note that the calculated value of the Student statistic is also lower than the tabular value, which means that the parameter (C1) is significant in the proposed model.
- Regarding the CERN coefficient (C2), we note that the calculated value of the Student statistic is also lower than the tabular value, which means that the parameter (C2) is significant in the proposed model.

### **Cointegration Model and Error Correction Model**

Cointegration analysis determines the actual relationship between the variables in the long term because the time series under study may not be stationary in the short term. Still, they become stationary in the long term, i.e., there is a stable relationship between them, called a cointegration relationship, and it reveals the problem of missing the Stability of the time series. The unit root test should be carried out initially. After proving the Stability and integrity of the time series to the same degree, we use the error correction model in the second stage because the second stage is only implemented if the Stability and integrity of the time series are proven. The same rating is by the Angel-Granger test, and there is another test related to the simultaneous integration model proposed by Johanssen, as it is considered better than the first test, especially when the sample size is small.

Regarding instability and integration of time series of the same order, i.e. there are integrated time series of order ( $I = 0$ ) and other integrated series of the first order ( $I = 1$ ). We must not use the two previous tests linked to the joint integration model. Whether for Granger or Johanssen, another test must be carried out in connection with the cointegration

test using the Limit Approach (ARDL), which is used in the case of unstable and incomplete time series of the same order, provided that the order of integration does not exceed the first degree (in other words, this test is only used for the degree of integration (I = 0) and (I = 1)).

After confirming the Stability of the time series of the study model variables, which are of the same degree, and then verifying that they are integrated synchronously (joint), it becomes clear that, according to one of the tests above, there is an equilibrium relationship in the long run between the dependent variable and the sum of the independent variables. Therefore, we must move on to the representation of the error correction model.

This model is estimated by adding the estimated one-year slowdown residuals into the short-run regression as a single-period slowdown independent variable alongside differences in other non-static variables as follows:

$$dGDP = C_0 + C_1dEC + C_2dCERN_t + E_{t-1} + \varepsilon_t$$

This mathematical form is called an error correction model because it considers the dynamics of the studied time series in the short and long term between the dependent and independent variables that explain the phenomenon studied. The emergence of (E<sub>t-1</sub>) in the above equation reflects the earlier assumption that the value of economic growth rates in the short run is not equal to its equilibrium value in the long run.

This partially corrects this imbalance in the short term, and here is the limiting coefficient of error correction, which is the parameter of modifying the fundamental values of the economic growth rates towards their equilibrium value from period to period because this parameter measures the percentage of imbalance in the Slowdown period (t-1) that is corrected or modified in period (t).

**Study of stationarity of time series using the Dickey-Fuller test** (Dickey & Fuller, 1981)

– **Series stationarity test (G.D.P.)**

**H<sub>0</sub>**: the series has a unit root; that is, it is unstable when  $T_{tab} < T_{cal}$

**H<sub>1</sub>**: the series does not contain a unit root, i.e. (the chain is stable)  $T_{tab} > T_{cal}$

*Table no. 5 - Stationarity of the series (GDP) as tested*

Series	At the level			At the 1st difference			Degree of stationarity
	Constant	Constant and trend	No one	Constant	Constant and trend	No one	
<b>GDP</b>	-0,65	-1,56	0,698	-5,51	-5,43	-5,39	I = (1)
<b>Prob</b>	0,84	0,78	0,86	0,0000	0,0004	0,000	

Source: Established by the student using Eviews software.12

### At the level:

Regarding the constant: the calculated student statistical value is greater than the tabular values at all critical levels (1%, 5%, 10%), and the corresponding probability is greater than the necessary values, it is, i.e.  $t_{tab} < t_{cal}$  and therefore we accept the null hypothesis, i.e. the G.D.P. series has a modulus root and thus is not stationary at the level ( $I = 0$ ).

For the constant and the trend, we note that the calculated Student statistic is greater than the tabular value at all levels, and the corresponding probability is also more significant than the critical values (1%, 5%, 10%), that is to say,  $t_{tab} < t_{cal}$ . We, therefore, accept the null hypothesis, that is to say, that the G.D.P. series has a unit root and thus does not stabilize at the level (grade  $I = 0$ ).

Compared to without the constant and the direction:  $t_{tab} < t_{cal}$ , and therefore, we accept the null hypothesis, that is to say, that the G.D.P. series has a unit root and thus does not stabilize at the level (degree  $I = 0$ ). We test this series in the first teams using the same test, as noted:

### At the first difference:

Regarding the constant, we notice that the Student statistic is lower than the tabular value at critical values (1%, 5%, 10%), and the corresponding probability is lower than 1%, 5%, and 10%. Hence, we reject the null hypothesis and accept the alternative hypothesis, i.e. this series contains neither root nor unit and is, therefore, stationary to the first degree ( $I = 1$ ).

Concerning the constant and the trend, we note that  $t_{tab} > t_{cal}$  is at 5% and 10%, and the corresponding probability is lower than all the critical values. Therefore, the series does not contain a unit root, which makes it stationary at the first difference.

Concerning the absence of constant and the trend: We note that the Student statistic is lower than all critical values, and the corresponding probability is lower than 1%, 5%, and 10%, and we, therefore, accept the alternative hypothesis, which is that the series does not contain a unit root, which makes it stationary at the first rank.

Stationarity test of the series (E.C.): We test the same previous hypotheses to determine the degree of Stability of the energy consumption series.

Table no. 6 - Chain stability (EC) according to the ADF test

Series	At the level			At the 1st difference			Degree of stationarity
	Constant	Constant and trend	No one	Constant	Constant and trend	No one	
EC	2,53	0,35	6,78	-5,47	-6,82	-0,67	I = (1)
Prob	1,000	0,99	1,000	0,0001	0,0000	0,41	

Source: Established by the student using Eviews software.12

It is clear from the results of the standard program that this series is not stationary at the level since the statistical values of the calculated student are higher than the table at all critical levels (1%, 5%, 10%), in particular for the first and third model, and the corresponding probability for each of the constants only. In other words, this series is of type D.S. without deviation, and the first difference is the best way to make it stationary.

But when performing the test at the first difference, it was noticed that the series is stationary in the first degree, since the statistical values of a student are significant, since their value was less than the tabular values at all critical values, in addition to the corresponding probability was much lower than these critical values, which makes us reject the null hypothesis We accept the alternative hypothesis that the energy consumption does not contain a root and a unit in both the constant and the trend, or set. Therefore, this series is stationary in the first row.

**• Stationarity test of the series (CERN)**

We test the Stability of this series through the two previous hypotheses linked to the null hypothesis and the alternative hypothesis; the results are presented in the following table:

*Table no. 7 - Stationarity of the series (CERN) according to the A.D.F. test*

La série	At the level			At the 1st difference			Degree of stationarity Constant
	Constant	Constant and trend	No one	Constant	Constant and trend	No one	
<b>CERN</b>	-3,46	-4,12	-2,84	-11,15	-3,438	-1,578	I= 1
<b>Prob</b>	0,0146	0,0125	0,0057	0,0000	0,0620	0,1065	

Source: Established by the student using Eviews software.12

It is clear from the results of the estimated program that this series is stationary at the level since the value corresponding to the student's statistic is more significant than all critical values. The probability of errors for this series is greater than the necessary values, which makes the null hypothesis acceptable, meaning that this series contains a unit root. Therefore, it is stationary at the level and stabilizes when the first differences are made in the three models.

**Cointegration Test Using the Johansen Method.**

This test is considered better than the two-step co-integration test for Angel–Granger (Johansen & Juselius, 1990), (Engle & Granger, 1987), especially when the sample size is small. After our study of the stationarity of the studied time series, which we have found stabilizes in the first degree; we determine the optimal degree of delay using Eviews.12.

According to the known Akaike (Akaike, 1974) and Schwarz (AS) standard norms, the optimal delay period is  $p = 1$ , as shown in the table below.

*Table no. 8 - Extraction of the degree of delay according to the Akaike and Schwarz standards*

Lag	LogL	LR	FPE	AIC	SC	HQ
<b>0</b>	-1257,085	NA	5,07e+26	70,00472	70,13668	70,05078
<b>1</b>	<b>-1143,366</b>	<b>202,1669*</b>	<b>1,51e+24</b>	<b>64,18700</b>	<b>64,71484*</b>	<b>64,37123*</b>
<b>2</b>	-1133,473	15,93935	1,46e+24*	64,13737*	65,06109	64,45977
<b>3</b>	-1129,210	6,157157	1,95e+24	64,40056	65,72015	64,86113

*Source:* Established by the student using Eviews software.12

Most criteria, including Akaike and Schwarz, demonstrate the degree of delay or delay is 1. This is a necessary condition for performing the Johansen test, and the following table highlights the co-integration relationship with its use.

### Johansen test

*Table no. 9 - Johansen Test*

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0,490664	37,08976	24,27596	0,0007
At most 1	0,246527	<b>12,12778</b>	<b>12,32090</b>	<b>0,0538</b>
At most 2	0,043731	1,654491	4,129906	0,2329
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0,05 Critical Value	Prob.**
None *	0,490664	24,96198	17,79730	0,0035
<b>At most 1</b>	<b>0,246527</b>	<b>10,47329</b>	<b>11,22480</b>	<b>0,0676</b>
At most 2	0,043731	1,654491	4,129906	0,2329

*Source:* Established by ourselves using Eviews software.12

Thanks to the outputs of the software used, it becomes clear that the results of the impact test of the null hypothesis that the number of cointegration vectors is less than or equal to  $R$  since the value of the most excellent calculated probability is greater than the tabular value of the first row, i.e.  $12,12 < 12,32$  and hence we reject the null hypothesis. We accept the alternative hypothesis to have a relationship of mutual complementarity over the long term. Therefore, it can be said that there is a typical cointegration relationship between the studied variables, and this is shown by testing the effect in the second row,

where  $10,47 < 11,22$ . Therefore, we accept the second null hypothesis that there is only one covariance relationship, i.e.  $R = 1$

Selecting the maximum characteristic value, Max tests the null hypothesis that the number of isometric vectors is  $R = 1$  instead of the alternative hypothesis that it is equal to  $r + 1$  (Because  $10,47 < 11,22$ ).

### Error Correction Model (VECM)

After verifying the existence of a Co co-integration relationship between the studied variables, it must push the error correction model because it studies the possibility of the existence of the Co co-integration relationship in the short term, which takes into account the value of the errors slowed down by one period. For reference, the residual series (U) station arises at the level after the test of two unit roots, confirming the existence of a co-relation integration between the estimated variables.

To formulate the error model, which indicates the existence of a short-term equilibrium relationship, we delay the series by the remainder of a period by the following equation:  $dGDP_t = C_0 + C_1 dEC_t + C_2 dCERN_t + \gamma U_{(-1)}$

Table no. 10 - Error correction model (VECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2,34E+09	3,64E+09	0,643594	0,5242
DEC	686952,3	1944397,	0,353298	0,7260
DCERN	1,43E+10	4,26E+10	0,336600	0,7385
U(-1)	<b>-0,075847</b>	0,116808	-0,649327	0,5205
R-squared	0,014281	Mean dependent var		3,08E+09
Adjusted R-squared	-0,072694	S.D. dependent var		1,53E+10
S.E. of regression	1.59E+10	Akaike info criterion		49.91501
Sum squared resid	8.58E+21	Schwarz criterion		50.08738
Log-likelihood	-944.3851	Hannan-Quinn criteria.		49.97634
F-statistic	0.164198	Durbin-Watson stat		1.804736
Prob(F-statistic)	0.919735			

Source: Established by ourselves using Eviews software.12

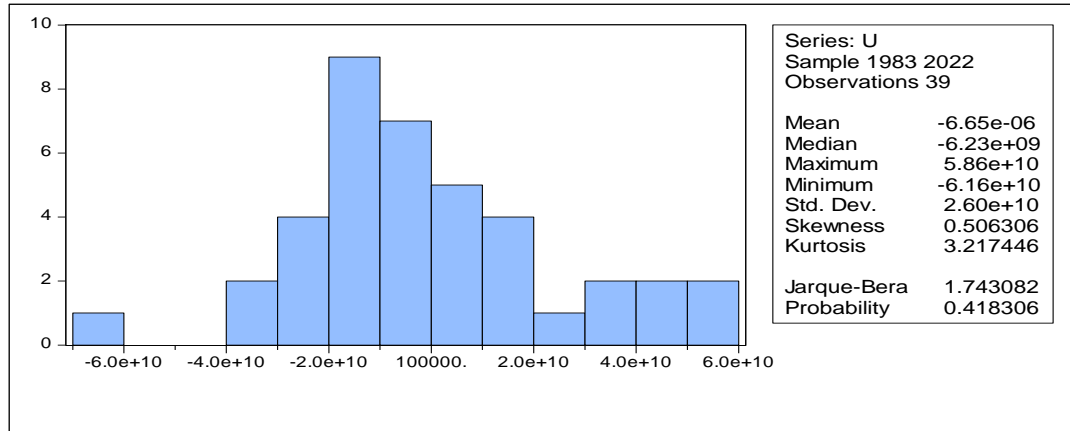
The table shows that the error term's value is negative and equal to  $(-0,0758)$ , and the negative sign is explained by proving the existence of the long-term equilibrium relationship between the variables studied, as mentioned above. This parameter reflects the speed of adaptation of the model to move from short-term imbalances to long-term equilibrium, where the value of the error correction limit factor indicates that the G.D.P. rate as the dependent variable is adjusted towards its equilibrium value in each period,

which is equivalent to 7.58 %, which means that when it deviates from its equilibrium value, the G.D.P. rate in the short period (t-1) equivalent of 7.58% is corrected in period (t). The positive sign for energy and renewable energy consumption is also noted, which is consistent with economic theory.

*Some tests on the residual series*

A- Test of the normal distribution of the residual series: the figure below shows the form of the normal distribution that the series of residuals takes, with a probability more significant than the critical value, i.e.  $0,41 > 0,05$  which proves that the residual series is naturally distributed

*Figure no. 5 Test of the normal distribution*



Source: Established by myself using Eviews software.12

**Test for heterogeneity of variance**

The table below shows the ARCH test for the heterogeneity of variance problem. All probabilities associated with the Fisher statistic and the coefficient of determination are more significant than the critical values, proving the consistency of variance uniformity.

*Table no. 11 – ARCH Test*

<b>Heteroskedasticity Test: ARCH</b>			
F-statistic	11,73027	Prob. F(1,36)	<b>0,3216</b>
Obs*R-squared	9.338941	Prob. Chi-Square(1)	<b>0.4322</b>

Source: Established by myself using Eviews software.12

**Conclusion**

The most important part of this research work is that I studied the causal relationship between energy consumption and economic growth in Algeria from 1983 to 2022. Starting



with the specification of the lag length and the stationarity of the series. Applying the Dickey-Fuller test showed that the first difference series is stationary. Concluding with the application of VECM-based cointegration and Granger causality, it was found that unidirectional causality runs from E.C. to G.D.P. in both the long and short term. Based on the results of this study, the overall recommendation is to prioritize an increase in energy efficiency through technological development and the use of cleaner production resources.

Statistical modelling is considered the most critical part of verifying the existence or not of a relationship between the variables. These two processes were based on applying empirical studies using the Augmented Dickey-Fuller (A.D.F.) test to test stationarity, then Johansen-Juselius cointegration and the Granger causality test based on the VECM test to study the relationship between energy consumption, economic growth in Algeria in 1983 - 2022. Several conclusions were drawn, and they are as follows:

Determination of the degrees of delay: the specification of the degree of delay  $P$  is an important practical question. To this end, the optimal shift degrees for the variables are chosen based on the Akaike and Schwarz information criteria. According to this rule, the optimization of the Akaike and Schwarz criteria admits several  $P^* = 1$ . This is a necessary condition for performing the Johansen test.

Stationarity Test: After determining the degree of delay, the first step is to implement the augmented Dickey-Fuller test. The results indicate that all series are non-stationary levels and are generally D.S. On the other hand, the A.D.F. statistics in the first differentiation suggest that they are stationary.

Johansen cointegration test: After implementing the augmented Dickey-Fuller test, the next step is to check the running relationship between all variables. The cointegration results confirm that energy consumption (E.C.), economic growth (G.D.P.), and renewable energy consumption (CERN) are cointegrated, and there is a cointegration vector ( $r$ ) in the long term.

## REFERENCES

- (MEM), mr. d. (2011). *Renewable energy and energy efficiency program*. Algeria.
- Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions on Automatic Control*, 19(6), 716-723. doi:10.1109/TAC.1974.1100705
- Awodumi, O., & Adewuyi, A. (2020). The role of non-renewable energy consumption in economic growth and carbon emission: Evidence from oil producing economies in Africa. *Energy Strategy Reviews*, 27. doi:https://doi.org/10.1016/j.esr.2019.100434

- Başkan T., Z. (2024). Understanding the concept of energy through definitions, drawings, and metaphors. *The Journal of Educational Research*, 117(1), 27-38. doi:<https://doi.org/10.1080/00220671.2024.2308150>
- Biljana , T. (2023). Analysis of the inflation and economic growth in the republic of north Macedonia and republic of Bulgaria . *Entrepreneurship*, 11(1), 79-97. doi:[10.37708/ep.swu.v11i1.7](https://doi.org/10.37708/ep.swu.v11i1.7)
- Bouznit, M., Pablo-Romero, M., & Sánchez-Braza, A. (2020). Measures to Promote Renewable Energy for Electricity Generation in Algeria. *Sustainability* , 12(4). doi:<https://doi.org/10.3390/su12041468>
- Cherfi , S. (2010). The Energy future of Algeria: What would be the prospects for consumption, production and export of oil and gas in Algeria by 2020-2030? *Managerial economic research Journal*, 4(1), 14-34. Récupéré sur <https://www.asjp.cerist.dz/en/article/38953>
- Dib, D. (2012). Renewable Energy And Energy Efficiency Program In Algeria(Investigation and Perspective). *7th International Conference and Exhibition On Ecological Vehicles And Renewable Energies*. France. Récupéré sur <http://www.evermonaco.com/fr/accueil.php>
- Dickey, D., & Fuller, W. (1981). Likelihood ratio statistics for Autoregressive time series with a Unit Root. *Econometrica*, 49(4), 1057-1072. doi:[10.2307/1912517](https://doi.org/10.2307/1912517)
- Energy transition in Algeria. (2020). *CEREFÉ Review*, 46-69, [https://www.cerefe.gov.dz/wp-content/uploads/2022/02/Rapport\\_CEREFÉ\\_TE-2020-4.pdf](https://www.cerefe.gov.dz/wp-content/uploads/2022/02/Rapport_CEREFÉ_TE-2020-4.pdf)
- Engle, R. F., & Granger, C. W. (1987). Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*(55), 251-276. doi:<http://dx.doi.org/10.2307/1913236>
- Ghezloun, A., Oucher, N., & Chergui, S. (2012). Energy Policy in the Context of Sustainable Development: Case of Algeria and Tunisia. *Energy Procedia*, 18, 53-60. doi:<https://doi.org/10.1016/j.egypro.2012.05.017>
- Honoré, A. (2014). Analysis of the impact of electrical energy on economic growth, p 2. Bujumbura.
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and interference on cointegration with application to the demand for money. *Oxford bull. Econ.statis*(52), 169-210. doi:<https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x>
- Khelifa, H. (2023). Determination of Algeria Natural Gas export: Using a vector correction Model (VECM). *Economics and Management*, 10(2), 1-14. doi:[10.37708/em.swu.v20i2.1](https://doi.org/10.37708/em.swu.v20i2.1)
- Liuyi , D., Rui , J., & Xinran , W. (2022). Relationship between Economic Growth and Energy Consumption from the Perspective of Sustainable Development. *J Environ Public Health*, 2022. doi:[10.1155/2022/6884273](https://doi.org/10.1155/2022/6884273)
- Mines, M. d. (2014). *Energy balance*. Algeria.
- Mondiale, B. (2008). *Algerian economy*. Wagshinton.

- Nicholas M, O. (2023). A symmetric impact of energy consumption on economic growth in South Africa: New evidence from disaggregated data. *Energy Nexus*, 9. doi:<https://doi.org/10.1016/j.nexus.2023.100174>
- Oluyomi A, O., Afolabi , O., Martha , A., & Adekunle , O. (2020). The Impact of Energy Consumption and Economic Growth on Carbon Dioxide Emissions. *Sustainability* , 12(19). doi:<https://doi.org/10.3390/su12197965>
- Ralle, D.G. (2003). *The new theories of growth*, 5th ed., Paris, 2003, p39 (5th ed.). Paris.
- Siouane, Z. (2021, June 18). Energy policy: what strategy for Algeria. Retrieved from <https://www.algerie360.com/>
- Sodik , D., Nur , W., Suharno , S., Arintoko , A., Herman , S., & Lilis , S. (2023). The Effect of Energy Consumption and Renewable Energy on Economic Growth in Indonesia. *International Journal of Energy Economics and Policy*, 13(1). doi: <https://doi.org/10.32479/ijeeep.13684>
- Subhes C., B. (2011). *Energy Economics Concepts, Issues, Markets and Governance*. London.
- Warsame, A., Alasow, A., & Salad, M. (2024). Energy consumption and economic growth nexus in Somalia : an empirical evidence from nonlinear ARDL technique. *International Journal of Sustainable Energy*, 43(1). doi:<https://doi.org/10.1080/14786451.2023.2287780>
- Zohuri, B., Mossavar-Rahmani, F., & Behgounia, F. (2022). Knowledge is Power in Four Dimensions: Models to Forecast Future Paradigm, With Artificial Intelligence Integration in Energy and Other Use Cases. Dans *Renewable energy* (pp. 423-463). doi:<https://doi.org/10.1016/B978-0-323-95112-8.00014-3>

## **COST AND REVENUE DYNAMICS OF CLINICAL TRIALS IN STATE-OWNED HOSPITALS (2019-2022)**

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### **Abstract**

**Objective:** The object of the article is to overview the cost and revenue dynamics of clinical trials conducted in state-owned hospitals. **Material and methods:** We have created a unique database of clinical trials from public registers of competent authorities. Our overview is based on the protocol content of 550 clinical trials conducted in 62 Bulgarian state-owned hospitals (a total 1,297 medical sites) in the period from 2019 to 2022. **Results:** In the new reality, reduced budget and declined state funding, the attitudes of state-owned hospitals are shifted to the benefits of clinical trials. The primary motive for state-owned hospitals to conduct clinical trials is not revenue, but rather access to new pharmaceutical products and treatment methods.

**Keywords:** Bulgaria; trial sites; cost-benefit analysis; health care market

**JEL Codes:** D61; H51; I11

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### **Introduction**

There is no universally correct answer to how much it cost to research and develop a new pharmaceutical product (Schlander et al., 2021, p. 1243). Yuleva's opinion is that innovations are a guaranteed positive change for society, especially when we talk about novelties in pharmaceuticals and pharmaceutical products (Yuleva, 2019a). Most of the reachable research is the product of a trade-off between the transparency and public accessibility of data and their specificity. Despite these challenges, fresh data reveals the value of the global clinical trials market at USD 80.7 billion (Kanhere, 2023) and forecasts world revenue for the clinical trial market to exceed USD 4.10 billion.

Clinical trials add social and fiscal values through access to new therapeutic treatments and investment in new pharmaceutical products (Rickwood, Pereira, and Gómez, 2022). Regardless of the declared goal of adding social value to public goods, the

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data indicate that the healthcare sector's priority is mainly on financial performance. According to Yuleva, this can be explained as a process - evident that the first step in the process is to establish the possibilities of the pre-order, the second step is to choose a strategy for the use of the opportunities already established, and the third is to manage the results of their use (Yuleva, 2019b). While social value receives due academic attention (Filipova, 2023, p. 58), there is a deficit of research on fiscal value due to its specific interdisciplinary nature (Kyurova, 2022, p. 7). We will try to add value to the healthcare sector by providing an overview of cost and revenue dynamics in conducting clinical trials.

The aim of our paper is carrying out an evidence-informed overview by systematically and scientifically collecting, combining and evaluating multiple reliable sources of information, including the best available and most relevant evidence from research and/or data, as a step towards improving policy and practice in clinical trials. Therefore, the term 'evidence-informed' better describes our overview than the term 'evidence-based'.

### **Objective**

Hospitals in Bulgaria are located in accordance with the administrative division of the country, as well as with the distribution of natural resources. At the end of 2022, 341 hospitals with 54,707 hospital beds were reported. The number of hospitals remains unchanged and a slight increase in hospital beds is reported (less than one percent per year, according to the new reality of hospitalization due to the COVID-19 pandemic).

The number of state-owned hospitals in Bulgaria is 62 enterprises (112 entities, including subsidiaries and medical centers). Their number has not changed, with the exception of two cases – the re-registration of Lozenets University Hospital as a state-owned hospital (2019) and Sveta Sofia Pulmonary Hospital is acquired by Sveti Ivan Rilski University Hospital (2022). One state-owned hospital, Specialized Hospitals for Rehabilitation-National Complex, is a special case as it is a holding group of 13 rehabilitation subsidiaries located in localities with natural resources (mineral springs, healing mud and healthy climate).

### **Material and Methods**

We have selected sources that are publicly available and regularly updated. First, we have formed a set of clinical trials that are authorized to be conducted in Bulgaria by the competent authority – the Bulgarian Drug Agency. Second, we have extracted the protocol items for each clinical trial according to the structure of the European Union Clinical Trials Register. Third, we have calculated financial data from the annual reports of state-owned hospitals provided by the Public Enterprises and Control Agency. Fourth, we have

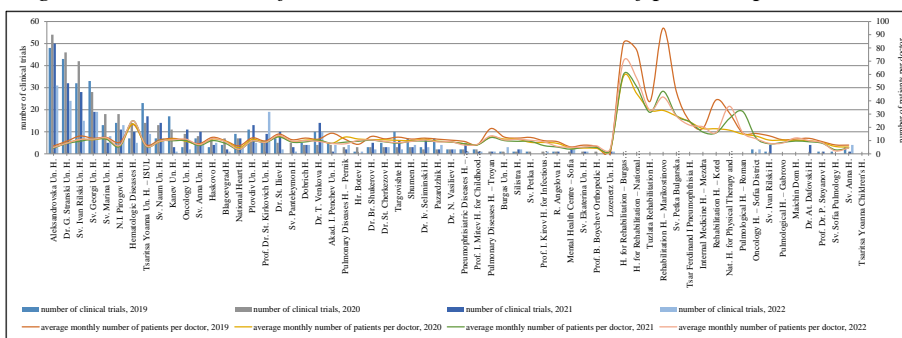
supplemented the medical and statistical data of state-owned hospitals from the Ministry of Health. Fifth, we have used aggregated data on the macroeconomic development of Bulgaria for the period of 2019-2022 of the National Statistical Institute.

Based on these criteria, we have created database of clinical trial protocols conducted in state-owned hospitals – 550 clinical trials at 1,297 medical sites in 62 state-owned hospitals. The database is unique, universal and pioneering. The collected information is systematised for sponsors and investigators, competent authorities and entities in the development of a competitive strategy at the micro and macro level. Our data are suitable for studying the future trend of clinical trials as well as for comparative analysis for other countries.

## Results

Over a third to a half of all clinical trials are conducted in state-owned hospitals and their medical sites. The decline in both the number of clinical trials and the participation of state-owned hospitals in clinical trials applies to general state-owned hospitals (Figure 1). Clinical trials in four state-owned hospitals (Aleksandrovska University Hospital, Dr. G. Stranski University Hospital, Sveti Ivan Rilski University Hospital, and Sveti Georgi University Hospital) represent 40% of the number of all clinical trials.

Figure no. 1 Number of clinical trials\* and number of patients per doctor\*\*



Source: \* – Register of Authorised Clinical Trials by Bulgarian Drug Agency, \*\* – Ministry of Health

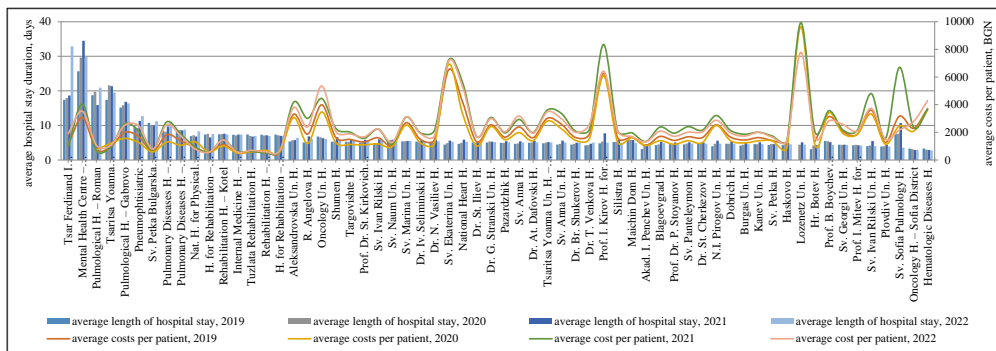
At the head of the number of clinical trials are general hospitals with 100% state ownership, followed by general hospitals with minority shareholders and speciality hospitals, finally – rehabilitation hospitals with zero clinical trials. The hospitals are arranged in reverse order when presenting the average monthly number of patients per

doctor – the leading ones are rehabilitation hospitals, followed by the speciality ones, and finally, the general hospitals.

The average monthly number of patients per doctor decreased by 25% in 2020 and remained unchanged, with an increase in the number of autonomous medical centres and private hospitals, as well as a decrease in patient admissions due to the COVID-19 pandemic. With the largest number of patients per doctor are rehabilitation hospitals that do not conduct clinical trials. Some speciality hospitals belong to this group, a large number of patients per doctor and a relatively small number of clinical trials (Maichin Dom Hospital, Sveta Sofia Pulmonary Hospital, Oncology Hospital – Sofia District, Mental Health Centre – Sofia, Professor I. Kirov Hospital for Infectious and Parasitic Diseases, Professor I. Mitev Hospital for Childhood Diseases).

The decrease in the number of clinical trials has been accompanied by an increase in the average length of stay (Figure 2). Speciality hospitals and rehabilitation hospitals have the longest length of stay (7-34 days). In pulmonary hospitals, the length of stay is 12-15 days, and in only one hospital the length of stay is doubled from 17 days to 33 days (Tsar Ferdinand I Pneumophthisia Hospital). In general hospitals, the average length of stay of one patient is 4-6 days, regardless of the pandemic reality.

Figure no. 2 Cost per patient and hospital length of stay



Source: Ministry of Health

Average length of stay is inversely related to average cost per patient. In addition to longer length of stay, speciality hospitals are also characterized by lower average cost per patient (Table 1). In three state-owned hospitals, the average cost per patient for a hospital stay of 4-5 days exceeds the annual cost for a person (Sveta Ekaterina University Hospital, Prof. I. Kirov Hospital for Infectious and Parasitic Diseases, and Lozenetz University Hospital). The amount of hospital stay exceeds the cost per capita on health – BGN 2,564 (Mitkova and Petrova, 2021, 9).

Table no. 1 - Cost per patient for a hospital stay and annual cost for a person, BGN

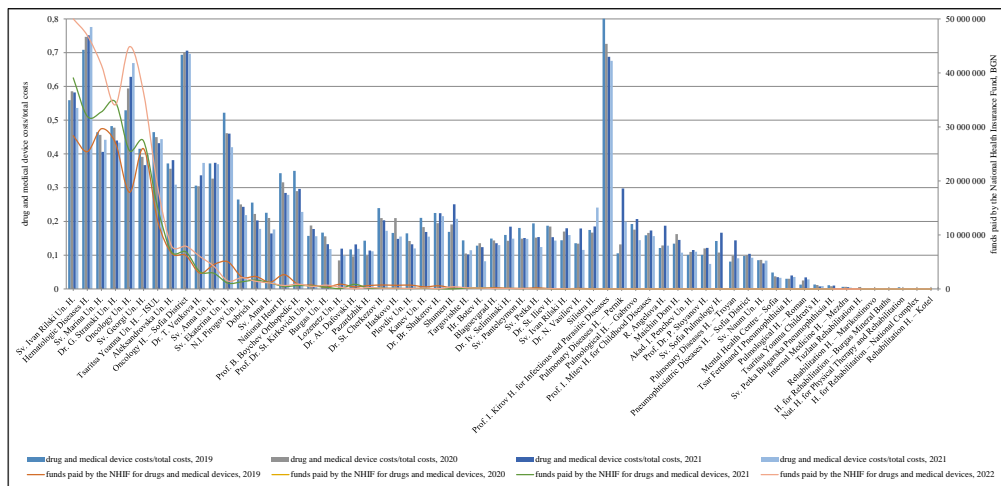
Cost	2019	2020	2021	2022
cost per patient for a hospital stay of 4-5 days*	6 397	8 273	8 502	8 574
annual cost for a person**	6 214	6 220	7 042	8 389

Source: \* - annual reports of state-owned hospitals, Public Enterprises and Control Agency and \*\* - National Statistical Institute

Three hospitals with the highest number of clinical trials had a consistent average length of stay of 5 days, with average costs per patient increasing by 15%.

Average length of stay and average cost per patient reflect other medico-statistics data of state-owned hospitals. For example, in three hospitals, the cost of pharmaceutical products and medical devices exceeded 50% of all costs (Figure 3). The specialization of these hospitals in oncology and haematology explains both the high percentage of cost on pharmaceutical products and medical devices, as well as the large amounts paid for pharmaceutical products and medical devices by the core source of funding – the National Health Insurance Fund.

Figure no. 3 Pharmaceutical products and medical device cost/total cost\* and funds paid by the National Health Insurance Fund for pharmaceutical products and medical devices\*\*



Source: \* – annual reports of state-owned hospitals, Public Enterprises and Control Agency.  
 \*\* – Ministry of Health

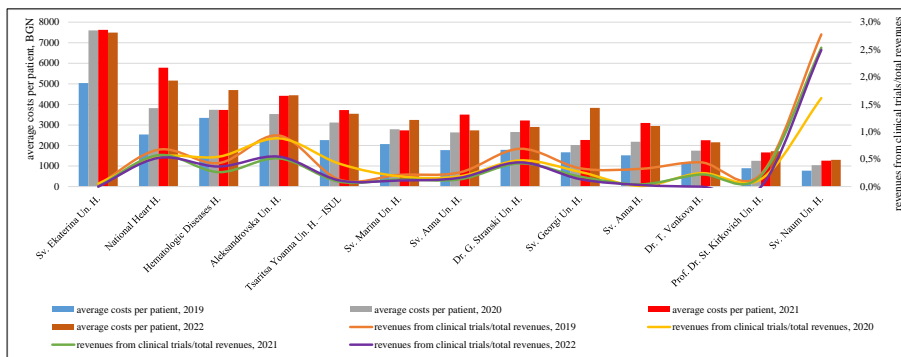
Hospitals with the highest number of clinical trials have an average of 40% pharmaceutical products and medical device cost/total cost. These hospitals received



disproportionately high funds paid by the National Health Insurance Fund for pharmaceutical products and medical devices – funds received increased by 75% during the COVID-19 pandemic.

The financial performance of state-owned hospitals is on a downward trend – cost per patient is increasing and revenue from clinical trials is decreasing. General state-owned hospitals report better results for cost per patient than specialty state-owned hospitals (Figure 4). Clinical trial revenue is higher for specialty state-owned hospitals, where trial and pharmaceutical product cost are higher, than in general state-owned hospitals.

Figure no. 4 Cost per patient and revenue from clinical trials



Source: annual reports of state-owned hospitals, Public Enterprises and Control Agency

Our overview found a higher level of disclosure of clinical trial revenue from hospitals that are wholly state-owned (specialty hospitals) compared to hospitals with minority shareholders (general hospitals). Different practices have been established in the reporting of clinical trial revenue. For example, revenue from clinical trials is reported as an additional fee – ‘ethics commission and clinical trial fees’ (Tsaritsa Yoanna University Hospital – ISUL EAD, 2023), as well as other revenue ‘payment for documentation review, incl. for clinical trials’ (Dr. Georgi Stranski University Hospital EAD, 2020). In another case, revenue from clinical trials is reported as combined fees: ‘clinical trials and related fees for administrative document review’ (Sv. Anna University Hospital EAD, 2021).

## Conclusion

General state-owned hospitals have a higher number of clinical trials than speciality hospitals. Speciality state-owned hospitals report higher cost per patient and revenue from clinical trials. There is no evidence that revenue is the primary motive for state-owned hospitals to conduct clinical trials. The motive is rather intangible – access to innovative

pharmaceutical products and treatment methods in search of safety and efficacy (preferences to health, not wealth).

The number of clinical trials, the cost of pharmaceutical products and medical devices/total cost, the average cost per patient, as well as the funds paid by the National Health Insurance Fund for pharmaceutical products and medical devices do not affect the revenue from clinical trials/total revenue. A lack of correlation between medical and financial data may mean that an individual doctor or team is conducting the clinical trial but not on behalf of the hospital itself, or that the clinical trial is not being reported as a part of the hospital's R&D.

The conclusion is drawn that the leading factor for the number of clinical trials and for the revenue from clinical trials is the hospital's specialization in certain diseases, as well as the provision of the hospital with doctors and medical devices for conducting clinical trials. The COVID-19 pandemic has shifted the dynamics of clinical trials, shifting the burden of health care to hospitals and diseases that are not subject to restrictions on both visitor accesses policy and doctor-patient contacts.

## REFERENCES

- Dr. Georgi Stranski University Hospital EAD. (2020). *Annual report for 2019*. Pleven.
- Filipova, M. (2023). Influence of corporate culture on social enterprise. *Entrepreneurship*, 11 (2), 58-69. DOI: 10.37708/ep.swu.v11i2.5.
- Kanhere, M. (2023). *Clinical trials market report 2024*. Chicago: Cognitive Market Research.
- Kyurova A. (2022). The digital transformation and its impact on small and medium-sized enterprises. *Entrepreneurship*, 10 (1), 7-18. DOI: 10.37708/ep.swu.v10i1.1.
- Mitkova, Z. & Petrova, G. (2021). Analysis of the household and healthcare system expenditures in Bulgaria. *Frontiers in Public Health*, 9:675277. DOI: 10.3389/fpubh.2021.675277.
- Rickwood, S., Pereira, F., & Gómez, C. (2022). *Attracting investment in clinical development*. IQVIA.
- Schlander, M., Hernandez-Villafuerte, K., Cheng, CY, Mestre-Ferrandiz, J. & Baumann, M. (2021). How much does it cost to research and develop a new drug? *A systematic review and assessment*. *Pharmacoeconomics*, 39(11), 1243-1269. DOI: 10.1007/s40273-021-01065-y.
- Sv. Anna University Hospital EAD. (2021). *Annual financial report for 2020*. Sofia.
- Tsaritsa Yoanna University Hospital – ISUL EAD. (2023). *Annual report for 2022*. Sofia. <https://www.researchgate.net/institution/University-Hospital-Tsaritsa-Yoanna-ISUL>

Yuleva, R. (2019a). State and development of theoretical knowledge about innovation. *Economics and Management*. 17 (2), 157-166.  
<http://em.swu.bg/images/SpisanieIkonomikaupload/Spisanieikonomika2019/STATE%20AND%20DEVELOPMENT%20OF%20THEORETICAL%20KNOWLEDGE.pdf>

Yuleva, R. (2019b). Competitive advantages and competitive strategies of small and medium-sized enterprises. *Economics and Management*, 17 (1), 71-81.  
<http://em.swu.bg/images/SpisanieIkonomikaupload/Spisanieikonomika2019/COMPETITIVE%20ADVANTAGES%20AND%20COMPETITIVE%20STRATEGIES%20OF.pdf>

## **DYNAMICS AND CHALLENGES OF FAMILY BUSINESSES IN ALGERIA: A MULTIDISCIPLINARY ANALYSIS OF THE LITERATURE (2008-2023)**

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### ***Abstract***

*This paper presents a systematic review and critical analysis of the literature on the dynamics and challenges of family businesses in Algeria from 2008 to 2023. Over 150 publications were identified through searches of significant databases, covering definitions, characteristics, succession processes, governance, performance, growth, internationalization, entrepreneurship, innovation, and perspectives related to Algerian family firms. The research provided critical conceptual foundations and empirical insights but often remained siloed without fully integrated, dynamic, or comparative perspectives.*

*The review is structured around six thematic areas. Within each, critical contributions and limitations of prior work are examined in depth. The synthesis shows that initial studies established conceptual bases, but constraints like small samples, isolated case studies, and compartmentalized methodologies limited generalizability. In the future, more cross-sectional, longitudinal, multi-sited research combining heterogeneous data and disciplines is needed to develop a comprehensive, actionable understanding of family business realities in Algeria.*

**Keywords:** *Algerian family businesses; succession; governance; performance; growth; internationalization; transmission processes; family influence.*

**JEL Codes :** *L29, L22, R11, R58*

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### **Introduction**

Over the last fifteen years, family businesses have become an essential area of study in management sciences in Algeria. Indeed, many researchers have sought to understand these organizations and their key aspects better.

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The work carried out aimed to clarify the specificities of this type of business in the Algerian context and its economic and social role. Various themes, such as governance, intergenerational transmission, internationalization, or managerial challenges related to growth, have been explored.

Their significant weight explains this research's enthusiasm for Algerian family businesses (AFBs) in the national economic fabric. Indeed, according to some estimates, they would represent up to 90% of companies in Algeria and would strongly contribute to job creation Ifourah (2015). Beyond their economic role, AFBs also have social and cultural importance due to their societal impacts on many communities. While many studies have enriched knowledge of AFBs in recent years, they often remain compartmentalized around a single theme or specific context.

Therefore, it is necessary to examine the evolution of the knowledge produced since the early 2000s and to analyze to what extent the literature has been able to adopt a systemic and integrative approach to the issues concerning AFBs. How has the research been organized around major thematic areas to apprehend the multidimensional reality of these companies? What have been the main advances at the conceptual and methodological level? In what ways do the identified limitations open up new perspectives for analysis? This article will answer these questions by critically reviewing the literature between 2008 and 2023. The objective is to draw up an inventory of the knowledge produced during this defining period by looking at its evolution at the thematic and methodological levels. We conducted a systematic literature review in the main scientific databases to rigorously analyze the evolution of research on Algerian family businesses between 2008 and 2023.

To adopt a systemic and integrative approach to issues related to AFBs, we will rely on a cross-analysis articulating the thematic areas identified following our literature review (characteristics of AFBs, transmission, governance, internationalization, and innovation). We conducted a systematic literature review in the leading scientific databases using the keywords "family business," "Algeria," "transmission," "governance," and "internationalization" to identify all articles, theses, communications, and books addressing these themes. The EBSCO, ScienceDirect, and CAIRN databases were explored, thus covering the fields of management sciences, economics, and management.

To be included, references had to analyze the Algerian case exclusively or comparatively, adopting a family business-specific approach. Temporal (2008-2023) and linguistic (French and English) inclusion criteria were applied.

## **1. Characteristics and Specificities**

### *1.1. Definitions*

The definitions adopted to understand the specificities of Algerian family businesses are essential to understanding their characteristics and evolutions. On this subject, Moumou's (2016a) work presents a key conceptual framework. According to this author, a family business is characterized by "the desire to pass the business on to future generations, control of ownership and direction by a single family."

This definition highlights determining aspects such as the intention of perpetuation through intergenerational transmission and the convergence between family ownership and leadership. It aligns with the dimensions that Klein et al. (2005) highlighted in their "F-PEC" scale to measure family influence within companies. These authors consider the degree of family influence, the incidence of family ownership, and the level of family member commitment as key defining elements (Klein et al., 2005). For its part, El Houmaïdi (2007) pioneered the crucial question of intergenerational succession within Algerian family businesses, a determining element in identifying and perpetuating these organizations over time.

These approaches favor an inclusive vision of the family beyond blood ties, encompassing all stakeholders united by a shared sense of belonging (Chrisman et al., 2005). They allow for the complex family dynamics at work to be grasped. However, more recent works also invite a finer understanding of integrating aspects such as gender or consideration of intra-family conflicts (Lassassi and Hammouda, 2009; Merzouk and Abeddo, 2015).

This critical review of the main definitions from all these significant references, covering over fifteen years of scientific production, makes it possible to embrace the complexity of the socio-economic phenomena inherent to the family dynamics at work within these singular organizations in the Algerian context. It thus provides an essential initial systemic understanding for the future comprehension of the issues addressed in this research.

### *1.2. Economic and social role of algerian family businesses.*

The economic and social role of Algerian family businesses (AFBs) has been addressed in several foundational studies. Moumou (2016a) conducted an initial quantitative analysis on a sample of 120AFBs, making it possible to highlight their significant economic contribution in terms of jobs and added value. However, the narrow definition adopted of the family, limited to the parental nucleus, probably underestimates their real impact (Moumou, 2016a).

Through a qualitative approach, Grari's (2014) work emphasized the importance of AFBs in local development dynamics, mainly through job creation. Nevertheless, the methodological weakness of this study in terms of external validity limits the generalizability of the results (Grari, 2014). For this part, Ifourah (2015) conducted a comparative analysis with SMEs in developed countries, showing the underestimated role of Algerian AFBs, where societal impacts, such as women's employment, are often poorly understood.

Furthermore, some authors have highlighted the renewal of family values as a driving force for development (Hall, Melin & Nordqvist, 2001) and the importance of human and social capital in performance (Zellweger, Eddleston & Kellermanns, 2012). In this context, a better consideration of gender (Lassassi & Hammouda, 2009) and broader societal impacts are needed to accurately understand the territorial anchoring of AFBs.

In conclusion, while pioneering work has quantitatively and qualitatively documented the economic and social role of AFBs, efforts remain to refine the understanding of the mechanisms at work by integrating more systemic dimensions. An expanded conceptualization of the family and societal impacts appears necessary to fully understand these singular organizations.

### *1.3. Impact of the family on Algerian family businesses.*

Research on the impact of the family on AFBs highlights both the contributions and inherent tensions of this close link (Gedajlovic et al., 2012). Thus, Acherchour and Boukrif (2018) highlighted the dual objective pursued by AFBs through the grouping of family businesses: strengthening competitiveness while maintaining family control. However, their analysis only considers the positive aspects of cognitive and affective governance without exploring the potential sources of conflict between family and performance.

Indeed, Zemirli and Hammache (2018) emphasized the constraints that the Algerian entrepreneurial context represents for the emergence of new generations of entrepreneurs, notably due to resistance linked to maintaining family power. Moreover, several authors have highlighted the inherent tensions in combining family and managerial dimensions (Gedajlovic et al., 2012). Thus, while some Algerian research has rightly underscored the family dimension's contributions to cognitive and affective governance Acherchour and Boukrif (2018), they need to sufficiently consider potential tensions between family and performance.

In conclusion, analyzing the family's impact on AFBs requires adopting a systemic approach that integrates the contributions and sources of intrinsic conflicts by combining family, managerial, and ownership dimensions. This more balanced perspective would

enable a better understanding of the mechanisms at work within these singular organizations.

#### *1.4. Case studies of Algerian family businesses.*

Several case studies of Algerian family businesses have been conducted to apprehend their internal functioning in detail (Salaouatchi et al., 2019; Kherraf, 2022). Thus, the emblematic case of NCA Rouiba has been the subject of in-depth analyses of its governance from a managerial and family perspective (Salaouatchi et al., 2019; Kherraf, 2022; Gheddache et al., 2016; Belabbas and Hadji, 2015). This work highlights the richness of the family and managerial context that could be reconstructed thanks to the company's archives over several generations. However, generalizing the conclusions remains challenging due to the unique nature of this case. Moreover, potential family conflicts are not addressed. Other case studies are available but often focus on a specific issue such as governance (Gheddache et al., 2016). Thus, qualitative research using multiple case studies would complement analyzing similarities and differences between Algerian family businesses and integrating the dimension of social conflicts.

The case studies on Algerian family businesses provide valuable insights into their internal operations. However, their scope remains limited due to their unique and isolated nature. Indeed, while the in-depth case study allows for an understanding of the long-term family, historical, and managerial context specific to each business, it only allows the results to be generalized to some of the fabric of Algerian family businesses. However, this type of business is far from homogeneous and experiences diverse situations depending on sectors of activity, business sizes, involved family generations, etc. In addition, single case studies tend to minimize family tensions and conflicts for confidentiality purposes. It is appropriate to multiply case studies to apprehend this heterogeneity. A comparative qualitative methodology between several companies would highlight similarities and differences in governance models, transmission, human resource management, or stakeholder relations.

This methodological triangulation on diverse terrains would contribute to a more systemic and representative understanding of the complex reality of Algerian family businesses while further integrating the perspective of potential conflicts. Thus, it constitutes a promising avenue of research to deepen knowledge of this major entrepreneurial fabric.



## **2. Transmission and Succession**

### *2.1. Issues of transmission.*

Transmission is a major issue for family businesses on economic, managerial, and emotional levels (De Massis et al., 2018). The pioneering work of Sharma et al. (2001) helped conceptualize satisfaction in the succession process as planned behavior depending on organizational, environmental, and individual factors.

In the Algerian context, Tessa and Gheddache (2010) explored the perceptions of potential ceding parties and highlighted the importance of preserving the business and maintaining its family identity. However, these studies pay little attention to individual family members' aspirations (El Houmaidi, 2007). Yet, considering these subjective factors seems crucial to ensuring everyone's commitment to entrepreneurial continuity (Hall et al., 2001).

Moreover, this work laid the foundations for a systemic conceptualization of transmission issues without fully operationally developing them. Thus, questions remain about articulating succession at the business level and the professional mobility of individuals who compose it (Kotlar et al., 2013). Therefore, a better understanding of each perception and its evolution is necessary to grasp the underlying human challenges to AFB sustainability.

In summary, while pioneering work-established bases for conceptualizing transmission's economic and identity issues, some aspects still need to be deepened to understand the underlying human problems. Indeed, if organizational and strategic implications for the business are beginning to be identified, understanding subjective issues such as individual family members' aspirations remains partial. Understanding each perception and motivation, as well as their evolution over time, seems essential to ensuring the buy-in of all human stakeholders in a systemic succession process. Research efforts should continue to accurately grasp the underlying emotional and psychological dimensions of such a determining issue for family business continuity.

### *2.2. The transmission process*

The transmission process represents a crucial step in ensuring the sustainability of family businesses (Sharma et al., 2003). Sharma and colleagues' work helped conceptualize transmission as planned behavior influenced by organizational, environmental, and individual factors. Their qualitative approach laid the foundations for a systemic understanding of the phenomenon.

In the Algerian context, Gheddache (2022) provides significant insights through the longitudinal study of the Cevital Group. His work demonstrates the complexity of the

process in light of the financial and strategic issues related to the company's structure. However, a multi-case analysis would help strengthen the external validity of the results (Cabrera-Suárez et al., 2001). Indeed, while the qualitative methodology adopted offers detail, the limited sample somewhat reduces generalization.

Furthermore, research on the transmission process needs to pay more attention to its cultural and psychosocial determinants (Sharma et al., 2014). Yet, a better understanding of subjective factors and their evolution over time could help the support of entrepreneurial families (Hall et al., 2001). Efforts are still needed to refine the systemic conceptualization initiated by integrating more qualitative dimensions.

There remains a need to understand better the dynamics of the determinants in play, whether cultural, psychosocial, or subjective. A better understanding of the evolution of these factors influencing representations within the family could help operationalize models.

Qualitative longitudinal multi-site research is necessary to refine systemic modeling and illuminate supporting transmission processes in the Algerian context.

### *2.3. Choice of successor*

The choice of successor represents a crucial decision for the future of the family business (Le Breton-Miller et al., 2004). Several cognitive and emotional factors are at play in this complex process (Lambrecht, 2005).

In the Algerian context, the work of Moulaï and Boukrif (2018) made it possible to identify the main determinants family leaders consider in the choice of successor. Managerial competence comes first, ahead of more subjective criteria such as loyalty or trust. However, themes such as gender or individual candidates' motivations remain little explored.

Moreover, Taleb's (2015) case study of a family SME in the Wilaya of Tizi Ouzou reveals the complexity of the underlying family issues. According to a systemic approach, the choice of successor results from complex interactions between rational and emotional, formal and informal dimensions. A comparison between members of the same family, integrating their profiles and personal visions, could enrich existing modeling.

A qualitative analysis comparing the perceptions and motivations of candidates within the same family would help refine understanding of the underlying issues. In addition, methodological triangulation seems necessary to consolidate the validity of current results, often limited by restrictive methods.

Longitudinal multi-site case studies, combining various approaches, would contribute to a more contextualized and dynamic modeling of the determinants of the choice of successor.

Therefore, a better, fine-tuned understanding of the various factors influencing the representations and behaviors of family actors is crucial to operationalizing conceptual models developed so far on this strategic issue in an objective and personalized manner.

### **3. Governance and performance**

#### *3.1. Specificities of governance in Algerian family businesses*

The governance of family businesses has specific characteristics, as evidenced by the work of Berrone et al. (2012) and Gomez-Mejia et al. (2007). Indeed, these studies helped conceptualize the critical notion of "socio-emotional wealth" to account for non-financial aspirations that guide strategic decision-making within family organizations. Salaouatchi et al.'s (2019) research on the emblematic case of NCA Rouiba illustrated this specificity in the Algerian context.

These authors highlighted the influence of emotional dimensions linked to heritage and perpetuation of the family dynasty, which is reflected in particular by a strong attachment to the historic shareholders' decision-making autonomy. However, as Toumi Amara (2019) rightly points out, consideration of Islamic values such as ethics or community solidarity is also a significant determinant of the functioning of many Algerian AFBs.

#### *3.2. Impacts of family governance on the performance of Algerian family businesses*

Many studies have examined the links between family governance and performance within family businesses. According to Miller et al. (2011), performance depends mainly on the company's status (family or non-family) and the degree of family control, with an inverted U-shaped relationship. This complex relationship was illustrated in the Algerian context by Rassoul (2018), who showed through the use of financial ratios that the method of financing influenced the sustainability of family businesses.

However, this work remains correlational and does not establish a causal link. Through a qualitative approach, Abbès (2020) helped better understand Algerian family leaders' perception of corporate social responsibility. Nevertheless, this study considers only one dimension of governance, among others. Elsewhere, Molly et al. (2010) showed by analyzing Belgian and Dutch companies that succession positively impacted financial structure and operational performance. Diversifying methodologies to consolidate these results in the Algerian context would now be appropriate.

The studies suggest a potential influence of family governance on the performance of Algerian family businesses. However, this work remains preliminary and deserves to be consolidated. Indeed, the methodologies used remain mainly quantitative or qualitative without combining the two approaches, thus limiting the internal and external validity of

the results. In addition, the samples considered remain small, only sometimes allowing generalization to the entire fabric of Algerian family businesses.

There is now a need to diversify the observed performance indicators beyond simple accounting measures of profitability to appreciate performance in its multiple economic, managerial, and social facets. In-depth qualitative studies also help better understand the underlying mechanisms of causal links, in particular by considering the complexity of family-business interactions. Finally, large-scale quantitative research combined with qualitative interviews would provide complementary insights to significantly advance knowledge on this central issue for Algeria's economic fabric.

According to Atanasova (2021), strategic planning is crucial for the performance of entrepreneurial small and medium-sized enterprises. She states that "enterprises in that category, regardless of their size, will achieve higher results if their activities are guided by strategic planning documents." The author highlights the numerous benefits of rigorous strategic planning, including setting clear directions, managing risks/opportunities, optimally allocating resources, enhancing competitiveness, and improving financial and economic performance.

Consequently, the adoption of a robust strategic planning approach by Algerian family businesses could be a critical success factor in supporting their success and longevity, enabling them to more effectively address the challenges they face in a competitive and uncertain environment.

### *3.3. Impacts of family governance on the growth of Algerian family businesses*

Several studies have looked at the links between family governance and growth within family businesses. Zahra (2005) showed that family businesses' entrepreneurial behavior determined their ability to take risks and achieve sustainable growth. However, this author did not study the Algerian context.

In the Algerian context, Moumou (2016a) analyzed the family business' financial policy and its impact on growth. Moreover, Kerzabi and Saidani (2009) studied the size of Algerian SMEs by explaining it through transaction costs. While these studies helped identify specific levers, they did not consider the dimension of family governance. More recently, Habba et al. (2021) developed a macroeconomic model integrating cultural and strategic variables to evaluate the influence of family governance on the performance and growth of listed African family businesses.

In the same perspective, Medjaher and Salmi (2021) focused in their in-depth case study of Biscuiterie de La Soummam on the determinants and obstacles linked to the growth of a high-performing Algerian family business. While informative, this single case still needs to allow generalizable conclusions to be drawn. Thus, while some work has

established promising relationships in the Algerian case, validating an integrative model remains to be pursued better to understand the influence of family governance on growth.

Research on the link between family governance and the growth of AFB is promising but preliminary. Some have identified vital variables such as entrepreneurial behavior and financial policy. Nevertheless, efforts are needed to develop an integrative model combining quantitative and qualitative approaches on large samples. The aim will be to consolidate the relationships highlighted and refine the understanding of the underlying causal mechanisms to support better the growth of these major players in the national economy.

### *3.4. Audit and Control*

Audit and control are key elements of family business governance (Oudjedi Damerdjji et al., 2017). According to Lassassi and Hammouda (2009), family labor is often used in support functions such as internal audits, raising questions about the independence and objectivity of these audits.

Oudjedi Damerdjji et al. (2017) developed a framework for analyzing the internal audit process in Algerian family businesses. Their qualitative study with managers helped identify the main stages of the audit, from planning to reporting. However, the authors note that perceptions remain at the formal level and that there is a need to allow for observation of actual audit and control practices.

More fundamentally, Lassassi and Hammouda (2009) emphasize that family labor in support functions can compromise the independence necessary for a high-quality audit. Indeed, family ties are likely to affect the objectivity of family internal auditors. It is, therefore, essential to examine how to reconcile the employment of family members and the ethical requirements of an audit by standards.

Research on auditing and control in Algerian family businesses remains in its early stages. While they have identified the main steps in the audit process according to managerial perceptions, they neglect to directly observe actual practices in the field, which alone would make it possible to evaluate the exact quality of control systems. Moreover, the frequent use of family labor for these functions raises crucial questions about the independence and objectivity required, which deserve in-depth empirical investigation.

## **4. Internationalization of AFB**

### *4.1. Determinants and obstacles to internationalization*

There is abundant research on the determinants and obstacles to the internationalization of Algerian family businesses between 2008 and 2023. Fernández and Nieto (2006, 2005) are among the first to identify certain critical factors of

internationalization according to the national context, notably the role of the degree of family ownership. In the Algerian case, Moumou (2016b) corroborates these results by showing that shareholder structure is both a driving force and a brake for family SMEs seeking to develop internationally.

This research was then deepened. Assyakh and Messaoudi (2023) propose a dynamic analysis of the process, revealing the importance of making strategic changes while preserving a certain cultural continuity specific to family values. This identity dimension, already highlighted by Lee (2006) and Koironen (2002), takes on a particular dimension in the North African context where tradition and modernity must be reconciled. Future research could explore qualitatively the identity tensions experienced by companies wishing to meet new markets.

This state-of-the-art shows the growing interest in the internationalization dynamics of Algerian AFBs. Recent research emphasizes cognitive and cultural dimensions, such as the influence of family identity and its values on strategic choices. Assyakh and Messaoudi (2023) emphasize the need to make changes while preserving a certain cultural continuity, which can generate tensions. These aspects deserve to be studied qualitatively and longitudinally to understand better their evolution, as well as through comparative analyses between internationalized and non-internationalized AFBs. This theme represents a promising avenue of research to understand all the factors involved in this complex process comprehensively.

#### *4.2. Product Policies*

Several studies have examined the product policies of internationalized Algerian family businesses between 2008 and 2023. Lee (2006) and Koironen (2002) highlighted the importance of family values in defining these policies. Indeed, the cultural identity specific to the family strongly influences choices regarding the range of products marketed abroad.

This identity dimension takes on whole meaning in the Algerian context, where tradition and modernity must be reconciled during the internationalization process, as Ettahri and Amsidder (2021) emphasized in their theoretical study of the socio-emotional wealth of Algerian family businesses. Through in-depth case analysis, Haidara and Iambeondrazana (2021) particularly well illustrate this tension by tracing the path of the Candia Algérie company.

Research on internationalized AFB product policies needs to be centered on a few case studies, limiting the generalizability of conclusions. However, as suggested by Lee (2006) and Koironen (2002), a comparative approach between several companies would better capture the diversity of contexts. In addition, a dynamic perspective is needed to

analyze the evolution of these policies over time under the influence of internal and external factors. This theme, therefore, offers further avenues for qualitative deepening through multiple case studies or longitudinal analyses to enhance knowledge of the international strategies of these players.

#### *4.3. Qualitative analysis of Algerian family businesses: case studies*

The work of Boutifour and Miraoui (2015) presents the case of ECFERAL, a successful example of an employee management buyout in Algeria between 2003 and 2011. According to the authors, this management buyout operation enabled the company to cope with the economic difficulties of the period while preserving jobs.

The authors trace the critical steps of the buyout process and success factors through in-depth qualitative research based on stakeholder interviews and internal document analysis. They notably highlight the decisive role of the employee buyer in defining a diversification strategy focused on products and international markets. This bold entrepreneurial policy enabled ECFERAL to become an exemplary case of successful buyout and solid growth in the Algerian market.

This case concretely illustrates the internationalization factors of family businesses identified by Fernández and Nieto (2006), such as the leader's family dimension and entrepreneurial dynamism. It also helps understand the corporate buyout mechanism proposed theoretically by Boutifour (2014). However, analysis of other examples of successful Algerian buyouts would further enrich the understanding of this phenomenon.

## **5. Entrepreneurial dynamics and Innovation**

### *5.1. Evolution of entrepreneurship*

The literature has documented the evolution of family entrepreneurship in Algeria between 2008 and 2023. Initially, the founding work of Hall et al. (2001) on the role of cultural context in the evolution of family entrepreneurship was adapted to the Algerian case by Moumou (2016b). These authors showed that traditional cultural values have long influenced the conservative nature of family entrepreneurship in Algeria.

However, several recent studies have highlighted the gradual dynamism of the Algerian entrepreneurial ecosystem. Thus, Oukaci and Achouche (2020) identified a significant increase in business creation over the period 2008-2018, indicating a greater appetite for entrepreneurial risk. Similarly, Moumou (2016a) observes a diversification of sectors invested by new family businesses, denoting an openness to innovation.

This evolution should be put into perspective with the cultural changes in Algerian society identified by Carsrud and Brännback (2011), with a new generation more inclined to autonomy and initiative. However, as emphasized by Abdellah and Hachemi (2023),

barriers persist, such as a lack of financing and the weight of family traditions. Thus, while notable progress has been made, Algeria's entrepreneurial dynamic remains constrained.

A notable recent evolution is the increasing role of Algerian universities in stimulating student entrepreneurship and innovation through specific initiatives. As highlighted by Belgoum and Benessalah (2023) in their study on the Start-up/Patent degree initiative in Algeria, universities play a crucial role in creating an enabling environment (training programs, agreements with companies, workshops, competitions, financing, etc.) that encourages and supports students from various specialties in creating innovative start-ups, thus obtaining highly satisfactory results in terms of student entrepreneurial involvement.

This section shows that while research has documented the gradual transformation of Algerian family entrepreneurship, a more in-depth qualitative analysis of sectoral specificities is still needed to refine understanding of this evolution. Existing studies have focused on macroeconomic quantitative indicators. It would be relevant to qualitatively study entrepreneurial dynamics in critical sectors such as industry or agriculture through interviews to identify motivations and obstacles encountered. A comparative analysis between traditional and innovative sectors could identify levers and barriers to emerging entrepreneurs with high-value-added projects. This would complement the understanding of ongoing transformations. This increased involvement of universities in training and supporting student entrepreneurs represents a key opportunity for Algerian family businesses to foster innovation and knowledge transfer to the new generations.

### *5.2. Role of the entrepreneur*

The role of the entrepreneur in the entrepreneurial dynamics of Algerian family businesses has been the subject of several studies. Firstly, Dyer and Sánchez's (1998) research helped conceptualize the family entrepreneur as the critical driver of business development by leveraging its unique resources and leadership.

More recently, authors have deepened the analysis of the characteristics of the Algerian family entrepreneur. Thus, Gheddache (2016) conducted an in-depth qualitative case study showing the central role of the leader in animating governance and the dynamism of the NCA Rouiba Company. Similarly, Soufi (2021) conceptualized the critical role of the leader in family entrepreneurship, particularly their ability to initiate radical change within a conservative structure.

This work should be nuanced in light of other research. Indeed, authors like Dyer and Sánchez (1998) emphasize the need to go beyond historical illustrations to validate entrepreneurial characteristics empirically. In addition, some leaders may hamper innovation through too conservative management (Hall et al., 2001). Thus, while the



entrepreneur's role seems central, its impact depends on individual and contextual factors that must be refined.

Existing research sheds light on the critical role played by the family entrepreneur in the innovative dynamics of Algerian AFBs, whether through conceptual or empirical case-based studies. However, these contributions still need to be more comprehensive regarding their profile and influence.

Cross-sectional qualitative and quantitative research seems necessary to refine understanding. Comparing entrepreneurs evolving in various contexts would help identify typical profiles. Combining observations, interviews, and financial analyses would clarify the links between leadership and performance.

A better understanding of the entrepreneur's concrete role would help support this essential driver of Algerian entrepreneurial development. Further in-depth investigations are still needed to enhance knowledge on this essential subject.

### *5.3. Success factors of an innovative AFB*

Several critical success factors regarding innovation within Algerian family businesses (AFBs) have been identified. Initially, empirical work carried out by Duran et al. (2016) on a sample of Spanish family businesses highlighted that valuing human capital, mainly through training policies, constituted a strategic resource for developing new ideas. Medjaher and Salmi (2021), who qualitatively studied the Soummam biscuit factory and showed the facilitating role of skilled labor, validate this dimension in the Algerian case.

Furthermore, Craig et al. (2008) emphasized the importance of the family business capitalizing on its family identity to legitimize its innovations with the domestic market. Koironen (2002) also highlighted the benefits of a family reputation for old Finnish companies. Locally, the case study conducted by Haïdara and Iambeondrazana (2021) on Candia Algérie allowed us to observe how this company could promote its sustainable family dimension to support the launch of new products in foreign markets.

However, not all innovative AFBs rely solely on intangible factors. Thus, Duran et al. (2016) showed a positive link between investments in research, experimentation, and testing and patent levels among Spanish SMEs. Medjaher and Salmi (2021) partially explored this quantitative dimension, pointing out the financial effort made by Soummam to equip itself with state-of-the-art equipment. Nevertheless, their single case study limits the generalizability of this result to the Algerian context.

In summary, while human capital and family identity remain key levers for innovation in Algerian AFBs, further contextual analysis is still needed to understand the full range of strategic capabilities that must be developed to sustain their innovative dynamism. Although case studies, such as those conducted at the Soummam biscuit

factory, make it possible to understand the organizational factors at work, their monographic nature limits the generalizability of results. Therefore, qualitative analyses should be multiplied of family businesses by sector and size, cross-referencing results with quantitative data on research, experimentation, and testing budgets, for example. This methodological triangulation would provide a systemic understanding of the levers public decision-makers can rely on to stimulate innovation within the entrepreneurial family fabric in Algeria. In addition, considering contextual elements such as the institutional environment or local cultural values would help refine understanding their impacts on innovative practices implemented.

## **6. Overall Perspective on the Analyses Conducted.**

Several significant trends emerge through this state-of-the-art 15-year research on Algerian family businesses. Initially, pioneering work helped establish conceptual foundations by proposing adapted definitions and emphasizing the socio-economic role of these organizations. However, their quantitative or qualitative approaches on restricted samples sometimes limit generalizability. In-depth case studies provide enriched insights, but their unique nature prevents generalization.

Regarding succession, cognitive and emotional issues have been highlighted, but more attention must be paid to individual aspirations and intrafamily dynamics to refine models. Research on governance has helped conceptualize family specificities but still needs to be expanded in number. They often point to impacts on performance without establishing strict causal links.

Determinants and obstacles to internationalization have been identified, but progress remains to be made in terms of methodological triangulation. Fine-grained qualitative analyses have helped understand specific mechanisms in entrepreneurship and innovation. Still, investigations must be multiplied while crossing levels and disciplines to comprehend these dynamics systemically.

## **Conclusion**

To conclude this critical state-of-the-art literature dedicated to Algerian family businesses from 2008 to 2023, it is worth recalling the main lessons from the crosscutting synthesis.

While pioneering work helped establish conceptual foundations, we have seen that some limitations still need to be addressed, such as often-modest samples and underexplored psychosociological aspects. In addition, quantitative analyses could be complemented by longitudinal qualitative approaches to comprehend the complexity of

these evolving systems, as suggested by the integrative systemic modeling work of Cabrera-Suárez et al. (2001) and Kotlar et al. (2013).

To go beyond these limitations and refine the systemic understanding of these organizations, it appears necessary to cross-reference quantitative and qualitative approaches on representative samples and in-depth case studies. Such an approach combining qualitative and quantitative methods will undoubtedly represent progress, in line with calls made in the literature by Fernández and Nieto (2005, 2006).

Future research will finally need to explore emerging fields, such as the evolution of organizational models or the digital transformation of these companies. These perspectives will contribute to sustainably advancing knowledge on this significant topic of the Algerian entrepreneurial landscape.

## REFERENCES

- Acherchour, Z., & Boukrif, M. (2018). Le regroupement d'entreprises familiales: une traduction de l'objectif du maintien du contrôle dans un contexte de développement. *Revue Africaine De Management*, 1(3), 120-131. <https://web.archive.org/web/20180501162419/http://revues.imist.ma/index.php?journal=RAM&page=article&op=download&path%5B%5D=11106&path%5B%5D=6815>
- Arabeche, Z., & Ouahba, A. (2020). La perception de la RSE par les entreprises familiales en Algérie: adaptation du modèle de Carroll (1991) au sein de groupe Chiali tube à Sidi Bel Abbès. *Revue du Lareiid*, 6 (1) 63-72. <https://www.asjp.cerist.dz/en/article/136421>
- Assyakh, H., & Messaoudi, A. (2023). Internationalisation de la PME familiale: entre changement stratégique et adaptation. *Revue Internationale des Sciences de Gestion*, 6(1). <https://revue-isg.com/index.php/home/article/view/1167>
- Atanasova, A. (2021). Influence of strategic planning on entrepreneurial small and medium-sized business. *Economics and Management*, 18(2), 35-49. <https://doi.org/10.37708/em.swu.v18i2.3>
- Belabbas, L., & Hadji, Y. (2015). Gouvernance et transmission de l'entreprise familiale: „Cas NCA-Rouiba“, *Thèse de doctorat, Université Mouloud Mammeri*, <https://dspace.ummo.dz/server/api/core/bitstreams/f808ccae-5e49-465f-ad4a-1b0c78baa8dd/content>
- Belgoum, F., & Benessalah, N. (2023). Start-up and patent degrees initiative in algeria: supporting business innovation and creation among university students. *Entrepreneurship*, 11(1), 21-30. <https://doi.org/10.37708/ep.swu.v11i1.2>
- Berrone, P., Cruz, C., & Gómez-Mejía, L. R. (2012). Socioemotional wealth in family firms theoretical dimensions, assessment approaches, and agenda for future research. *Family Business Review*, 25(3), 258-279. <https://doi.org/10.1177/0894486511435355>

- Boutifour, Z. (2014). La reprise des entreprises : Une solution de restructuration et de revitalisation des entreprises dans les différents pays. *Economics Researcher's Journal*, 1(1), 209-218. <https://www.asjp.cerist.dz/en/article/4915>
- Boutifour, Z., & Miraoui, A. (2015). ECFERAL d'Alger un exemple de la réussite de la reprise d'entreprise par ses salariés en Algérie sur la période de 2003-2011. *Revue Eco Nature*, 7(2), 96-119. <https://www.asjp.cerist.dz/en/article/6819>
- Cabrera-Suárez, K., et al. (2001). The succession process from a resource-and knowledge-based view of the family firm. *Family Business Review*, 14(1), 37-46. <https://doi.org/10.1111/j.1741-6248.2001.00037.x>
- Carsrud, A., & Brännback, M. (2011). Entrepreneurial motivations: what do we still need to know? *Journal of Small Business Management*, 49(1), 9-26. <https://doi.org/10.1111/j.1540-627X.2010.00312.x>
- Chrisman, J.J., Chua, J.H., & Sharma, P. (2005). Trends and directions in developing a strategic management theory of the family firm. *Entrepreneurship Theory and Practice*, 29(5), 555-576. <https://doi.org/10.1111/j.1540-6520.2005.00098.x>
- Craig, J.B., Dibrell, C., & Davis, P.S. (2008). Leveraging family-based brand identity to enhance firm competitiveness and performance in family businesses. *Journal of Small Business Management*, 46(3), 351-371. <https://DOI:10.1111/j.1540-627X.2008.00248.x>
- De Massis, A., Sieger, P., Chua, J. H., & Vismara, S. (2016). Incumbents' attitude toward intrafamily succession: An investigation of its antecedents. *Family Business Review*, 29(3), 278-300. <https://doi.org/10.1177/0894486516656276>
- Duran, P., Kammerlander, N., van Essen, M., & Zellweger, T. (2016). Doing more with less: Innovation input and output in family firms. *Academy of Management Journal*, 59(4), 1224-1264. <https://psycnet.apa.org/doi/10.5465/amj.2014.0424>
- Dyer, W.G., & Sánchez, M. (1998). The current state of family business theory and practice: Family business has become a significant field of study. *Family Business Review*, 11(4), 287-295. <https://doi.org/10.1111/j.1741-6248.2004.00001.x>
- El Houmaïdi, A. (2007). La succession dans l'entreprise familiale marocaine. Une approche par les ressources. *Critique économique*, 20, 175-182. <https://doi.org/10.48409/IMIST.PRSM/ce-n20.1540>
- Ettahri, Y., & Amsidder, S. (2021). L'internationalisation des entreprises familiales à l'épreuve de la richesse socio-émotionnelle : Etude théorique. *Revue Française d'Economie et de Gestion*, 2(6). <https://www.revuefreg.fr/index.php/home/article/view/317>

- Fernández, Z., & Nieto, M.J. (2005). Internationalization strategy of small and medium-sized family businesses: Some influential factors. *Family Business Review*, 18(1), 77-89. DOI: [10.1111/j.1741-6248.2005.00031.x](https://doi.org/10.1111/j.1741-6248.2005.00031.x)
- Fernández, Z., & Nieto, M.J. (2006). Impact of ownership on the international involvement of SMEs. *Journal of International Business Studies*, 37(3), 340-351. <http://dx.doi.org/10.1057/palgrave.jibs.8400196>
- Gedajlovic, E., Carney, M., Chrisman, J. J., & Kellermans, F. W. (2012). The adolescence of family firm research: Taking stock and planning for the future. *Journal of Management*, 38(4), 1010-1037. <https://doi.org/10.1177/0149206311429990>
- Gheddache, L., & Mohammed Amokrane Haroun. (2016). La gouvernance dans l'entreprise familiale: Cas de la Spanca Rouiba. *Journal of Economic Sciences Institute*, 20(2), 34-2016. <https://www.asjp.cerist.dz/en/article/51466>
- Gheddache, L. (2022). Le processus de transmission et maintien du caractère familial de l'entreprise: le cas Cevital SPA. *Revue Abaad Iktissadia*, 1(12), 363-347 <https://www.asjp.cerist.dz/en/article/195966>.
- Gomez-Mejia, L.R., et al. (2007). Socioemotional wealth and business risks in family-controlled firms: Evidence from Spanish olive oil mills. *Administrative Science Quarterly*, 52(1), 106-137. <https://doi.org/10.2189/asqu.52.1.106>
- Grari, Y. (2014). La place de la PME dans la dynamique du processus de développement. *Cas de la wilaya de Tlemcen. Les cahiers du mecas*, 10(1), 115-125. <https://www.asjp.cerist.dz/en/article/8979>
- Habba, B., Alloui, A., & El Azizi, T. B. (2021). Les effets du leadership féminin sur la performance financière des entreprises familiales cotées dans le contexte culturel de l'Afrique du Nord et du Moyen-Orient. *Revue africaine de management*, 6(1). <https://doi.org/10.48424/IMIST.PRSM/ram-v6i1.23376>
- Haidara, M. A. C., & Iambeondrazana, M. (2021). La politique produit à l'international : Cas de Candia Algérie, *Thèse de doctorat, Université Mouloud Mammeri*. <https://dspace.ummto.dz/handle/ummto/17532>
- Hall, A., Melin, L., & Nordqvist, M. (2001). Entrepreneurship as a radical change in the family business: Exploring the role of cultural patterns. *Family Business Review*, 14(3), 193-208. <https://doi.org/10.1111/j.1741-6248.2001.00193.x>
- Ifourah, H. (2015). Le rôle de la PME en Algérie : étude comparative avec la PME dans les pays de la Triade. *Revue d'Economie et de Management*, 14(1), 58-79. <https://www.asjp.cerist.dz/en/article/106536>.

- Kellemans, W. F., Eddleston, K. A., & Zellweger, T. M. (2012). Extending the socioemotional wealth perspective: A look at the dark. *Entrepreneurship Theory and Practice*, 36(6), 1175-1182. <https://doi.org/10.1111/j.1540-6520.2012.00544.x>
- Kerzabi, A., & Saidani, M. (2009). La taille des PME algériennes une explication par les coûts de transaction. *Revue d'ECONOMIE et de MANAGEMENT*, 8(1), 324-334. <https://www.asjp.cerist.dz/en/article/106501>
- Kherraf, H. (2022). la gouvernance des entreprises familiales : étude du cas de la NCA-Rouiba. *Revue algérienne d'économie et gestion*, 16(2), 276-297. <https://www.asjp.cerist.dz/en/article/212178>
- Klein, S. B., Astrachan, J. H., & Smyrnios, K. X. (2005). The F-PEC scale of family influence: Construction, validation, and further implication for theory. *Entrepreneurship Theory and Practice*, 29(3), 321-339. <https://doi.org/10.1111/j.1540-6520.2005.00086.x>
- Koiranen, M. (2002). Over 100 years of age but still entrepreneurially active in business and industry: Exploring old Finnish family firms' values and family characteristics. *Family Business Review*, 15(3), 175-187. <https://doi.org/10.1111/j.1741-6248.2002.00175.x>
- Kotlar, J., & De Massis, A. (2013). Goal setting in family firms: Goal diversity, social interactions, and collective commitment to family-centered goals. *Entrepreneurship Theory and Practice*, 37(6), 1263-1288. DOI: [10.1111/etap.12065](https://doi.org/10.1111/etap.12065)
- Lambrecht, J. (2005). Multigenerational transition in family businesses: A new explanatory model. *Family Business Review*, 18(4), 267-282. <https://doi.org/10.1111/j.1741-6248.2005.00048.x>
- Lassassi, M., & Hammouda, N. (2009). La main d'oeuvre familiale : Quelle utilisation en Algérie?. *Les cahiers du CREAD*, 25(89), 97-121. <https://www.asjp.cerist.dz/en/article/2108>.
- Le Breton-Miller, I., Miller, D., & Steier, L.P. (2004). Toward an integrative model of effective FOB succession. *Entrepreneurship Theory and Practice*, 28(4), 305-328. <https://doi.org/10.1111/j.1540-6520.2004.00047.x>
- Lee, J. (2006). Impact of family relationships on attitudes of the second generation in family business. *Family Business Review*, 19(3), 175-191. <https://doi.org/10.1111/j.1741-6248.2006.00069.x>
- Medjaher, K., & Salmi, R. (2021). Les déterminants et les obstacles liés à la Croissance des PME Familiales En Algérie Cas: Biscuiterie de La Soummam de Boghni, *Thèse de doctorat, Université Mouloud Mammeri*. <https://dspace.ummto.dz/handle/ummto/16706>
- Merzouk, F., & Abedou, A. (2015). Les entreprises familiales comme une alternative de développements en Algérie. *Les cahiers du mecas*, 11(1), 21-34. <https://www.asjp.cerist.dz/en/article/8949>

- Miller, D., Le Breton-Miller, I., & Lester, R.H. (2011). Family and lone founder ownership and strategic behavior: Social context, identity, and institutional logics. *Journal of Management Studies*, 48(1), 1-25. <https://doi.org/10.1111/j.1467-6486.2009.00896.x>
- Molly, V., Laveren, E., & Deloof, M. (2010). Family business succession and its impact on financial structure and performance. *Family Business Review*, 23(2), 131-147. DOI: 10.1177/0894486510365062
- Moulai, S., & Boukrif, M. (2018). Le choix du successeur dans les PME familiales. *Revue africaine de management*, 1(3). <https://doi.org/10.3917/vuib.nivoi.2022.01.0237>
- Moumou, O. (2016a). L'entreprise familiale en Algérie: Quelle politique financière? *Dirassat Journal Economic*, 7(2), 277-302. <https://www.asjp.cerist.dz/en/article/90289>.
- Moumou, O. (2016b). Les déterminants et les obstacles à l'internationalisation des PME familiales algériennes. *Revue Des économies nord Africaines*, 11(13), 1-24. <https://www.asjp.cerist.dz/en/article/1888>
- Oudjedi D, Y., Colot, O., Selka, M. (2017). L'audit et la gouvernance dans les entreprises familiales en Algérie: Une prévention ou une formalité?. XV Congrès international des coûts: Vers davantage de pratiques de comptabilité, d'audit et de gestion des coûts pour les citoyens. Lyon, France. <https://www.intercostos.org/documentos/congreso-15/OUJEDI-DAMERDJI.pdf>
- Oukaci, M., & Achouche, M. (2020). Evolution de la dynamique entrepreneuriale en Algérie ; une comparaison des caractéristiques de l'entrepreneur. *Revue algérienne de développement économique*, 7(1), 395-408. <https://www.asjp.cerist.dz/en/article/117690>
- Rassoul, N. (2018). Importance du mode de financement dans la pérennité des entreprises familiales algériennes. *Journal of Academic Finance*, 9(1), 91-103. <https://doi.org/10.59051/joaf.v9i1.137>
- Redouane, A., & Zaidi, H. (2023). L'orientation entrepreneuriale des étudiantes de fin de cycle; Cas des étudiantes de l'université de Bejaia. *Revue El Kistas. Management-Economie et Finance*, 5(1), 152-166. <https://www.asjp.cerist.dz/en/article/229131>
- Salaouatchi, H. S., Ait Yahia, K. & Hamida, A. (2019). Les Spécificités de la Gouvernance des Entreprises Familiales: Cas NCA Rouiba. *Journal of North African Economies*, 15(1), 391-403. <https://www.asjp.cerist.dz/en/article/81644>
- Sharma, P., Chrisman, J.J., Pablo, A.L., & Chua, J.H. (2001). Determinants of initial satisfaction with the succession process in family firms: A conceptual model. *Entrepreneurship Theory and Practice*, 25(3), 17-35. <https://doi.org/10.1177/104225870102500302>
- Sharma, P., Chrisman, J.J., & Chua, J.H. (2003). Succession planning as planned behavior: Some empirical results. *Family Business Review*, 16(1), 1-15. DOI: 10.1111/j.1741-6248.2003.00001.x

- Sharma, P., Salvato, C., & Reay, T. (2014). Temporal dimensions of family enterprise research. *Family Business Review*, 27(1), 10-19. DOI: [10.1177/0894486513516058](https://doi.org/10.1177/0894486513516058)
- Sirmon, D.G., & Hitt, M.A. (2003). Managing resources: Linking unique resources, management, and wealth creation in family firms. *Entrepreneurship theory and practice*, 27(4), 339-358. <https://doi.org/10.1111/1540-8520.t01-1-00013>
- Soufi, W., & Bekkar, B. (2021). Le rôle du dirigeant dans le dynamisme entrepreneurial des entreprises familiales. *La Revue des Sciences Commerciales*, 20(2), 144-165. <https://www.asjp.cerist.dz/en/article/158590>
- Taleb, K. (2015). La petite et moyenne entreprise familiale comme acteur du développement local Cas de la commune de Ain El Hammam, *Thèse de doctorat, Université Mouloud Mammeri*. <https://dspace.ummo.dz/handle/ummo/3017>
- Tessa, A., & Gheddache, L. (2010). La transmission de la PME familiale : Une étude exploratoire à partir des perceptions du cedant potentiel. *Les cahiers du cread*, 26(91), 105-129. <https://www.asjp.cerist.dz/en/article/2095>
- Toumi Amara D., (2016). Ethique islamique et gouvernance des PME familiales : essai de modélisation d'un processus d'intégration des valeurs au management.. *Revue d'Économie et de Développement Humain*, (3)7, 53-67. <https://www.asjp.cerist.dz/en/article/29793>
- Zahra, S.A. (2005). Entrepreneurial risk-taking in family firms. *Family Business Review*, 18(1), 23-40. <https://doi.org/10.1111/j.1741-6248.2005.00028.x>
- Zellweger, T.M., et al. (2012). Family, wealth, and governance: An agency account. *Family Business Review*, 25(3), 303-328. <https://doi.org/10.1111/etap.12182>
- Zemirli, R., & Hammache, S. (2018). Le contexte entrepreneurial en Algérie : quelles opportunités et contraintes pour les jeunes entrepreneurs. *Revue du contrôle, de la comptabilité et de l'audit*, 2(2). <https://www.researchgate.net/publication/327069515>.



## MODERN LEADERSHIP AND MANAGEMENT

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### **Abstract**

*The article analyzes and describes the main essential characteristics of the concepts of leadership and management. A comparative analysis of these two phenomena was made, clarifying the relationship, identity and differences between them. The object of the study is the process of managing interpersonal and professional relationships in the company and the focus is on the leaders and managers with their cognitive, professional and personal qualities.*

*Special attention is paid to innovation and crisis management in the context of the digital transformation of business models. The author's thesis is that the modern leader is not only an individual, but a resource and capital, an intangible asset and an extremely important key factor for achieving competitive advantage and achieving sustainable development.*

**Keywords:** *leadership; management; management competencies; innovation and crisis management.*

**JEL Codes:** *M10, M21, O32*

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### **Introduction**

For many authors management and leadership are two completely different phenomena in management theory. For other researchers these are two complementary specific styles of behavior. In practice, there are many examples of how you can be a manager without being recognized as a leader or vice versa. The combination of weak management and a strong claim to leadership leads to negatives and management inefficiency. Naturally, a winning combination is the combination of these two things or the phenomenon of leader and manager at the same time. If the differences between the two concepts are to be sought and formulated, we would justify the following statement: Leadership is informal, non-coercive influence, mainly affecting interpersonal relationships, while management is more concerned with professional relationships and company administration. This thesis is confirmed by other authors studying leadership and

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management. However, before getting to the specifics of the essence of these two concepts, defined in many different ways, it must be assumed that they are very strongly related to the efficiency and success of the company. In other words, successful leaders with their skills, although there is not a sufficient condition ensuring the company's competitiveness, are an important and necessary condition for it in the complex and mobile market environment. Every well-structured and successfully functioning company has its own strategy, traditions, goals and mission. The implementation of the above-mentioned things requires effective management and it is impossible without leadership, professional collegiality, good interpersonal relations and good management.

## **Results and Discussion**

Leadership can be considered as releasing the intellectual forces of the organization, which in turn creates intellectual capital (Karastoyanov, 2005).

According to Simeonov (2020), effective management is impossible without leadership, it is able to organize, unite and inspire a group of individuals for a common mission and goal, and the ability to develop leadership skills is a necessary condition for the success and competitiveness of individual companies (pp.127-142).

There is no generally accepted definition of the essence of leadership, although there are many authors interested in clarifying its essence. According to Drucker (1993), leadership is not eloquence and influence by creating friendships. It is an influence that promotes the potential of others and pushes them to self-improvement and fuller deployment of their professional skills. This influence induces a desire in others to fully reveal their capabilities and even exceed their own conception and expectations of them (pp.8-20). Drucker (1999) expands his vision of leadership by developing it further when he defines the characteristic personal qualities necessary for successful management - management by vision, by a personal example, with respect, trust and personal influence (pp.73-95).

In our opinion, any thesis and attempt to clarify the relationship and identity and/or differences between a leader and a manager can find its arguments and justification. However, it is obvious that the essential characteristics of the leader and leadership are related more to the sensory-emotional sphere and the psychological impact than to administration and management that are more characteristic of the manager. Al-Nasour and Najm emphasize that "leadership is not a job description as we find in the job description system, nor an administrative center that can meet its requirements" (Al-Nasour, Najm, 2020, p.121).

Cole (1988) defined leadership as "a dynamic process in a group, in which a person who stands at the head in a particular organizational context and for a particular time

influences other members of the group to commit themselves voluntarily to group tasks and goals" (p. 41). According to Filipova (2012), the specific personal qualities of an individual that prove to be effective in certain situations essentially represent managerial competencies and role (p.131). The leadership potential of crisis management was explored by Kirsanov. According to him, the socio-psychological characteristic of the personality is an important condition for the implementation of leadership and management and is an ability inherent in the individual regardless of the situational circumstances (Kirsanov, 2003). Examining the process of management and leadership as a subject-object relationship between "leader" and "followers", Filipova (2019) concludes that "the opportunities for developing the managerial competencies of the leader in the group or enterprise include the set of his managerial competencies, the ways of manifestation of leadership and the peculiarities of its perception by a given group, which determine the manager's ability to take the position of a leader and successfully use his leadership resources in the practice of management" (p.94). In her research the author pays serious attention to the "I-concept" of the manager, which is associated with his ideas about himself, his place and role in the social environment. She believes that the model for the development of management competencies should include cognitive and behavioral elements of the manager and the followers, considering the influence of the organizational-management and social-psychological conditions for the manifestation of leadership (Filipova, 2019, pp.104 -105).

According to Maxwell (1998), who studied the laws of leadership, despite their large number, the general conclusion can be drawn that it is in its deep essence "influence". Very often leadership is associated with informal influence that is not a function of administrative or other empowerment. The optimal option for successful management is when the natural, informal leadership position is characteristic and inherent to the manager and supervisor. Naturally, when the manager is not fully and sincerely recognized as a leader, the management style often diverges to authoritarianism, undemocratic, and from there to poor efficiency.

Leadership as a style of behavior and influence on interpersonal relations is also an object of interest by Kotter. Looking for answers to the question of what leaders actually do to implement important and leading changes, the author reaches the following general conclusion. A leader must be a visionary who sets the parameters and outlines the future, but at the same time he must be able to convince people, to make them believe in him in order to realize this vision, despite all the expected difficulties and unforeseen circumstances (Kotter, 1996, p.25; Kotter 2001, pp. 85-96).

Robert Blake and Jane Mouton's 1964 Management Grid is still accepted as the basic, classic model that conceptually describes and reflects possible leadership styles (Simpson, 2012, p.16).

Another group of theories holds that successful leadership is not only a function of style, behavior and personal qualities, but depends significantly on a number of situational factors. The main idea is that leadership style variability is necessary, that it cannot be constant and applicable everywhere and in all circumstances and situations. We fully share such a thesis, because it is obvious that when you are a successful team leader of seven people, for example, your leadership style is hardly fully applicable and adequate if you manage fifteen people. Another situation exists where other situational factors related to power, authority, responsibilities come into play and this requires an upgrade in management style. The decision-making style in a relatively calm company and market environment is unlikely to be appropriate in problematic and crisis situations. We will look at crisis management in more detail later. The model created by Fiedler (1967) is applicable to situations related to the power, authority of the leader and the force of circumstances, the nature of the relationship between the leader and the employee, and depending on the difficulty and structure of the work task. His model further develops those theories that are primarily related to the personality qualities of the leader and considers leadership effectiveness as a function of the aforementioned three situational variables. Fiedler (1967) studied 1,200 groups in which he compared people-oriented and task-oriented leadership. The studies of Opuni (1984) and Verkerk (1990) are also in this direction.

*Figure no. 1 Capability Determination Model*

	very favorable		Intermediate				very unfavorable	
Leader-Employee Relationships	good	good	good	good	Weak	weak	weak	weak
Structure of the task	high		low		high		Low	
Power of leadership position	strong	weak	strong	weak	strong	weak	strong	weak

Source: Opuni, K. (1984). The least preferred coworker (LPC) concept and the interpersonal construct validity of Fiedler's LPC Scale. Oklahoma.

<https://shareok.org/bitstream/handle/11244/5240/8418589.PDF?sequence=1&isAllowed=y>, p.5.

For the first three and the last eighth situation, managers with a task orientation are most effective. Human relations leaders are most effective in the fourth, fifth, and sixth situations. The seventh situation is equally suitable for both task-oriented managers and good leader-employee-oriented managers. The optimality of the first situation for any leader is obvious - a well-structured task, good relationships, serious job powers and maximum opportunities for influence. In this context, the eighth situation is the most unfavorable. Fiedler (1967) researched that in situations that are at both extremes (first and eighth) effective is that leadership which is task oriented. The third group of theories about leadership is related to the personal qualities of the leader, which are really a huge number. These theories were developed in the middle of the last century and were attempts to explain and characterize the phenomenon of leadership.

As for the semantic similarities and differences of leadership and management, we believe that considering them as two complementary systems and styles of behavior and work most accurately summarizes the existing opinions and theories (Avramov, 2003, pp.5-7; Avramov, 2006, pp.7-19).

Simeonov (2020) summarizes in the following way the specifics and peculiarities of management presented in the works of other authors, as follows: Management primarily concerns company policy, organizational structure and administrative procedures and it does not contain informal components.

Issues related to leadership and well-being in the workplace are explored by Kulova (2023) using European Social Survey data for ten European countries.

Leadership and subjective well-being in the workplace are specific and important phenomena that are a continuous process, adequate to the opportunities and company culture and traditions.

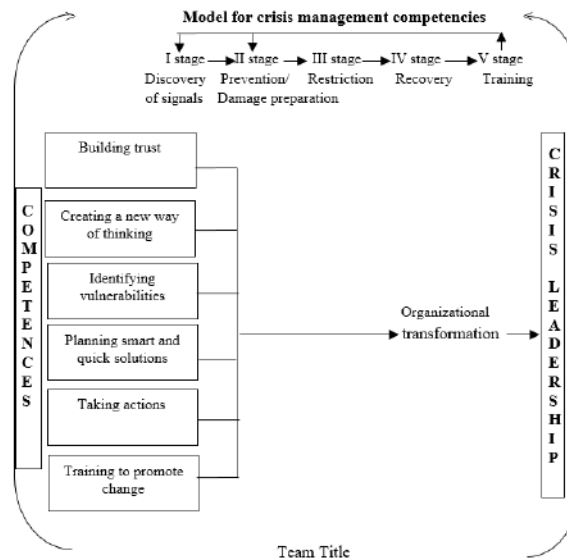
Depending on the danger it represents, the degree of influence on the company's activity, the nature and scale of the damage it can cause, the risk situation can be defined and classified in many ways. We will consider that the realization of the risk leads to a crisis situation without entering into a semantic analysis of the essence of the two concepts of risk and crisis, and their functional interdependence. In our opinion, in order to avoid and limit risk, the company must have a plan and, depending on the specifics of the company, choose the nature of its risk avoidance strategy. In some cases, the reduction (mitigation) strategy is applicable, where the goal is to reduce the probability of the risk materializing, to transform the risk through insurance, to make additional investments. According to Dimitrov (2012), risk and crisis management requires the organization to have a risk management plan as well as a risk avoidance plan. Furthermore, the two documents with prescribed implementation rules must be integrated. The author relates these plans mainly to risk analysis and assessment, which includes identification,

measurement and risk management, and procedures for monitoring, evaluation and actions (pp. 202-203).

In our opinion company strategies related to risk and crises may be different in terms of planning, emphasis and other specifics, but their philosophy, paradigm as a model of thinking should consider the current state of affairs in the company as a permanent problem situation. In the global information environment, changes are extremely fast and the dynamics in the market disequilibrium are so clearly expressed that any refusal to implement new ideas and solutions in a timely manner leads to a crisis situation for the organization. According to Tzvetkova (2020), risk management is part of the project management, and project managers can take the necessary measures to reduce the likelihood for the occurrence of unfavorable situations and the scope of the damage (p.174).

In one of their studies James & Wooten (2005) propose a crisis management skills and competencies model in which they consider the stages and describe the organizational dynamics. In another of their work related to risk management, Wooten & James (2008) provide an opinion on the relationship between the stages and the leadership competencies required for each of them.

Figure no. 2 A Model for Crisis Management Competencies

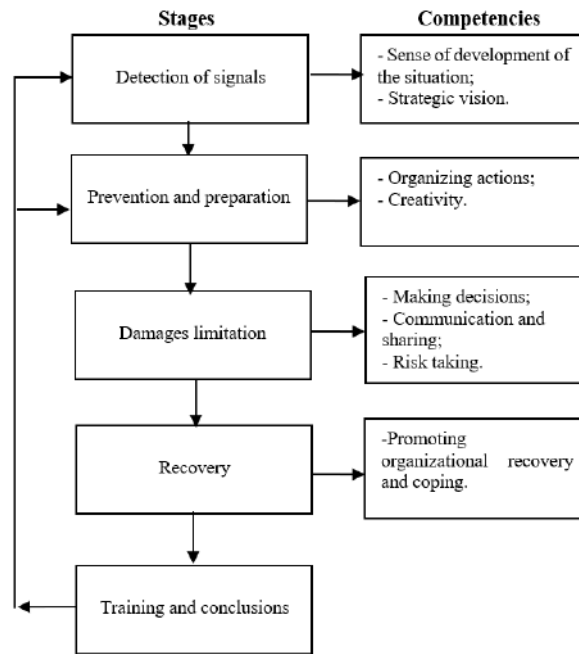


Source: Adapted by Yordanova, D. (2020). About the role and competencies of the crisis manager in business organizations. *Economic and Social Alternatives*, pp.134-144. doi:<https://doi.org/10.37075/ISA.2020.1.12>; James, E., & Wooten, L. P. (2005). Leadership as (un)usual: How to display competence in times of crisis. *Organizational Dynamics*, 34(2), pp. 141-152. doi:10.1016/j.orgdyn.2005.03.005

What we agree with in the applied model is the unidirectionality of the relation "competencies → leadership". In our opinion, the experience gained during crises can lead to organizational change and from there to upgrading or new competencies.

The relationship between leadership competencies and stages of crisis management is presented in Figure 3.

*Figure no. 3 Stages of the Crisis and Leadership Competencies*



*Source:* Adapted by Wooten, L. P., & James, E. H. (2008). Linking crisis management and leadership competencies: The role of human resource development. . *Advances in Developing Human Resources*, 10(3), p.353. doi:<https://doi.org/10.1177/1523422308316450>

We can summarize that there are many competencies that a crisis manager must possess. With their help, the manager must anticipate and implement changes in the structural-functional company organization and medium- and long-term goals and policies in order to prevent and minimize crisis situations. After all, he must have another very important quality - to be ready to take direct responsibility when it is necessary.

This mostly applies to the people implementing the company's innovation management. Modern management requires, in addition to basic knowledge in the field of economic sciences, also competences and skills to use and apply some specific tools from the field of probabilities and statistics, econometrics, modeling and decision-making in conflict situations. This will enable management to forecast and plan the company's

activities successfully and effectively. The manager must know the organization's strengths and weaknesses, its opportunities, as well as the risks of the external environment. In the era of global digitalization, the application of a system-scientific approach is preferable to the intuitive one. Personal qualities of the leader such as initiative, tact, flexibility and motivational skills are extremely important.

When examining issues related to modern management, two important characteristics of labor in modern conditions should be taken into account. These are the accelerated digitization associated with the implementation of the digital transformation and the hybrid work model as a combination of remote and office employment of the staff. Depending on the customers, the brand and the company specifics and culture, the ratio of the two forms of work in the hybrid model is different. A good balance must be found between them to ensure the effectiveness of the relationship between teamwork and the flexibility preferred by employees. In addition, we can mention the rapid and aggressive penetration of digital technologies into the internal company environment and communications with customers and partners. This almost imperatively requires a serious modification of the existing organization of work processes, as well as the building of new or improvement of the existing skills and competencies of the employees. This, in its essence, is a prerequisite for the development of human capital (Koleva-Stefanova, 2019, p.96).

The issues discussed above are also closely related to the increasingly imposed network organizational structure in many companies.

New digital technologies have enormous transformative potential on work processes and environments. Good management foresees not only modifications and improvement of existing processes in the work environment. It must define new goals and approaches to redesign the work architecture. However, the new requirements placed on employees in terms of their knowledge, skills and competencies must be tied to the inclusion, encouragement, motivation, commitment and attitudes of the human resource to participate in such a process transformation, which is part of the overall transformation of the business model. For a long time, the role of teachers and managers was no longer understood as someone who "re-transmits" knowledge. The manager (leader) must be a facilitator, instructor, coach, mentor, boss and at the same time "one of us". In our view, this means the following:

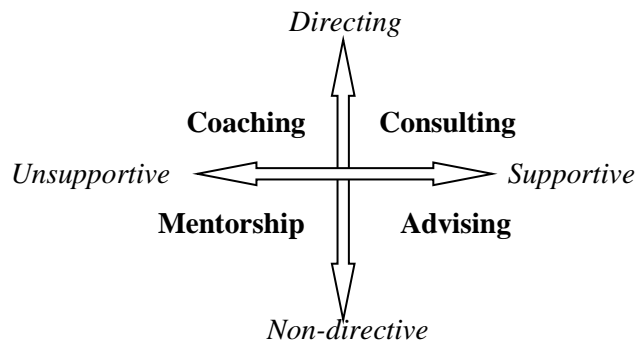
- To know how the people he works with think and learn;
- To understand what motivates staff and partners;
- To carry out good communication and filter the noise on the information routes;
- To determine the appropriate goals, stages for their implementation and priority;
- To show, direct and motivate;



- To deal with crisis situations and challenging behavior;
- To encourage and build confidence;
- To promote creative thinking;
- To control the quality;
- To be part of the team;
- To understand the role of education as a factor for competitiveness;
- To build and maintain an appropriate organizational culture;
- To forecast, plan and manage the change in the company;
- To act confidently.

For the manager's role as an instructor and coach, the foreign word coaching is increasingly used, which in its essence is a symbiosis of stimulation, instruction, showing and directing, and is different from leadership and teaching. The differences between coaching and other support models are explored by Bates (2022). According to him, the consultant will give you advice, the counselor will try to ease your worries and anxiety, the mentor will share his experience and knowledge. A coach will encourage you to achieve your goals (Bates, 2022).

*Figure no. 4 The Differences between Coaching and other Ways and Models of Support*



Source: Bates, B. (2022). A little book about the big models in coaching. Publishing house "Hermes", p.21.

The commonality between the approaches described above is the search for a change in the behavior of the individual or the company. One of the tasks of coaching, as already specified, is to build. Landsberg (2003) believes that coaching, by asking questions, motivating and creating feedback, makes the individual with the will and the ability to believe and become ready to participate in solving a given problem. According to him, a successful coaching approach is related to the skill and will of the trainee (Landsberg, 2003), which can be illustrated as shown in Figure 5.



intuition and determination to act quickly on the part of the manager, we will qualify this as a favorable, positive confluence of circumstances and events, which for managers with a lot of experience and competences works in some cases. Taking risks and taking responsibility are characteristics of the modern manager. With global informatization and conditions of uncertainty, however, the qualities related to forecasting, the use of digital technologies for the purpose, statistical planning and the ability to share, modify and adapt other people's experience and practice will become increasingly important. In the field of ecology, environmental protection, forecasting of temperatures, precipitation, hail, drought and other disasters have long been in the archives, so there is a "historical" approach related to the analysis of data from recent years and decades in search of cyclical dependence and repeatability. Big data computing, cloud technologies and artificial intelligence with its many faces and manifestations provide enormous opportunities for forecasting in all social spheres. Self-learning in Machine Learning (ML) and Deep Learning (DL) enables an interactive process where models adapt to new changes in conditions and continuously improve their accuracy.

The use of such machine learning algorithms (ML and DL), the multilayer, i.e. spatially structured data of neural networks (ANN), the qualities and possibilities of virtual reality (VR/AR/MR), 3D printing, the cloud and high-speed 5G networks make consulting, forecasting and sharing foreign experience a key and unavoidable factor in modern management. It is a great advantage to be able to identify the risk at an early stage and in real time and to anticipate and take preventive measures and actions. Artificial intelligence can be said to make predictions based on evidence. In this case, it is not only about ecology, medicine or business, but about any other sphere of human life. Another important advantage of "digital forecasting and consulting" is the existence of a feedback relationship with the manager. It can monitor the progress of processes, their effect, defects and take corrective actions during the design and diffusion of the innovation activity. Not only the allocation of resources regardless of their nature is predicted, but also adequate strategic solutions related to the dynamics of market relations and the creation of new customer and partner policies and company culture are proposed. Apart from these optimistic and positive notes, one should not turn one's back on the skepticism related to the risks and dangers of the entry of artificial intelligence into human life. The use of artificial intelligence, however, so far has brought more opportunities and positives than significant negative consequences.

The use of a descriptive approach related to determining the qualities of the modern leader and manager has its grounds and benefits for theory and practice. Any comprehensive and in-depth literature review made on the subject will confirm the thesis that there are hundreds of characteristics of the modern successful manager. This will lead

to the natural and objective conclusion that a person can hardly possess and combine an essential part of this universe of qualities. Which, in turn, forces the conclusion that the modern manager must identify with the concept of teamwork and distribution of roles, tasks and responsibilities in the management process (especially in large enterprises and companies). The analyses and findings provide arguments to define modern management as a function of possessed qualities in the following key areas – economy, digitalization, social and corporate responsibility. The principles underlying the ESG concept (Environmental, Social and Governance) concern precisely these spheres, and competitiveness and good financial indicators depend on their efficiency, balance and harmony. It is an international, established, modern and applied standard of management effectiveness.

### **Conclusion**

The comparative analysis of a huge number of sources defines leadership and management as aspects and manifestations of both sides of the management process, related to relationships, personal and professional skills, on the one hand, and planning and administration of company activity, on the other hand. Leadership and management are not constant, but are a function of the following three variables - personal qualities, behavioral skills and situational conditions. No less important are cognitive competencies, professional experience and skills.

The importance and role of the human factor and the use of human potential is a postulate for successful innovation activity. The qualities and skills of those managing this activity are particularly important. The modern manager must be both an entrepreneur and an innovator. In the highly competitive and aggressive market environment, he must have the professional qualifications and expertise to evaluate and implement new products, services, technologies and organizational initiatives.

Managerial strategies and styles may be different in terms of planning, emphasis, priorities and other specifics, but as a philosophy and model of thinking and behavior, they must always consider the current state of the company, even with the existing equilibrium of the environment, as a problem situation. Modern management is associated with uncertainties, a high degree of risk and a high probability of crisis conditions in the competitive environment. For this purpose, the company must have a developed and tested risk management model, as well as a damage reduction plan.

Modern management should be seen not as a one-way subject-object relationship, but as a subject interaction. The existence of feedback is extremely effective in modern management and changes the roles of the subject and the object (leader and executor).

In the digital era, the person must be considered as an individual, resource and capital, as an intangible asset of the company with an extremely important factor for achieving competitive advantage and achieving sustainable development.

## REFERENCES

- Al-Nasour, J., Najm, N. (2020). Leadership capital: Concept and roles. *Economics and management*, ISSN: 2367-7600, 17(1), pp. 120-126.
- Argyris, C., Schon, D. (1974). *Theory in practice: Increasing professional effectiveness*. San Francisco: Jossey-Bass.
- Avramov, V. (2003). *Leadership and Management*. Sofia: University Publishing House "Economics".
- Avramov, V. (2006). *Leadership and Management*. Sofia: University Publishing House "Economics".
- Bates, B. (2022). *A little book about the big models in coaching*. Publishing house Hermes.
- Cole, G. (1988). *Personnel Management: Theory and practice*. D.P. Publications in English - 2nd ed, p.41.
- Dimitrov, P. (2012). *Innovations and innovative thinking in tourism*. Sofia: Avangard Prima.
- Drucker, P. (1993). *Management: Tasks, Responsibilities. Practices*. New York: Truman Talley Books.
- Drucker, P. (1999). *Management Challenge for the 21st Century*. New York: HarperCollins.
- Fiedler, F. (1967). *A theory of leadership effectiveness*. New York: McGraw-Hill.
- Filipova, M. (2012). The Leadership Competences in Tourism. *8th International Scientific Conference "Management in the Function of Increasing the Tourism Consumption*. Rijeka, Croatia: University of Rijeka, Croatia, p. 131.
- Filipova, M. (2019). *The profile of the manager in the enterprise*. Blagoevgrad: "Neofit Rilski" University Publishing House, p. 94, pp. 104-105.
- James, E., & Wooten, L. P. (2005). Leadership as (un)usual: How to display competence in times of crisis. *Organizational Dynamics*, 34(2), pp. 141–152. doi:10.1016/j.orgdyn.2005.03.005
- Karastoyanov, G. (2005). Basic psychological theories of leadership. In: Karastoyanov (Compiler and General Editor), *Leadership in Multinational Operations*. Sofia: "Military Publishing House". <https://www.ozone.bg/media/pdfs/576b6617e3d68.pdf>
- Kirsanov, M. (2003). *Leadership potential of anti-crisis managers*. Moscow.

- Koleva-Stefanova, D. (2019). Human capital and its importance for our time. *Dialogue*(1), pp. 85-98.
- Kotter, J. (1996). *Leading Change*. Boston: MA: Harvard Business Review Press.
- Kotter, J. (2001). What Leaders Really Do? *Harvard Business Review*, 79(11), pp. 85-96.
- Kulova, E. (2023). Relationship between leadership and well-being at work – evidence from the European Social Survey. *Economic and Social Alternatives*, 29(1), pp. 49-62. doi:<https://doi.org/10.37075/ISA.2023.1.04>
- Landsberg, M. (2003). *The Tao of Coaching*. London: Profile Books.
- Maxwell, J. (1998). *The 21 Irrefutable Laws of Leadership*. Thomas Nelson Publishers.
- Opuni, K. (1984). *The least preferred coworker (LPC) concept and the interpersonal construct validity of Fiedler's LPC Scale*. Oklahoma. <https://shareok.org/bitstream/handle/11244/5240/8418589.PDF?sequence=1&isAllowed=y>
- Simeonov, S. (2020). Nature and practical dimensions of leadership in international management. *Economic and social alternatives*, UNSS, 2, pp. 127-142. doi:<https://doi.org/10.37075/ISA.2020.2.11>
- Simpson, S. (2012). *The Styles, Models & Philosophy of Leadership*. Ventus Publishing ApS, p.16.
- Tzvetkova, S. (2020). Risk management in the development of transport projects. *Entrepreneurship*, 8 (2), pp. 173-182, DOI: 10.37708/ep.swu.v8i2.14
- Verkerk, P. (1990). *Fiedler's contingency model of leadership effectiveness : background and recent developments* (Tom 9002). (OCTO-report) Eindhoven: Eindhoven University of Technology, <https://pure.tue.nl/ws/portalfiles/portal/4271307/352989.pdf>
- Wooten, L. P., & James, E. H. (2008). Linking crisis management and leadership competencies: The role of human resource development. *Advances in Developing Human Resources*, 10(3), pp. 352–379. doi:<https://doi.org/10.1177/1523422308316450>
- Yordanova, D. (2020). About the role and competencies of the crisis manager in business organizations. *Economic and Social Alternatives*,(1), pp. 134-144. doi:<https://doi.org/10.37075/ISA.2020.1.12>

## **DETERMINANTS OF WORK MOTIVATION AND ITS EFFECTS ON JOB PERFORMANCE VIA P-O FIT: EVIDENCE OF TAIWANESE- INVESTED ENTERPRISES IN VIETNAM**

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### ***Abstract***

*The purpose of this study is to explore the main determinants of employees' work motivation working in Taiwanese-invested enterprises in Vietnam. How these determinants affect workers' job performance is then examined by person-organization fit (P-O fit). The empirical results show that physiological needs, love and belonging needs, self-esteem needs and self-actualization needs are the main determinants of the work motivation of Vietnamese employees in Taiwanese-invested enterprises. Among them, employees' love and belonging needs, esteem needs and self-actualization needs will affect task performance and contextual performance via P-O fit. These results may suggest that in order to strengthen the motivation for Vietnamese employees working in Taiwanese-invested enterprises on their job performance, it is necessary to pay more attention to the P-O fit as an intermediary role. The enterprises can develop appropriate strategies to reduce strikes and turnover rates by enhancing work motivation, while improving job performance through P-O fit.*

**Keywords:** *work motivation; P-O fit; jobPerformance; Vietnamese workers; Taiwanese-invested enterprises in Vietnam.*

**JEL Codes:** F23, J28, M12

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### **Introduction**

Human resource management promises that if people are treated as strategic resources and managed, it can help businesses gain a competitive advantage, leading to superior performance (Heijltjes and Witteloostuijn, 2003; Reiche, Lee and Allen, 2019). The task of human resource management is to put the right people in the right jobs to improve efficiency and personal acceptance of their work. We also believe that worker

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(employee) motivation needs to be understood, as it affects employee and organizational performance. Therefore, it is necessary to study the interactions between the influence of employee motivation and job that they can improve job performance while considering both worker motivation and P-O fit simultaneously. Because we believe that person and organizational needs and supplies can be met and job performance improved.

Human resource management also plays a vital role in developing the skills, qualifications, knowledge and abilities of employees to improve their work and organizational performance. The effective functioning of any organization depends not only on its available technological resources, but also on the reputation and competence of the employees that the organization needs to meet its future human resource needs. Employees are the main factors that determine the performance of an organization. Unfortunately, people are capricious and human resource management is a daunting task, especially in cross-cultural human resource management. Vu and Tran (2021) discussed the Labor disputes and illegal strikes in sustainable development of Vietnam's industrial parks and mentioned that there were 5,843 strikes from 1995 to the end of 2018. In particular, the enterprises with foreign investment such as Taiwan, Korea, Japan, etc., accounted for 75.4% (about 3,122 cases of strikes). These strikes lead us to believe that not only does work motivation affect employee's job performance, but so does P-O fit. Therefore, it is an essential issue to study the relationships of employee motivation and job performance via P-O fit between Vietnamese workers and foreign enterprises. According to the statistics from Vietnam government, Taiwanese enterprises are one of the most significant foreign investors in Vietnam. Thus, our research focuses on studying the relationships between Vietnamese workers and Taiwanese enterprises as well as the key determinants of work motivations and their impact on job performance via P-O fit.

In this study, we not only examine the relationships between the motivations of Vietnamese labor when joining the Taiwanese-invested enterprises with job performance, but also at the same time consider the intermediary effects of P-O fit. Because according to the research of Byrne (1969), Tsui and O'Reilly III (1989) and Cable and Edwards (2004), the congruency of individuals and organizations would affect employee attitude and behavior because people are more attracted to and trusted by people who are similar to them. In sum, the current research intends to explore the relationships between work motivation and job performance while considering P-O fit as a mediating variable. There is little literature to show the relationship between these variables in the context of workers joining FDI enterprises, such as Taiwanese-owned enterprises operating in Vietnam. This study will help add to the knowledge of the existing literature by examining the impact of these variables on work motivation of Taiwanese firms operating in Vietnam. It will guide the managers to understand the phenomenon of work motivation and job performance,



taking P-O fit into account, which will help to adjust employees in organizational operations, thus improving job and organizational performance.

The remainder of this research is structured as follows. Section 2 reviews the related literature. Section 3 describes the conceptual framework and hypotheses. Section 4 depicts the study method of this research. Section 5 analyzes the empirical results. Section 6 then provides the concluding remarks.

## **Literature Review**

This study attempts to explore the main determinants of work motivation and their effects on job performance via P-O fit. In this section, relevant theories and literature are described in order to effectively propose research hypotheses and build an analytical framework.

### *Work Motivation*

The concept of motivation varies with the motivation and purpose of research. There are many definitions that describe motivation. Locke (1996) pointed out that work motivation is a continuous process from individual needs to behavioral results. Robbins (1998) pointed out that motivation is the willingness of individuals to work hard to achieve corporate goals. Gagné and Deci (2005) further mentioned that power (force) motivation is the reason for individuals to devote themselves to work. Work motivation is an internal organic psychological state. It is a series of motivating and working performances. Work motivation is the important factor that affects labor behavior and work performance (Hemakumara, 2020). Therefore, work motivation will have an impact on individual and organizational performance.

The need hierarchy concept (Maslow, 1970) acknowledged classical theories of human motivation. It is the most widely used theory in the study of organizational motivation. Maslow (1970) divides human needs from low to high into five levels: physiological needs, security needs, social needs (friendship connectedness and belonging needs), respect needs, and self-actualization needs. Understanding the needs of employees is an important prerequisite for applying hierarchy of needs theory to motivate employees. The employee needs of different organizations, different periods, and different employees within the organization are full of differences and often change. Therefore, managers should often conduct research in various ways to find out which needs of employees are not being met, and then carry out targeted incentives. Maslow (1970) stresses that all of these needs require to happen in sequence. Kaur (2013) and Basalamah and As'ad (2021) argued that needs theory and work environment are intertwined, and this relationship has a

significant impact on work motivation. These five levels of need hierarchy can be used as five dimensions to manifest and measure work motivation.

#### *Person-Organization Fit (P-O Fit)*

P-O fit indicates compatibility between an individual and the organization they serve, such that employees share the same values, goals, and beliefs with the organization they serve. According to Kristof (1996), P-O fit is important for maintaining the loyal workforce necessary in a competitive business environment. In practice, P-O fit is one of the most important indicators in employee selection.

The essence of P-O fit research involves the precedents and effects of compatibility between individual and the organization where they work. Kristof (1996) divides P-O fit into four types: (1) value compatibility between people and organizations; (2) the compatibility between people and organizational goals; (3) compatibility between personnel requirements and organizational structure; (4) compatibility between personality traits and organizational climate. Kristof (1996) showed the implication of P-O fit, it including the supplementary fit and complementary fit. Kristof (1996) also claimed that complementary fit is the fitness of demand and supply between individual and organization whereas supplementary fit is the sharing of values, goals, beliefs and cultures between the individual and the organization.

The literature on P-O fit can be traced back to Schneider's (1987) "Attraction-Selection-Attribution (ASA)" viewpoint, which pointed out that organizations attract the same types of people, and then select people with the same characteristics as other members of the organization to enter the organization, and finally choose to leave when the personal characteristics do not match other members of the organization. Kristof (1996) defines the P-O fit as the consistency between the individual and the organization. The theory of P-O fit also assumes that the characteristics of the organization are consistent with the characteristics of the individual, and that the attitude or behavior of the individual affects the consistency or fit between the individual and the organization (Cable and Edwards, 2004; Hoffman and Woehr, 2006; Ahmad, 2012; Pattnaik, Mishra and Tripathy, 2020; Thuy and Phinaitrup, 2023). Therefore, the overall meaning of the P-O fit should include the consistency of individual characteristics, beliefs, values and the organizational culture, organizational norms, organizational values and strategic needs in the organization.

In the past research, the fit between individuals and organizations is mostly discussed in terms of value consistency, including complementary fit (representing the similarity of personal and organizational traits in the same environment) and supplementary fit ( a needs-supplies fit is achieved when the resources and opportunities provided by the organization are aligned with the needs of the individual, whereas a demands-abilities fit is achieved

when individuals and organizations agree on resources and knowledge skills). Among the research findings on relationship between the P-O fit and job performance, the findings on value alignment showed that P-O fit was highly correlated with job satisfaction and organizational performance. More employees and organization fit, employees have more willingness to contribute to the organization (Hoffman and Woehr, 2006; Farooqui and Nagendra, 2014; Jehanzeb and Mohanty, 2018; Kao, Hsu, Thomas, Cheng, Lin and Li, 2021; Thuy and Phinaitrup, 2023). In this study, we explore the P-O fit dimensions from the perspectives of supplementary and complementary fit.

### *Job Performance*

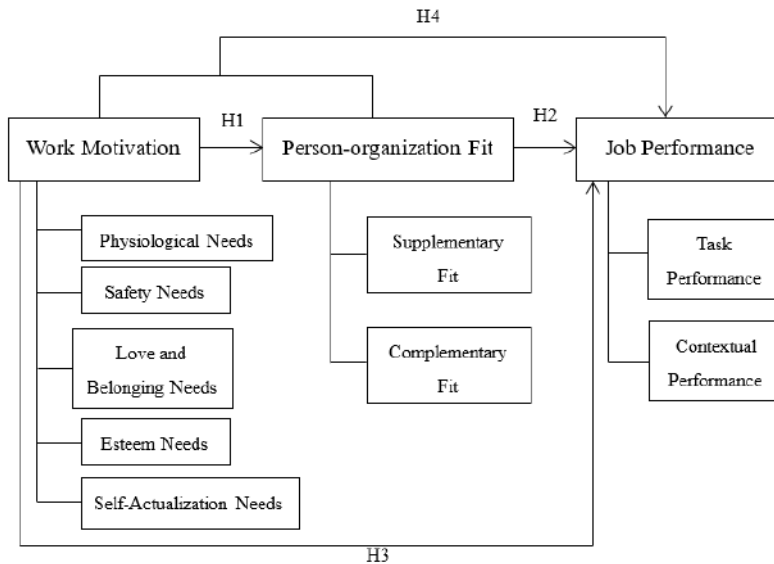
Job performance is a very important aspect of evaluating work performance, including individuals, groups and organizations (Pandey, 2018). It focuses on actions that will affect company goals and achievements positively or negatively. Generally speaking, job performance is a routine task for the personnel department to review or evaluate the work performance of employees. It is a measure of employee appreciation and devaluation. Borman and Motowidlo (1997) classified job performance into task performance and contextual performance. Task performance is more likely to be related to the job description, which refers to compliance with obligations that benefit the company and its products (Griffin, Neal and Neale, 2000; Farooqui and Nagendra, 2014; Akca and Ozdemir, 2020; Papadopoulou, 2020). It can take the form of accomplishing tasks, such as reaching performance and contextual performance are two different dimensions of work behavior that can independently contribute to the effective outcomes of an organization. Contextual performance is important because it represents a behavior that is largely controlled by individual motivation (Robbins and Judge, 2017; Akca and Ozdemir, 2020; Rabhi, Harizi, Djoul and Thamri, 2023). Task performance is recognized as the core skill or technology in getting the job done flawlessly. Contextual performance is considered as the activities which contribute to the climate of the organization. For example, high team spirit, high willingness to follow the rules of an organization and help coworkers.

When describing a job performance, it should not be viewed from a general perspective, but from a specific perspective. The work performance of employees at work is seen as a multidimensional concept that may vary depending on the outcome and how it is achieved. It can be task performance and/or contextual performance (Sonntag, Volmer, and Spychala, 2008; Jehanzeb and Mohanty, 2018; Akça and Özdemir, 2020; Hue, Vo Thai and Tran, 2022). These two performance effects directly determine organizational performance. Therefore, in this study, task and contextual performance are used to measure job performance.

## Conceptual Framework and Hypotheses Development

As previously mentioned, this study takes P-O fit as a mediator variable to investigate the link and influence between work motivation and job performance. Based on the relevant literature review above, the conceptual framework (Figure 1) and hypotheses are explained together as follows.

Figure no. 1 Conceptual Framework and Hypotheses



Source: Authors' own research

Based on the information in the literature overview above and as shown in Figure 1, we can consider that work motivation leads to P-O fit and job performance. The work motivation consists of five dimensions: Physiological needs, safety needs, love and belonging needs, esteem needs and self-actualization needs. P-O fit is composed of two dimensions: supplementary fit and complementary fit. The dimensions of task and contextual performance are used to measure job performance. In this research, work motivation is the independent (antecedent) variable, P-O fit is the intermediary (mediator), and the dependent (consequence) variable is job performance.

The interaction between factors will also be tested. Furthermore, a causal relationship between job motivation, P-O fit and job performance has been previously found. This causal sequence will also be accounted in the research. However, these hypotheses will be elaborated upon after factor analysis. The conceptual model is shown in

Figure 1. The focus of this study is to explore the relationship between work motivation and job performance from the perspective of P-O fit. We want to detect a direct relationship work motivation and job performance or an indirect relationship through P-O fit, i.e., P-O fit mediates relationship between work motivation and job performance.

These four hypotheses are put forward on the basis of the above discussions:

*Direct Effect*

H1: Work motivation has a positive effect on P-O fit

H2: P-O fit has a positive effect on job performance

H3: Work motivation has a positive effect to job performance

*Indirect Effect*

H4: Work motivation has a stronger positive effect on the job performance when P-O fit is the mediator (intermediary)

## **Study Methods**

### *Measures and Questionnaire*

Based on the research framework (Figure 1), the constructs of work motivation, P-O fit and job performance are needed to assist test the hypotheses. The empirical data were collected by self-filling questionnaires. The questionnaire has been pre-tested and adjusted to ensure the validity of the content. The questionnaire consists of three parts. The first part is work motivation, which consists of three dimensions: physiological needs, safety needs, love and belonging needs, esteem needs and self-actualization needs. The second part is P-O fit, including two dimensions of complementary and complementary fit. Job performance is measured by two dimensions, namely task and contextual performance. All items in the three sections were assessed using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree."

### *Sampling and Survey*

The questionnaire for this study was filled out by employees working in Taiwanese-invested firms in Vietnam. Questionnaires were distributed directly to a random sample of Taiwanese-invested firms in Vietnam. A total of 581 responses were collected. 178 unused responses were removed, resulting in a response rate of about 80%.

### *Econometric Method (Data Analysis)*

For the purpose of this study, econometric methods were used for statistical analysis. SPSS was used for reliability, validity and factor analysis, and the principal factors of work motivation, P-O fit and job performance were extracted. Then, the principal components and varimax rotation in factor analysis are applied to calculate to select the principal

factors. Structural equation models (SEM) were analyzed using LISREL8 computer software packages, and estimating path coefficients through maximum likelihood estimation (MLE).

## Empirical Results and Implications

### *Demographical Characteristics*

According to Comrey and Lee's (2013) suggestion, the sample size should be more than 300 for conducting a factor analysis and the related statistical analysis. As mentioned above, 403 responses were successfully collected in this study. The basic statistics of demographical characteristics are indicated in Table 1.

*Table no.1 - Demographical Characteristics of Respondents (Samples=403)*

Variable	Frequency	Percentage	F-Value (P-Value)
<u>Sex</u>			0.127 (0.721)
Male	108	26.8%	
Female	295	73.2%	
<u>Age</u>			3.29 (0.158)
20-30	263	65.3%	
30-40	126	31.3%	
Above 40	14	3.5%	
<u>Education</u>			0.793 (0.555)
junior high school	1	0.2%	
High school	110	27.3%	
Technical College	71	17.6%	
Associate Bachelor	67	16.6%	
Bachelor	138	34.2%	
Postgraduate	16	4.0%	
<u>Foreign Language</u>			1.986 (0.096)
Chinese	68	16.9%	
English	152	37.7%	
Both (Chinese and English)	72	17.9%	
Vietnamese	63	15.6%	
Others	48	11.9%	
<u>Industry</u>			
Manufacturing	267	66.3%	
Trading	44	10.9%	
Service	64	15.9%	
Banking/Finance	18	4.5%	
Others	10	2.5%	

<u>Position</u>			0.429 (0.788)
Executive Personnel	158	39.2%	
Financial Personnel	50	12.4%	
Personnel	50	12.4%	
Technical Personnel	46	11.4%	
Worker	99	24.6%	

*Source:* Authors' own research

As shown in Table 1, the majority of respondents were female, accounting for about 73.2%. This is related to the position of the majority of respondents working in an office, as most administrative work is usually performed by women. As expected, the majority of respondents were younger, aged between 20 and 30, accounting for 65.3%. The rest of the respondents were aged between 30 and 40. Most of the respondents had a high school education or above, and about 34.2% had a bachelor's degree. This shows that these respondents can provide more accurate answers for the study. As all interviewees work for Taiwanese-invested enterprises in Vietnam, their foreign language ability needs to be learned. Research shows that Vietnamese workers mainly use English as a foreign language. 37.7 % of the respondents were able to communicate in English and 16.9 % in Chinese. Because the main industry of Taiwanese-invested enterprise is manufacture, therefore, the collected questionnaires are 66.3% from manufacturing industry. The questionnaires were distributed to different division of Taiwanese-invested enterprises. The responses were from workers, technicians, administrators and financial personnel on the production line. In addition, Table 1 also details the results of the ANOVA analysis according to different age, gender, education, language communication, job position and industry type, suggesting that sample selection and empirical analysis in this study are not affected by these demographic variables.

#### *Reliability and Validity Analysis*

In order to evaluate the measurement model to be useful, it is necessary to ensure that reliability and validity are achieved from questionnaires. This study assessed scale reliability through internal consistency reliability. As shown in Table 2, Cronbach's  $\alpha$  of the three constructs reflecting latent variables (work motivation, P-O fit and job performance) ranged from 0.824 to 0.887. Even Cronbach's  $\alpha$  0.848 of the total scale is well on high the threshold level of 0.7 suggested by Nunnally (1978). Thus, their internal consistency is verified. Regarding the validity of the scale, convergent validity and discriminant validity were tested. Zaltaman and Burger (1975) proposed using commonality (between observed variables and their underlying constructs) to assess validity. It has been suggested that an average extraction variance (AVE)/commonality

approaching or exceeding 0.5 (Bagozzi and Yi, 1988) indicates reasonable and good convergent validity (Bagozzi and Yi, 1988). Additionally, the square root of AVE was used to test the cross-correlation of this construct with other constructs to ensure discriminative validity (Chin, 2010). We also found that whatever square roots of AVE exceeded the correlations with other variables (items). As can be seen from Table 2, the (AVE)/commonality of all extracts (items) also surpass 0.5. Thus, we confirm the convergent and discriminative validity of these constructs.

*Table no. 2 - Cronbach's  $\alpha$  and AVE /Communalities\**

Work Motivation (Cronbach's $\alpha = 0.824$ )					
AVE /Communality					
Physiological needs					
A1	0.593	A3	0.642	A5	0.565
A2	0.505	A4	0.673		
Safety need					
B1	0.592	B3	0.561	B5	0.530
B2	0.515	B4	0.562		
Love and belonging needs					
C1	0.517	C3	0.591	C5	0.502
C2	0.576	C4	0.634		
Esteem needs					
D1	0.646	D3	0.621	D5	0.660
D2	0.570	D4	0.683		
Self-actualization needs					
E1	0.537	E3	0.651	E5	0.537
E2	0.698	E4	0.411		
P-O Fit (Cronbach's $\alpha = 0.884$ )					
AVE /Communality					
Supplementary Fit					
F1	0.840	F3	0.821	F5	0.785
F2	0.742	F4	0.816		
Complementary Fit					
G1	0.741	G3	0.698	G5	0.777
G2	0.810	G4	0.609		
Job Performance (Cronbach's $\alpha = 0.887$ )					
AVE /Communality					
Task performance					



H1	0.713	H3	0.645	H5	0.749
H2	0.734	H4	0.614		
contextual performance					
I1	0.711	I3	0.861	I5	0.754
I2	0.828	I4	0.831		
Total (Cronbach's $\alpha = 0.848$ )					

*Source:* Authors' own research

*Note:* Please see Appendix 1 for a list of item abbreviations with each construct

### *Factor Analysis*

Scores of KMO (Kaiser-Meyer-Olkin sampling adequacy indicator) above 0.9 for all dimensions (Table 3) meet the minimum requirement of 0.6, also entailing that the null hypothesis of the correlation matrix can be rejected as the identity matrix in the Bartlett test of sphericity as it is significant ( $p < 0.01$ ). This demonstrates that factor analysis can be carried out successfully. Factor analysis was performed using the principal component method with maximum variance rotation. Eigenvalues greater than 1 are applied to identify the number of components express in the data. The extracted factors were then renamed by using the features of items with factor loadings greater than 0.7.

*Table no. 3 - Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity Results*

Dimension(Construct)	Kaiser-Meyer Olkin	Significance Level for Bartlett Test of Sphericity
Total	0.967	0.000
Work Motivation	0.943	0.000
P-O Fit	0.938	0.000
Work Performance	0.921	0.000

*Source:* Authors' own research

### *Work Motivation*

Initially, there are five factors of work motivation: physiological needs, safety needs, love and belonging needs, respect needs and self-actualization needs. However, the factor analysis results show that there are 3 factors with eigenvalues greater than 1. Then, the extracted factors are renamed by using the features of items with factor loading greater than 0.7, namely "aspiration need" (eigenvalue =10.624, variation ratio =42.496), "love and belonging needs" (eigenvalue =2.118, variation ratio =8.473) and "physical needs" (eigenvalue =1.440, variation ratio =5.760). The cumulative variation proportion of the three factors is 56.729%. In addition, Cronbach's  $\alpha$  of the factors is greater than 0.8, and the internal reliability of the factors is high.

The first factor “aspiration needs (including esteem and self-actualization needs)” refers to positive feedback, accepting new work arrangements and challenges, job performance evaluation, having the confidence to tell others that I work for a foreign company, liking companies with high efficiency requirements, educational suitability, learning new knowledge, success is better work results than others as well as work harder, fair and open promotion system. The second factor “love and belonging needs” refers to identifying and recognizing well-behaved employees, conducting employee activities, caring for employees, listening to employees, accepting help from managers and colleagues to solve problems, and union protecting the interests and rights of our employees. The third factor, "physical needs (including physiological and safety needs)," consists of questionnaire items related to salary, company-provided food safety and hygiene, bonuses, and labor and health insurance.

#### *P-O Fit*

By using the varimax rotation in the principal component analysis, the factor analysis results show that there are two factors with eigenvalues greater than 1 in this construct. Then, the extracted factors are renamed by using the features of items with factor loading greater than 0.7, namely "supplementary fit" (eigenvalue = 6.065, variation ratio = 60.649) and "supplementary fit" (eigenvalue = 1.376, variation ratio = 13.758). These are the same as our two hypothesized dimensions (factors) of this construct. The cumulative variation proportion of the three factors is 74.407%. In addition, Cronbach's  $\alpha$  of the factors is greater than 0.8, and the internal reliability of the factors is high.

The first factor “supplementary fit” is made up by five questionnaire items which more related to organizational images (knowledge, belief, and feeling structures) match their own personal self-concepts such as sharing of values, goal, beliefs and cultures between individual and organization, attending training courses, gaining respect and trust and concerning whether the company treats its employees fairly. The second factor “complementary fit” refers to employee skills and knowledge can improve output, positive attitude and cooperation on the job and aim to increase the company's profits.

#### *Job Performance*

There are 10 items in the job performance construct. The factor analysis result shows two factors with eigenvalues greater than 1 in this construct. Then, the extracted factors are renamed by using the features of items with factor loading greater than 0.7, namely "contextual performance" (eigenvalue = 6.066, variation ratio = 60.661) and "task performance" (eigenvalue = 1.374, variation ratio = 13.742). These are the same as our two hypothesized dimensions (factors) of this construct. The cumulative variation proportion

of the three factors is 74.403%. In addition, Cronbach's  $\alpha$  of the factors is greater than 0.8, and the internal reliability of the factors is high.

The first factor "contextual performance" includes five items such as helping colleagues, helping new comers, working weekends, learning additional skills, volunteering for company events and responsibility. The second factor "task performance" refers to sufficient knowledge to manage tasks, advancing management, completing work on time and never repeating mistakes.

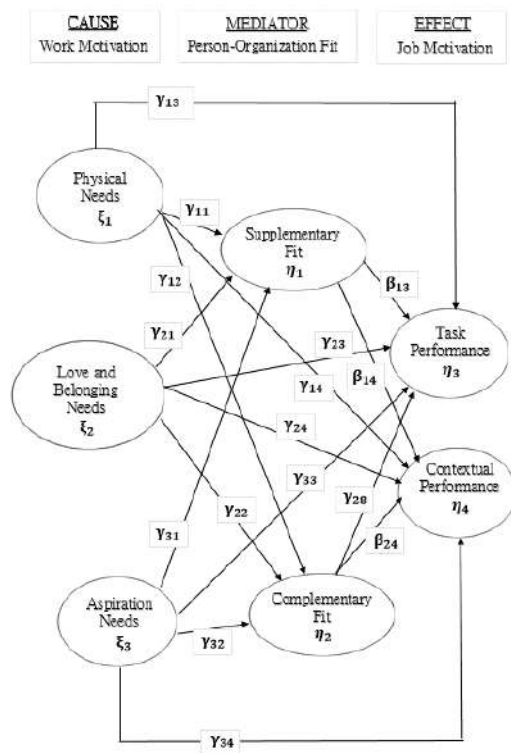
*Estimated Results of the Reformulated Hypotheses*

Now, the hypotheses are reformulated as follows to comprise the assorted factors found in the factor analysis and the related path diagram is shown in Figure 2.

H1a: Physical needs have positive effect on supplementary fit

H1b: Physical needs have positive effect on complementary fit

*Figure no. 2 The Estimated Path Coefficients of the Final Model*



Source: Authors' own research

H1c: Love and Belonging needs have positive effect on supplementary fit

- H1d: Love and Belonging needs have positive effect on complementary fit  
H1e: Aspiration needs have positive effect on supplementary fit  
H1f: Aspiration needs have positive effect on complementary fit  
H2a: Supplementary fit has positive effect on task performance  
H2b: Supplementary fit has positive effect on contextual performance  
H2c: Complementary fit has positive effect on task performance  
H2d: Complementary fit has positive effect on contextual performance  
H3a: Physical needs have positive effect on task performance  
H3b: Physical needs have positive effect on contextual performance  
H3c: Love and Belonging needs have positive effect on task performance  
H3d: Love and Belonging needs have positive effect on contextual performance  
H3e: Aspiration needs have positive effect on task performance  
H3f: Aspiration needs have positive effect on contextual performance  
H4: Work motivation has stronger positive effect on the job performance when  
P-O fit is the mediator (intermediary)

In order to test the above hypotheses, the following basic structural equation model is also established:

$$\begin{aligned}\eta_1 &= \gamma_{11}\xi_1 + \gamma_{21}\xi_2 + \gamma_{31}\xi_3 + \zeta_1 \\ \eta_2 &= \gamma_{12}\xi_1 + \gamma_{22}\xi_2 + \gamma_{32}\xi_3 + \zeta_2 \\ \eta_3 &= \gamma_{13}\xi_1 + \gamma_{23}\xi_2 + \gamma_{33}\xi_3 + \beta_{13}\eta_1 + \beta_{23}\eta_2 + \zeta_3 \\ \eta_4 &= \gamma_{14}\xi_1 + \gamma_{24}\xi_2 + \gamma_{34}\xi_3 + \beta_{14}\eta_1 + \beta_{24}\eta_2 + \zeta_4\end{aligned}$$

Where  $\eta_j$ : dependent latent variables,  $j=1, 2$   
 $\xi_i$ : independent latent variables,  $i=1, 2, \dots, 5$   
 $\gamma_{ij}$  and  $\beta_{13}, \beta_{23}, \beta_{14}, \beta_{24}$ : regression coefficients,  $i=1, 2, \dots, 5$   $j=1, 2$  and  
 $\zeta_j$ : disturbance terms,  $j=1, 2$

#### *Evaluation of Goodness-of-Fit*

After several modifications, the final estimation model is obtained through MLE. The modifications has further improved the goodness-of-fit of the estimated model. The goodness-of-fit of the final estimated model is shown in Table 4. This indicates that the performance of the final estimated model is within an acceptable range. Therefore, the final estimation model can be applied to analyze the hypothesized relationships, as well as the direct and indirect effects of the modeled structure.

Table no.4 - Comparisons of Goodness-of-Fit of the Final Structural Equation Models

Type of Measure	Measure	Recommended Limits	Original model	Acceptable
Absolute	X <sup>2</sup> /df	<3	362.52/165=2.197	Yes
	GFI	>0.9	0.93	Yes
	RMR	<0.06	0.048	Yes
	RMSEA	<0.05	0.049	Yes
Relative	AGFI	>0.9	0.91	Yes
	NNFI	>.09	0.99	Yes
	CFI	>0.9	0.99	Yes
Adjusted	PNFI	>0.5	0.77	Yes
	PGFI	>0.5	0.66	Yes

Source: Authors' own research

### Results and Implications of Hypothesis Testing

The estimated path coefficients of the final MLE model are shown in Figure 3. A solid line indicates a significant effect at a significant level of 1% or 5%, while a dashed line indicates a non-significant result. The results of all hypothesis tests are disserted as follows:

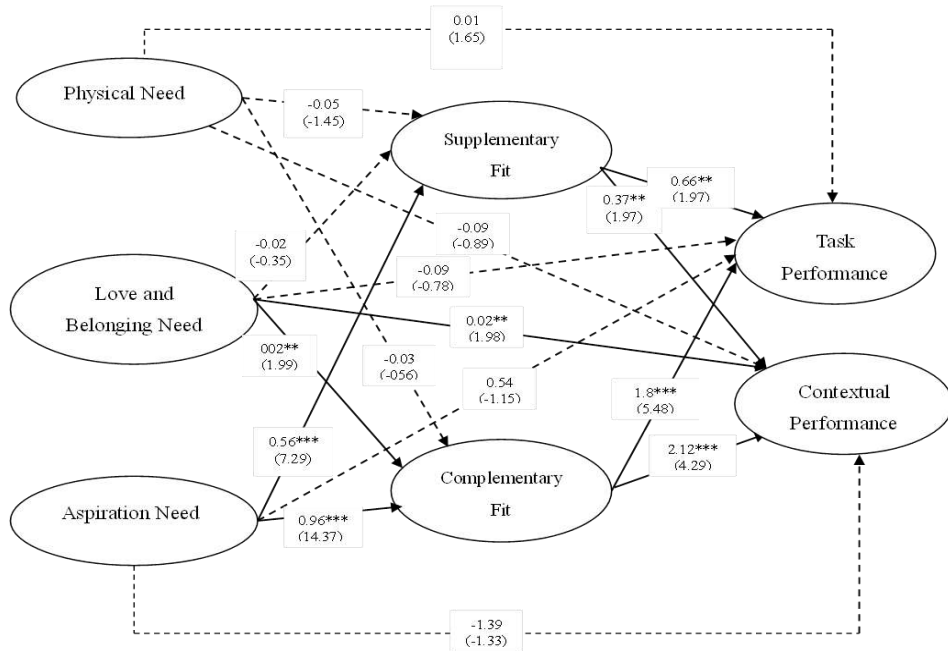
H1a-H1f: The effect of work motivation on P-O fit

Based on the results shown in Figure 3, the estimated coefficient of physical needs on supplementary fit is -0.05 and non-significant at 5% level (t-value -1.45). Hypothesis H1a is not supported. Supplementary fit is not affected by physical needs. The reason maybe that the supplementary fit is a shared spirit, value and culture between employees and organizations. However, physical needs are expressed as material needs. Therefore, Taiwanese-invested enterprises in Vietnam provide physical needs as worker motivation may not allow employees to share in the values and culture of the business.

The physical needs of work motivation had no significant effect on the complementary fit (path coefficients, -0.03 and -0.56 t-value). H1b is not supported, meaning that there is no significant relationship between physical needs and complementary fit (e.g., providing more resources, opportunities, task-related interludes, etc.). This result may indicate that the physical needs of work motivation do not motivate

employees work in Taiwanese-invested enterprises in Vietnam to devote time and energy to meet organizational needs. Physical needs for work motivation are not a major concern for employees.

Figure no. 3 The Final Model Path Coefficients and t-value



Source: Authors' own research

Note: 1. Dotted lines mean the coefficients do not reach the significant level.

2. \*\*\* 1% significant level, \*\* 5% significant level

3. ( ) t-value

Love and belonging needs had no significant effect on supplementary fit (path coefficient, -0.02 and non-significant at 5% level (t-value -0.35)). H1c is not supported. One reason for this result may be that supplementary fit (such as sharing of values, goals, beliefs and cultures between employee and organization) does not come from an employee's need for love and belonging. Taiwanese-invested enterprises in Vietnam need to focus on higher-level needs of employees, such as aspirational needs (respect and self-actualization), to improve the supplementary fit between employees and the organization.

The estimated effect (path coefficient 0.02, t-value of 1.99) of love and belonging needs on complementary fit is positive and significant at 5% level. H1d is supported. It

implies that when the love and belonging needs of employee is satisfied, this enables employees work in Taiwanese-invested enterprises in Vietnam to have a positive attitude to work with the companies, contribute skills and knowledge to improve output, as well as the companies can identify and recognize good performers. Complementary needs between companies and employees can be met.

The effect of aspiration needs on supplementary fit is significantly positive because the estimated path coefficient (0.56) is tested significantly at 1% level (t-value 7.29). H1e is supported, indicating that the aspiration needs of work motivation will obviously help to achieve complementary fit, i.e., promoting the aspiration needs of work motivation for employees work in Taiwanese-invested enterprises in Vietnam can really foster a shared understanding of values, goals, beliefs and culture among employees and organizations.

The effect of aspiration need of work motivation on complementary fit is supported by statistical result where the path coefficient is 0.96 and significantly at 1% level (t-value 14.37). H1f is supported, showing that the aspiration need can lead to complementary fit between employees and organizations which satisfy their demand and supply together. Specifically, aspiration need enables employees work in Taiwanese-invested enterprises in Vietnam to have a positive attitude to work with the companies, contribute skills and knowledge to improve output, as well as the companies can identify and recognize good performers.

#### H2a-H2e: The effect of P-O fit on job performance

The estimated effect (path coefficient 0.66, t-value 1.97) of supplementary fit on task performance is positive and significant at 5% level. The hypothesis H2a is supported, implying that employee task performance (such as completing work on time, having sufficient knowledge to manage tasks, etc.) can be improved by the alignment of values and goals between the employee and the organization. Therefore, organizations can consider how to establish complementary fit between organizations and their employees in order to improve their task performance.

The effect (path coefficient 0.37) of the Supplementary fit of P-O fit on contextual performance is significant at 5% level (t value 1.97). H2b is supported, depicting that contextual performance (e.g., high team spirit, high willingness to follow organizational rules, and help colleagues, new employees, etc.) is achieved when supplementary fit of P-O fit which employees enables employees work in Taiwanese-invested enterprises in Vietnam to identify the organization's values, culture and operational goals.

Based on the statistical test (path coefficient 0.66, t-value 1.97 and significant at 5% level), the complementary fit of P-O fit has a significantly positive effect on task

performance. H2c is supported. It implies that Taiwanese-invested enterprises in Vietnam want to improve employees' task performance, they can promote the complementary fit.

Still based on the statistical test (path coefficient 2.12, t-value 4.29 and significant at 5% level), the complementary fit of P-O fit has also a significantly positive effect on contextual performance. H2d is supported. This means that Taiwanese-invested enterprises in Vietnam need to achieve complementary fit when they want to improve employees' contextual performance.

H3a- H3d : The effect of work motivation on job performance

The effect of physical needs on task performance is 0.01 (t-value -1.64) and non-significant at 5% level. H3a is not supported. The reason may be that employees' task performance is not just based on their physical needs. This means that Taiwanese-invested enterprises in Vietnam provide physical or material needs as employee motivation cannot lead the employees to achieve the organization's task performance.

As shown in Figure 3, the effect of physical needs on contextual performance is -0.09 and t-value -0.89 under non-significant at 5% level. H3b is not supported. This result may indicate that contextual performance is still not based on physical needs of employee motivation for Taiwanese-invested enterprises in Vietnam.

The effect of love and belonging needs of work motivation on task performance is not significantly negative because the estimated path coefficient (-0.09) is tested non-significantly at 1% level (t-value -0.78). H3c is not supported. This reason maybe that satisfying love and belonging needs of employee motivation for Taiwanese-invested enterprises in Vietnam cannot directly improve employees' task performance such as having sufficient knowledge to manage tasks, advancing management, completing work on time and never repeating mistakes, etc.

The effect (path coefficient 0.02) of love and belonging needs on contextual performance is positive and significant at 5% level (t value 1.98). The hypothesis H3d is supported, meaning that employees' contextual performance is based on their love and belonging needs being met, i.e. the Taiwanese-invested enterprises in Vietnam provide employees with more love and belonging motivation, and they can promote contextual performance.

The effect (path coefficient -0.54) of aspiration needs of work motivation on task performance is negative but not significant at 5% level (t value -1.15). H3e is not supported. This result indicates that task performance is not solely based on aspiration needs of employees. There are also one or more additional conditions, such as the P-O fit in this study needs to act as a mediator between aspiration needs and task performance. We will discuss later.



The effect of aspiration needs on contextual performance is -1.39 (t-value -1.33) and non-significant at 5% level. H3f is not supported. This result may indicate that there is no direct effect of aspiration needs on contextual performance. The reason may be that employees' contextual performance is not just based on their aspiration needs. The P-O fit in this study needs to act as a mediator between aspiration needs and contextual performance. We will also discuss later. The testing results of hypotheses discussed above are summarized in Table 5.

*Table no.5 - Summary of Hypothesis Tests*

Hypothesis	Description	Conclusion
<b>H1a</b>	Basic need of work motivation has positive impact on supplementary fit	Reject
<b>H1b</b>	Basic need of work motivation has positive impact on complementary fit	Reject
<b>H1c</b>	Love and belonging need of work motivation has positive impact on supplementary fit	Reject
<b>H1d</b>	Love and belonging need of work motivation has positive impact on complementary fit	Accept
<b>H1e</b>	Aspiration need of work motivation has positive impact on supplementary fit	Accept
<b>H1f</b>	Aspiration need of work motivation has positive impact on complementary fit	Accept
<b>H2a</b>	Supplementary fit of P-O fit has positive impact on task performance	Accept
<b>H2b</b>	Supplementary fit of P-O fit has positive impact on contextual performance	Accept
<b>H2c</b>	Complementary fit of P-O fit has positive impact on task performance	Accept
<b>H2d</b>	Complementary fit of P-O fit has positive impact on contextual performance	Accept
<b>H3a</b>	Basic need of motivation of work has positive impact on task performance	Reject
<b>H3b</b>	Basic need of work motivation has positive impact on contextual performance	Reject
<b>H3c</b>	Love and belonging need of work motivation has positive impact on task performance	Reject
<b>H3d</b>	Love and belonging need of work motivation has positive impact on contextual performance	Accept
<b>H3e</b>	Aspiration need of work motivation has positive impact on task performance	Reject
<b>H3f</b>	Aspiration need of work motivation has positive impact on contextual performance	Reject
<b>H4</b>	Work motivation has stronger positive impact on job performance when P-O fit is the mediator (intermediary).	Accept

*Source:* Authors' own research

*Direct, Indirect and Total Effects of the Path Analysis*

The purpose of path analysis is to determine the relative strength of different paths on job performance. The test results of the direct, indirect and total effects of the estimated model are summarized in Table 6.

*Table no. 6 - Direct, Indirect Effect and Total Effect*

Path	Direct Effect	Indirect Effect	Total Effect
PhN( $\xi_1$ )→SF( $\eta_1$ )	-0.05 (-1.45)	---	---
PhN( $\xi_1$ )→CF( $\eta_2$ )	-0.03 (-0.56)	---	---
PhN( $\xi_1$ )→TP( $\eta_3$ )	0.01* (1.65)	---	---
PhN( $\xi_1$ )→CP( $\eta_4$ )	-0.09 (-0.89)	---	---
LBN( $\xi_2$ )→SF( $\eta_1$ )	-0.02 (-0.35)	---	---
LBN( $\xi_2$ )→CF ( $\eta_2$ )	0.02*** (1.99)	---	---
LBN( $\xi_2$ )→TP( $\eta_3$ )	-0.09 (-0.78)	---	---
LBN( $\xi_2$ )→ CP( $\eta_4$ )	0.02** (1.98)	---	---
AN( $\xi_3$ )→SF( $\eta_1$ )	0.56 ** (7.29)	---	---
AN( $\xi_3$ )→CF( $\eta_2$ )	0.96*** (4.37)	---	---
AN( $\xi_3$ )→TP( $\eta_3$ )	-0.54 (-1.15)	---	---
AN( $\xi_3$ )→CP( $\eta_4$ )	-1.39 (-1.33)	---	---
SF( $\eta_1$ )→TP( $\eta_3$ )	0.66** (1.97)	---	---
SF( $\eta_1$ )→CP( $\eta_4$ )	0.37 ** (1.97)	---	---
CF( $\eta_2$ )→TP( $\eta_3$ )	1.80 *** (5.48)	---	---
CF( $\eta_2$ )→CP( $\eta_4$ )	2.12 *** (4.29)	---	---
LBN( $\xi_2$ )→CF( $\eta_2$ )→TP( $\eta_3$ )	0.02*** (1.99)	0.0360	0.0560
LBN( $\xi_2$ )→CF( $\eta_2$ )→CP( $\eta_4$ )	0.02*** (1.99)	0.0424	0.0624
AN( $\xi_3$ )→SF( $\eta_1$ )→TP( $\eta_3$ )	0.56 ** (7.29)	0.2072	0.7672
AN( $\xi_3$ )→CF( $\eta_2$ )→TP( $\eta_3$ )	-0.54 (-1.15)	1.7280	1.7280
AN( $\xi_3$ )→SF( $\eta_1$ )→CP( $\eta_4$ )	0.56 ** (7.29)	0.3696	0.9296
AN( $\xi_3$ )→CF( $\eta_2$ )→CP( $\eta_4$ )	0.96*** (4.37)	2.0352	2.9952

Source: Authors' own research

Note: PhN= Physical Need; LBN= Love and Belonging Need; AN=Aspiration Need; SF=Supplementary Fit; CF=Complementary Fit; TP=Task Performance; CP=Contextual Performance

( ) t-value

As shown in the empirical results (Figure 3 and Table 6), in general, the complementary and complementary fits of the P-O fit have a positive effect on task performance and contextual performance of work motivation. The direct effects between work motivation (physical need, love and belonging need and aspiration need) and job

performance (task performance and contextual performance) are weaker than the indirect effect which is the effect through P-O fit. Therefore, P-O fit is considered as mediator while Taiwanese-invested enterprises adopt P-O fit concept to affect the Vietnamese employees' job performance. The direct and indirect effects are described as follows.

#### Direct Effects

The direct effect of the linear structural relation model is as previously explained in the estimated results of H1a, H1b, H1c, H1d, H1e, H2a, H2b, H2c, H2d, H2e and H3, thus this section will not be further detailed here.

#### Indirect Effects

The various indirect paths under different aspects of work motivation that affect job performance via P-O fit is as follows:

As notified in Figure2 and Table 6, regarding the six indirect path of love and belonging needs → complementary fit → task performance, love and belonging needs → complementary fit → contextual performance, aspiration needs → complementary fit → task performance, aspiration needs → supplementary fit → contextual performance, aspiration needs → supplementary fit → task performance, aspiration needs → supplementary fit → contextual performance, we find that the indirect effects of love and belonging needs and aspiration needs on job performance(task or contextual performance) through P-O fit (complementary or supplementary fit) are 0.036, 0.0424, 0.2072, 1.728, 0.3696 and 2.0352, respectively. As indicated in the aforementioned six direct effects of love and belonging needs → task performance, love and belonging needs → contextual performance, aspiration needs → task performance, aspiration needs → contextual performance, aspiration needs → task performance, aspiration needs → contextual performance, the direct effects of love and belonging needs and aspiration needs on job performance (task or contextual performance) are -0.09, 0.02, -0.54, -0.54, -1.39, and -1.39, respectively.

#### Total Effects

The total effects of 0.056, 0.0624, 0.7672, 1.728, 0.9296 and 2.9952 are all larger than the direct effects. Based on the empirical results under these six path analyses, we draw the hypothesis H4: Work motivation has a stronger positive impact on job performance when P-O fit is the mediator (intermediary).

The purpose of path analysis is to determine the relative strength of different paths on job performance. Table 6 describes the direct, indirect, and total effects of the estimated model. As indicated above, these six indirect path of love and belonging needs or aspiration

needs are found to have larger effect on job performance (task performance and/or contextual performance) via P-O fit (complementary and Supplementary fit) than the direct effect. Compared with physical needs, love and belonging needs and aspiration needs are main determinants of employees' work motivation for Taiwanese-invested enterprises in Vietnam. We also find that in order for belonging needs and/or aspiration needs of work motivation to have a positive impact on job performance, P-O fit (complementary and Supplementary fit) needs to be included as a mediating variable.

Love and belonging needs and aspiration needs interacting with P-O fit (complementary and supplementary fit) has a stronger effect on job performance (task performance and/or contextual performance) than a direct effect. Especially, some of direct effect for love and belonging needs and aspiration needs on job performance (task performance and contextual performance) are negative (-0.09, -0.54, -1.39). However, using P-O fit (complementary or supplementary fit) as a mediator reverses this directly negative influence effect, as the total effects (0.056, 0.7672, 1.278) all turn into positive influence effects. This reversal effect highlights the importance of P-O fit as a mediator for job performance. The above results also suggest that administrators/operators of of Taiwanese-invested enterprises in Vietnam should intentionally encourage employees' work motivations to interact with P-O fit, as this interaction will lead to improved work performance (task performance and situational performance). Furthermore, the strength of this indirect effect displays the potentially powerful nature of P-O fit (complementary and/or supplementary fit) as a role of intermediary.

### **Concluding Remarks**

This section presents the conclusions drawn from the empirical results of this study. It then makes recommendations to Taiwanese-invested enterprises in Vietnam and Vietnamese laborers wish to work in these enterprises.

#### *Main Findings*

Our empirical research results show that the main determinants of work motivation of Vietnamese employees working in Taiwanese-invested enterprises in Vietnam are aspiration, love and belonging, and physical needs in order. In addition, based on the research results of SEM, the intermediary effect of P-O fit can be defined as an important mediating factor (intermediary) between love and belonging as well as aspiration needs of work motivation and job performance. The direct effects from these work motivation to job performance are smaller than the indirect effect from these work motivation to job performance with P-O fit as an intermediary. The empirical results also imply that these work motivations alone are not sufficient to generate the best job performance unless P-O

fit is considered. Therefore, it is necessary to consider the supplementary and complementary fit within P-O fit to obtain a greater effect for Taiwanese-invested enterprises in Vietnam.

### *Managerial Implications*

Taiwanese-invested enterprises in Vietnam can base the relationships among these seven factors to satisfy their work motivation and fulfill P-O fit and job performance. The physical need is high pay and benefits; love and belonging need is caring employees and rewarding employees for good performance; aspiration needs are learning new knowledge and positive feedback from managers. Supplementary fit manifests as fair treaties and respect from managers. Complementary fit is such as meeting work goals on time and keeping working hours. The last two factors are task and contextual performance, including managing emotions, identifying job responsibilities, helping colleagues and newcomers. With the interactions of the work environment, enterprises can also understand the real relationship between work motivation and job performance. Through the coordination of the P-O fit, the ability to explain the variation of work motivation on job performance can indeed be improved. Therefore, the enterprises can formulate appropriate human resource management strategies, which can not only reduce strike and turnover rate by enhancing work motivation but also improve job performance via P-O fit in their organization.

Vietnamese labors who work for Taiwanese-invested enterprises may consider the love and belonging and aspiration needs as their work motivations, also combining the person-organization fit. For supplementary fit, employees share the spirit, the value and the culture with organizations. For complementary fit, supplying more resources, time, effort, commitment, experience, etc. to reach the tasks and further contribute to the company's job performance as they work.

## **REFERENCES**

- Ahmad, K. Z. (2012). The mediating effect of person-environment fit on the relationship between organizational culture and job satisfaction. *International Journal of Psychological Studies*, 4(1), 91-102. DOI:10.5539/ijps.v4n1p91
- Akça, C. & Özdemir, H. O. (2020). A research on determining the moderating role of person-job fit in the effect of person-organization fit on contextual performance. *Hitit University Journal of Social Sciences Institute*, 13(2), 550-565. <https://dergipark.org.tr/tr/download/article-file/1324758>

- Bagozzi, R. P. & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 74-94. <https://link.springer.com/article/10.1007/BF02723327>
- Basalamah, M. S. A. & As'ad, A. (2021). The Role of Work Motivation and Work Environment in Improving Job Satisfaction. *Golden Ratio of Human Resource Management*, 1(2), 94-103. DOI: 10.52970/grhrm.v1i2.54
- Borman, W. C. & Motowidlo, S. J. (1997). Task performance and contextual performance: The meaning for personnel selection research. *Human performance*, 10(2), 99-109. [https://doi.org/10.1207/s15327043hup1002\\_3](https://doi.org/10.1207/s15327043hup1002_3)
- Byrne, D. (1969). Attitudes and attraction. *Advances in Experimental Social Psychology*, 4, 35-89. [https://doi.org/10.1016/S0065-2601\(08\)60076-3](https://doi.org/10.1016/S0065-2601(08)60076-3)
- Cable, D. M. & Edwards, J. R. (2004). Complementary and supplementary fit: a theoretical and empirical integration. *Journal of Applied Psychology*, 89(5), 822-834. <https://doi.org/10.1037/0021-9010.89.5.822>
- Chin, W. W. (2010). How to write up and report PLS analyses. In V. Esposito Vinzi, W. W. Chin, J. Henseler and H.Wang (Eds.), *Handbook of partial least squares: Concepts, methods and application*. New York: Springer, 645-689. [https://doi.org/10.1007/978-3-540-32827-8\\_29](https://doi.org/10.1007/978-3-540-32827-8_29)
- Comrey, A. L. & Lee, H. B. (2013). *A first course in factor analysis*. Psychology Press.
- Farooqui, M. S. and Nagendra, A. (2014). The impact of person organization fit on job satisfaction and performance of the employees. *Procedia Economics and Finance*, 11, 122-129. [https://doi.org/10.1016/S2212-5671\(14\)00182-8](https://doi.org/10.1016/S2212-5671(14)00182-8)
- Gagné, M. & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, 26(4), 331-362. DOI: 10.1002/job.322, [https://selfdeterminationtheory.org/wp-content/uploads/2014/04/2005\\_GagneDeci\\_JOB\\_SDTtheory.pdf](https://selfdeterminationtheory.org/wp-content/uploads/2014/04/2005_GagneDeci_JOB_SDTtheory.pdf)
- Griffin, M., Neal, A. & Neale, M. (2000). The contribution of task performance and contextual performance to effectiveness: Investigating the role of situational constraints. *Applied Psychology*, 49(3), 517-533. <https://doi.org/10.1111/1464-0597.00029>
- Hemakumara, M. G. G. (2020). The impact of motivation on job performance: A review of literature. *Journal of Human Resources Management and Labor Studies*, 8(2), 24-29. DOI: 10.15640/jhrmls.v8n2a3, <https://scirp.org/reference/referencespapers?referenceid=3055196>
- Hoffman, B. J. & Woehr, D. J. (2006). A quantitative review of the relationship between person-organization fit and behavioral outcomes. *Journal of Vocational Behavior*, 68(3), 389-399. <https://doi.org/10.1016/j.jvb.2005.08.003>

- Hue, T. H. H., Vo Thai, H. C. & Tran, M. L. (2022). A link between public service motivation, employee outcomes, and person–organization fit: Evidence from Vietnam. *International Journal of Public Administration*, 45(5), 379-398. DOI: 10.1080/01900692.2021.1912086, <https://ideas.repec.org/a/taf/lpadxx/v45y2022i5p379-398.html>
- Jehanzeb, K. & Mohanty, J. (2018). Impact of employee development on job satisfaction and organizational commitment: person–organization fit as moderator. *International Journal of Training and Development*, 22(3), 171-191. <https://doi.org/10.1111/ijtd.12127>
- Kao, K. Y., Hsu, H. H., Thomas, C. L., Cheng, Y. C., Lin, M. T. & Li, H. F. (2021). Motivating employees to speak up: Linking job autonomy, P-O fit, and employee voice behaviors through work engagement. *Current Psychology*, 1-15. DOI: 10.1007/s12144-020-01222-0 , <https://awspntest.apa.org/record/2021-06179-001>
- Kaur, A. (2013). Maslow’s need hierarchy theory: Applications and criticisms. *Global Journal of Management and Business Studies*, 3(10), 1061-1064. [https://www.ripublication.com/gjmbsspl/gjmbssv3n10\\_03.pdf](https://www.ripublication.com/gjmbsspl/gjmbssv3n10_03.pdf)
- Kristof, A. L. (1996). Person-organization fit: An integrative review of its conceptualizations, measurement and implications. *Personnel psychology*, 49(1), 1-49. <https://doi.org/10.1111/j.1744-6570.1996.tb01790.x>
- Locke, E. A. (1996). Motivation through conscious goal setting. *Applied and Preventive Psychology*, 5(2), 117-124. [https://doi.org/10.1016/S0962-1849\(96\)80005-9](https://doi.org/10.1016/S0962-1849(96)80005-9)
- Maslow, A. H. (1970). *Motivation and personality*. New York: Harper and Row
- Nunnally, J. C. (1978). An overview of psychological measurement. *Clinical diagnosis of mental disorders: A handbook*, 97-146. [https://link.springer.com/chapter/10.1007/978-1-4684-2490-4\\_4](https://link.springer.com/chapter/10.1007/978-1-4684-2490-4_4)
- Papadopoulou, K. (2020). Comparative review of performance measurement methods effectiveness. *Economics and Management*, 17(1), 127-139. <http://em.swu.bg/images/SpisanieIkonomikaupload/SpisanieIkonomika2020/ vol.XVII issue 1 2020-127-139.pdf>
- Pattnaik, L., Mishra, S. & Tripathy, S. K. (2020). Perceived Organizational Support and Organizational Commitment: Moderating Role of Person-Organization Fit. *Global Business Review*, 1, 1-14. DOI: 10.1177/0972150920920776
- Pandey, J. (2018). Factors affecting job performance: an integrative review of literature. *Management Research Review*, 42(2), 263-289. <https://www.emerald.com/insight/content/doi/10.1108/MRR-02-2018-0051/full/html>
- Rabhi, M., Harizi, R. A., Djoual, M. S., & Thamri, A. (2023). Decision-making processes between contextual factors and the structural dimensions of the organization: structural equations

- modeling analysis. *Economics and Management*, 20(1), 43-67. DOI: 10.37708/em.swu.v20i1.4, [http://em.swu.bg/images/Spisanielkonomikaupload/Spisanielkonomika2023/4\\_19.03.2023\\_Decision-Making%20version\\_corrected\\_compressed.pdf](http://em.swu.bg/images/Spisanielkonomikaupload/Spisanielkonomika2023/4_19.03.2023_Decision-Making%20version_corrected_compressed.pdf)
- Reiche, B. S., Lee, Y. T. & Allen, D. G. (2019). Actors, structure, and processes: A review and conceptualization of global work integrating IB and HRM research. *Journal of Management*, 45(2), 359-383. <https://doi.org/10.1177/0149206318808885>
- Robbins, S. P. & Judge, T. A. (2017). *Organizational behavior* (17th Edition). Edinburgh Gate Harlow Essex CM20 2JE, England: Pearson Education Limited. <https://scirp.org/reference/referencespapers?referenceid=2647298>
- Robbins, S. P. (1998). *Organizational behavior, concept, controversies and application* (8th Edition). Pearson-Prentice Hall.
- Schneider, B. (1987). The people make the place. *Personnel Psychology*, 40(3), 437-453. <https://doi.org/10.1111/j.1744-6570.1987.tb00609.x>
- Thuy, N. T. T. & Phinaitrup, B. A. (2023). The effect of public service motivation on job performance of public servants in Vietnam: The role of mediation of job satisfaction and person-organization fit. *International Journal of Public Administration*, 46(5), 326-343. DOI: 10.1080/01900692.2021.1995747, <https://ideas.repec.org/a/taf/lpadxx/v46y2023i5p326-343.html>
- Tsui, A. S. & O'reilly III, C. A. (1989). Beyond simple demographic effects: The importance of relational demography in superior-subordinate dyads. *Academy of Management Journal*, 32(2), 402-423. <https://doi.org/10.2307/256368>, <https://www.jstor.org/stable/256368>
- Vu, D. & Tran, T. M. (2021). Labor disputes and illegal strikes in sustainable development of Vietnam's industrial parks. In E3S Web of Conferences (Vol. 258). *EDP Sciences* 258: 07047. <https://doi.org/10.1051/e3sconf/202125807047>

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**Appendix: List of Abbreviations used in the Empirical Analyses**

***Work Motivation***

- A1: I joined this company because the salary meets my expectations  
 A2: I joined this company because of the annual salary accumulation system  
 A3: The salary paid by the company is relatively high, so I have a lot of motivation to work hard  
 A4: I am highly motivated to work harder for a company where employee benefits meet my needs  
 A5: I am concerned about the amount of bonuses the company pays  
 B1: A safe working environment allows me to focus on my work  
 B2: I don't need to worry about food safety and hygiene because my company is well managed



B3: Because the company has a labor union to protect the rights and interests of employees, I can concentrate on work  
B4: Foreign companies must have labor insurance.  
B5: A foreign company pays health insurance for its employees  
C1: My manager always cares about our employees and listens to us  
C2: I enjoyed my work very much because of my good relationship with my colleagues  
C3: I get enough resources from my manager and colleagues to resolve the issue  
C4: My company has always identified and recognized employees who perform well  
C5: My company regularly hosts employee events such as parties, sports, outings, family days, etc.  
D1: I believe that my company can provide me with a platform to learn new knowledge  
D2: The company's fair and open promotion system motivates me to work harder  
D3: My company has detailed planning procedures that make it easy for me to achieve my goal  
D4: I am I concerned about how my manager evaluates my performance  
D5: I have the confidence to tell others that I work in a foreign company  
E1: The company I like should require high efficiency  
E2: Managers give positive feedback that enables me to maintain or improve their work performance  
E3: I am willing to accept new work arrangements and challenges  
E4: My recognition of success is to produce better work than others  
E5: Thanks to my high degree, I can join a foreign company

### ***P-O Fit***

F1: I am very concerned about the quality of my work  
F2: I care deeply about whether my company treats our employees fairly  
F3: I am happy to attend the training courses arranged by the company to improve my skills and knowledge  
F4: Gaining the manager's respect and trust can motivate me to work hard  
F5: To increase the company's profits as the goal is my work goal  
G1: My skills and knowledge can improve the company's outputs  
G2: My positive attitude and cooperating on work can improve company outputs  
G3: I absolutely abide by the company's working hours, including the need to work overtime  
G4: Due to the good working environment, I was able to meet the work goals on time  
G5: I enjoy the satisfaction of my job and grow in it

### ***Job Performance***

H1: I always finish the work assigned by the manager on time  
H2: I have sufficient knowledge to manage tasks assigned by my manager  
H3: I can manage my motion without affecting my work  
H4: I keep making repeated mistakes at the same job  
H5: I see my job as a responsibility  
I1: I voluntarily participate in the arrangement of company activities  
I2: I always help newcomers in the company to improve their work efficiency

I3: I always help my colleagues solve problems that I am familiar with and able to handle

I4: I am willing to learn additional job-related skills and knowledge to increase my productivity

I5: I am willing to work on weekends if need be

## **DIGITAL FINANCIAL LITERACY AND THE PERFORMANCE OF FEMALE ENTREPRENEURS IN NIGERIA**

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### ***Abstract***

*This cross-sectional study investigates the interplay between entrepreneurial knowledge dimensions—Digital Knowledge (DK), Financial Knowledge (FK), Awareness of Digital Finance Risk (ADFR), Digital Finance Risk Control (DFRC), and Knowledge of Digital Finance Systems (KDFS)—and the Performance of Female Entrepreneurs (PFE) in the context of digital finance. A survey research method with purposive sampling through an online questionnaire of 94 female entrepreneurs in Kaduna state has been employed. The study found that digital knowledge (DK), financial knowledge (FK), awareness of digital finance risk (ADFR), digital finance risk control (DFRC) and knowledge of digital finance systems (KDFS) have positive and significant impact on the performance of female entrepreneurs (PFE). The study acknowledges limitations such as the cross-sectional design and the absence of mediators and moderators in the analysis. Practically, the study underscores the importance of cultivating positive attitudes and enhancing perceived control among female entrepreneurs in the digital finance realm.*

**Keywords:** *digital knowledge; financial knowledge; awareness of digital finance risk; digital finance risk control; knowledge of digital finance systems, resource-based view*

**JEL Codes:** *M30, M31, M37*

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### **Introduction**

In Sub-Saharan Africa, the number of female micro-entrepreneurs have increased dramatically. This is due to the fact that female entrepreneurs usually commit practically all of their personal time, energy, and resources to generating income to remain afloat and expand their wealth (Pandey & Gupta, 2018). Furthermore, entrepreneurship allows women to thrive autonomously, lessening their concerns about their abilities to care for their children and, as a result, promoting other women to pursue personal, financial, or autonomous choices to advocate for themselves (Kevehazi, 2020). Sadly, many female

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entrepreneurs are still unable to reach their full potential (Hassan & Mugambi, 2013). Probably, as a consequence of not having enough exposure to financial education, adequate bookkeeping skills, cash flow forecasting, having poor social networks, gender-based discrimination, family obligations, work-life conflicts and general cultural prejudice (Liu, Pacho & Xuhui, 2019).

The entrepreneurship world is changing due to digital revolution. The digital revolution has had a profound impact on how businesses function in the quickly changing economic environment of today, particularly Small- and Medium-sized Enterprises (SMEs) (Oktasavira & Ismanto, 2022). In addition to altering how SMEs carry out their daily business, the digital sphere has also revolutionised the financial scene by providing new opportunities for expansion and success (Gosal & Nainggolan, 2023). But one essential component is necessary for navigating this digital financial landscape successfully: digital financial literacy. Female entrepreneurs need to be digitally literate in order to manage their finances, business operations, and minimise risks. Moreover, the fact that self-driven financial literacy via Fintech is going to grow even more crucial in our global economy is underscored by the world becoming more digital (Wil & Leslie, 2022; Stanoevska, Danevska, Sadiku & Dmitrieska, 2023).

Prasad, Meghwal and Dayama (2018) described digital financial literacy (DFL) as the comprehension of the online payment and banking systems for the purpose of expenditure and accumulation of funds. Azeez and Akhtar (2021) viewed it as taking into account digital monetary risks, improved use of knowledge about digital financial products, the fundamentals of risk control, comprehensive understanding of consumer rights and redress channels. To Lyons and Kass-Hanna (2021), DFL is financially literate on digital platforms which combines digital and financial literacy. Additionally, Xiao et al. (2014) noted that metrics of both financial and digital literacy/knowledge are used to conceptualise digital financial literacy. They described financial knowledge (FL) as being aware of financial services and products as well as having the application skills and literacy necessary to manage financial resources and attain excellent financial health, while being proficient with digital technologies is seen as digital literacy/knowledge.

It is noteworthy to mention that digital financial literacy is a relatively novel idea, existing at the nexus of digital and financial knowledge, and allowing users to fully benefit from digital financial services. As far as the researchers are aware, not many studies have been conducted in these areas, hence this study is proactive rather than reactive because the variables employed in it are novel. As such, this study included a portion of Ravikumar, Suresha, Prakash, Vazirani and Krishna (2022) dimensions of digital financial literacy such as digital knowledge, financial knowledge, awareness of digital financial risk, knowledge

of digital financial services, digital financial risk control which are newly proposed measures.

A number of studies, e.g. Khwatenge & Muchelule, 2023; Ojobo, Orga, & Okechukwu, 2023; Widiastuti, Kurniasih & Sri Martini, 2021; Fauzi, Antoni & Suwarni, 2020, demonstrated that the effect of digital knowledge on the performance of SMEs is direct and significant. The ability to read and comprehend information, especially when it comes to digital formats, goes hand in hand with the capacity to gather information. Digital technology may be a useful tool for SMEs in a number of ways, including cost reduction, strengthening customer networks and connections, enabling market niches, and stimulating innovation. In addition to increasing organizational competitiveness, ICT adoption can be a potent tactical and strategic weapon that boosts firm performance (Ranatunga, Priyanath, & Megama, 2020).

In the same vein, previous studies, e.g. Tuffour, Amoako & Amartey, 2022; Frimpong, Agyapong & Agyapong, 2022; Wati, Sumiati & Andarwati, 2021; Ye & Kulathunga, 2019; Games & Rendi, 2019; Lusardi, Michaud & Mitchell, 2017; Adomako, Danfo & Ofori, 2016; Eniola, Entebang, & Law, 2015, have displayed a positive and influential connection between financial knowledge and performance of SMEs. This base on the assertion that highly knowledgeable entrepreneurs in finance will be incentivised to actively participate in the management of the company's finances or offer financial guidance in order to address financial issues which will ultimately boost firm performance.

Awareness of digital financial risk refers to being knowledgeable and cautious about potential risks and threats related to financial transactions conducted online. It is critical to comprehend the privacy policies, security precautions, and potential frauds or scams related to digital financial transactions. When conducting business online, female entrepreneurs are advised to keep themselves educated and adopt the appropriate security measures to safeguard their financial and personal data. A number of researches (Ismanto, Widiastuti, Muharam & Pengestuti, 2021; Tuffour, Amoako & Amartey, 2022) discovered a direct and impactful connection between financial risk and performance of SMEs. In contrast, Amenawo, Chris, and James (2019) and Gayan and Koperunthevy (2016) discovered that there is no meaningful connection between SMEs' performance and financial risk.

Digital financial risk control is a continuous, monitored, controlled, and integrated formal process that defines objectives, identifies points of uncertainty, analyses unpredictability of uncertainty, and develops management capabilities in order to achieve a suitable balance of opportunity and risk. Similarly, risk control is a continual process that may assist in improving processes, desired outcomes, and resources; ensure statutory compliance; achieve performance objectives; promote financial stability; and, ultimately, avoid loss and damage to the organisation (Dickinson, 2001). Numerous studies, e.g. Ajayi

& Osasona, 2023; Yakob, Syah, Yakob & Raziff, 2019; Yang, Muhammad & Muhammad, 2018; Gayan & Koperunthevy, 2016; Yaakub & Mustafa, 2015; Yusuf & Dansu, 2013, found a positive and significant effect of financial risk control on performance of SMEs.

Knowledge of digital financial services can significantly boost the accessibility of fundamental financial services to people of all ages particularly the poor in an affordable, feasible, as well as safe setting using advanced technologies such as digital payment platforms, digital currency models, and mobile devices phone-enabled solutions. To make efficient use of digital financial services, the entrepreneur must be digitally literate. Digital financial services provide financial clients with both benefits and problems. According to the Alliance for Financial Inclusion (2021), problems include accepting complicated technology-based financial products and managing sophistication, whereas opportunities include personalised financial products and services, faster transactions, and convenient access to financial products. According to the OECD (2018), digital financial services encompass a range of financial operations that leverage digital technology, such as branch-less banking, i-teller, mobile and online financial services, electronic money, and mobile financial services. For female entrepreneurs, knowledge of digital financial services is essential since it is a prerequisite for both obtaining and using other expertise. Many studies, e.g. Zulqarnain, Mustehsan & Balouch 2023; Tuffour, Amoako & Amartey, 2022; Yuyi, 2022; Fernanda & Rodrigo, 2022, have found positive and significant impact of digital financial services on performance of SMEs.

Meanwhile, performance is described as the completion of a work to specified, acknowledged criteria of timeliness, completeness, cost, and accuracy. According to McNamara (2018), performance in a contract is defined as the accomplishment of a duty in a way that absolves the performer of all contractual obligations. It involves applying knowledge, skills, and abilities to complete a task. With new opportunities and difficulties, the integration of digital tools into financial processes has become a revolutionary force. Women entrepreneurs must have a sophisticated understanding of financial technologies and how to use them in order to successfully navigate this digital landscape.

This study aims to expand on past research findings and probe further into the intricate connection between digital financial literacy and the success of female entrepreneurs in Nigeria. The purpose of this study is to look at how knowledgeable female entrepreneurs are about digital financial tools, their ability to use these tools, and what effect this has on their financial health and development potential, with the ultimate goal of increasing female entrepreneurs' prosperity and resilience in the digital era. Therefore, on the basis of the aforementioned literature gaps, the study hypothesised that:

H01: Digital Knowledge does not have significant influence on performance of female entrepreneurs in Nigeria.

H02: Financial Knowledge does not have significant influence on performance of female entrepreneurs in Nigeria.

H03: Awareness of digital financial risk does not have significant influence on performance of female entrepreneurs in Nigeria.

H04: Digital finance risk control does not have significant influence on performance of female entrepreneurs in Nigeria.

H05: Knowledge of digital financial services does not have significant influence on performance of female entrepreneurs in Nigeria.

### ***Theory of Resource-Based View***

This research is based on the Resource-Based View (RBV). Digital financial literacy is crucial for improving female entrepreneurial success, especially when seen through the perspective of the firm's resource-based view (RBV). According to this theoretical approach, a company's productivity and success are heavily influenced by its distinctive resources and competencies (Barney, 1991). For female entrepreneurs, digital financial literacy is a valuable, unusual, distinctive, and not replaceable resource that has the potential to provide a competitive edge. For example, understanding and using digital financial tools allows these entrepreneurs to better manage their finances, access online financing sources, assess market trends, and make educated choices that are critical for company survival and development (Lusardi & Mitchell, 2014). Furthermore, digital financial literacy empowers women by breaking down conventional barriers to financial markets and networks, which often results in better company performance in terms of profitability, long-term viability, and sustainability. Thus, in the context of RBV, increasing digital financial literacy among female entrepreneurs is critical because it provides them with crucial skills and information that serve as strategic resources for improving their company success.

### **Methodology**

The study used a quantitative research design, including survey and cross-sectional research methods, to evaluate digital financial literacy among female entrepreneurs in Kaduna State. The target respondents consisted of female entrepreneurs with postsecondary educational backgrounds and access to electronic mail, since digital financial literacy was thought to need formal educational literacy and technology competency. The study aims to gather perspectives from female entrepreneurs with postsecondary education and email capabilities, since they are more likely to have the necessary skills for navigating digital financial systems. To collect data, an online questionnaire was sent to 120 female entrepreneurs. Out of the 106 pieces of questionnaire received, 12 were removed because

of missing or incomplete information, leaving a final sample size of 96 respondents for analysis. This resulted in an overall response rate of 80%, showing a high degree of engagement within the targeted sample. Furthermore, the use of a snowball sampling approach aided in the identification of new participants through existing relationships, possibly increasing the sample size and diversity of opinions represented in the study.

### ***Measures***

This study used research instruments from prior studies to evaluate the research instruments. First, multidimensional scale digital financial literacy was measured using Ravikumar, et al (2022) digital financial literacy scale adapted to suit the Nigeria context. Digital Knowledge (DK) was assessed using 5-item with Cronbach's alpha of 0.823 depicting the consistency of the instrument. A sample of the question is: "I use internet banking". Financial Knowledge (FK) was measured using 6-item with Cronbach's alpha of 0.716 showing that the instrument is consistent. One of the sampled items is: "I prepare a budget for my personal finance every month". Knowledge of Digital Financial Services (KDFS) with 4-items was used to measure the construct. The reported Cronbach's alpha was 0.721 showing that the instrument is appropriate for this study. One of the research items is: "I am aware of digital payment methods such as Konga, Jumia, Alibaba and so on". Awareness of Digital Finance Risk (ADFR) was measured employing 4-items with reported Cronbach's alpha of 0.701 displaying that the instrument is dependable. A sample question is "I am aware that I am exposed to various risks such as phishing, and spyware when I perform a digital financial transaction". Digital Finance Risk Control (DFRC) with reported Cronbach's alpha of 0.792 and 4-items. "I can resolve errors that happen in a digital financial transaction" was utilised to measure the last dimension of financial digital literacy. The criterion variable Performance of Female Entrepreneurial (PFE) was measured using 8-items of Spillan and Parnell (2006) with reported Cronbach's alpha of 0.764. A sample of the question is: "Profit goals have been achieved".

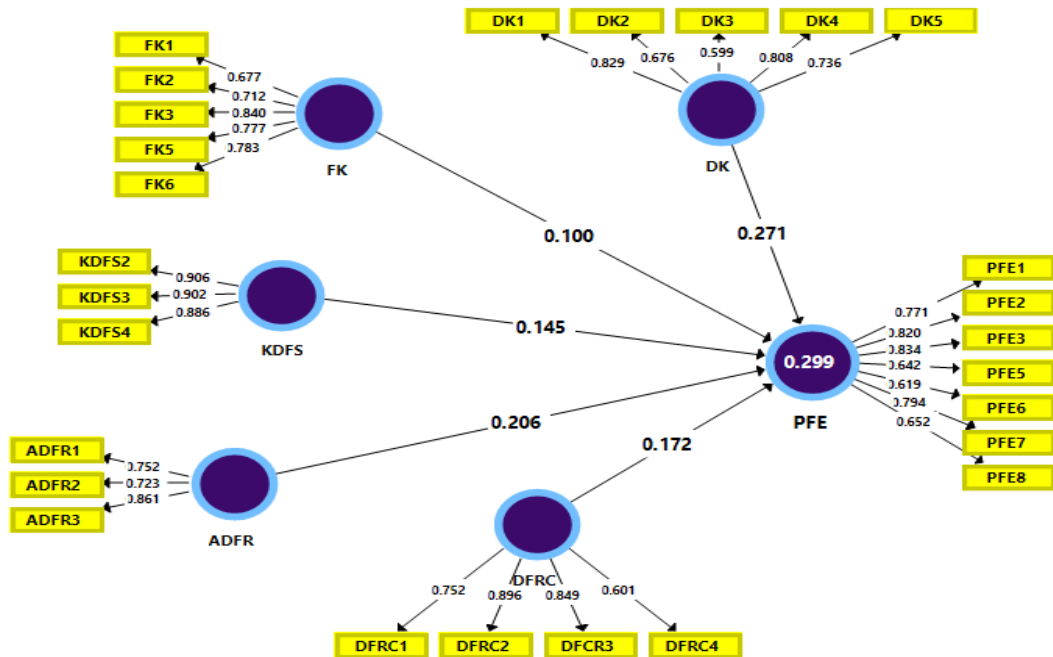
### ***Research Findings***

The research employed a structural equation model (SEM) to examine the hypothesised relationship between the constructs, as well as to assess their validity and reliability. The item loadings, reliability, and validity (convergent and divergent validity) were assessed using the SEM measurement model. The influence of the predictor on the criterion variable was determined using the structural model.



## Measurement Model

Figure no. 1 Pictorial display of Measurement Model



Source: Authors' systemisation of Smart-pls output

The research analysis commenced by determining item loadings. According to Hair, Risher, Sarstedt, and Ringle (2019), for subsequent analyses, only items that have a loading of 0.70 or higher should be held and utilised. However, owing to the practicality of possessing loadings that are below 0.7, Hulland (1999) argued for retaining loadings of 0.5 and higher while taking into account the influence of the threshold on convergent validity and reliability. As a result, loadings of 0.5 were preserved, whereas those of less than 0.5, such as FK4, KDFS1, ADFR4, and PFE4, were expunged (see Table 1 and Figure 1). The study was evaluated for convergent validity using Average Variance Extracted (AVE). Hair et al. (2021) advised an AVE value of 0.5 or above to demonstrate that the concept has convergent validity. The fact that all of the constructs' AVE values in Table 1 exceed the 0.5 threshold indicates that the constructs have convergent validity. A value of 0.7 or above is suggested by Hair, Page, and Brunsveld (2020) to indicate consistency and reliability in the construct. It is evident from Table 1 that the composite reliability values are higher than the 0.7 threshold. Thus, the constructs are reliable.

*Table no. 1 - Item Loadings, Reliability and Convergent Validity*

<b>Constructs</b>	<b>Items</b>	<b>Loadings</b>	<b>Composite Reliability</b>	<b>AVE</b>
Awareness of Digital Finance Risk	ADFR1	0.752	0.824	0.610
	ADFR2	0.723		
	ADFR3	0.861		
	DFCR3	0.849		
Digital Finance Risk Control	DFRC1	0.752	0.861	0.613
	DFRC2	0.896		
	DFRC4	0.601		
Digital Knowledge	DK1	0.829	0.853	0.540
	DK2	0.676		
	DK3	0.599		
	DK4	0.808		
	DK5	0.736		
Financial Knowledge	FK1	0.677	0.872	0.578
	FK2	0.712		
	FK3	0.840		
	FK5	0.777		
	FK6	0.783		
Knowledge of Digital Financial Services	KDFS2	0.906	0.926	0.807
	KDFS3	0.902		
	KDFS4	0.886		
Performance of Female Entrepreneurs	PFE1	0.771	0.892	0.545
	PFE2	0.820		
	PFE3	0.834		
	PFE5	0.642		
	PFE6	0.619		
	PFE7	0.794		
	PFE8	0.652		

*Source:* Authors' systemisation of SmartPLS output (2024)

Furthermore, the study checked for divergent validity as recommended by Hair et al., 2019; Kline, 2011. The study checked for divergent validity using heterotraits-monotraits correlation ratio as recommended by Henseler, Ringle and Sarstedt (2015)

owing to the inability of the previous used methods of Fornell and Larcker Criterion and Cross-loading to detect lack of discriminant validity among constructs. Meanwhile, two benchmarks were advocated for by scholars Kline, 2011; Henseler et al., 2021. Kline advocated for a strictly threshold of  $< 0.85$  for construct that are conceptually different while Henseler et al. (2015) recommended a more relax threshold of  $< 0.90$  for construct that are conceptually similar. As such, since the constructs of study are conceptually similar, threshold of  $< 0.90$  was utilised. Therefore, since the correlations between constructs are less than 0.90, divergent validity is hereby confirmed.

*Table no. 2 - Heterotrait-Monotrait (HTMT) Ratio of Correlations Discriminant Validity*

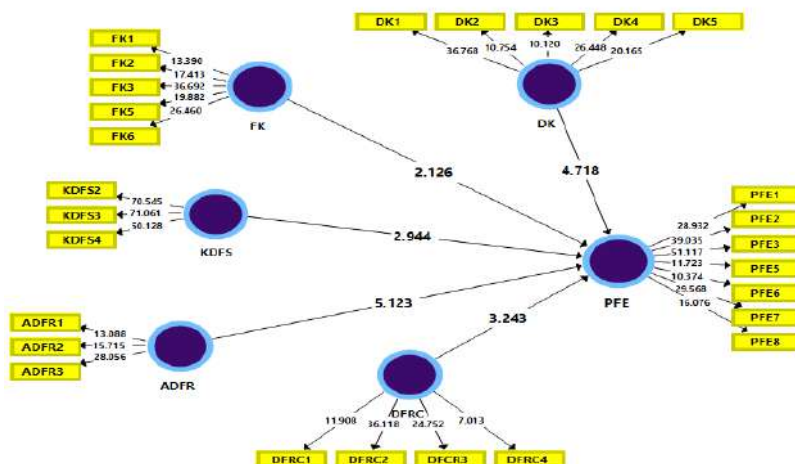
Constructs	ADFR	DFRC	DK	FK	KDFS	PFE
ADFR						
DFRC	0.148					
DK	0.222	0.271				
FK	0.299	0.229	0.496			
KDFS	0.337	0.196	0.219	0.416		
PFE	0.358	0.287	0.461	0.394	0.354	

Source: Authors' systemisation of SmartPLS output (2024)

### Structural Model

The assessment of the direct correlation between the exogenous and endogenous variables is covered in detail in this section. Furthermore, assessments were made of the predictive relevance ( $Q^2$ ), effect size ( $f^2$ ), and coefficient of determination ( $R^2$ ).

*Figure no. 2 Pictorial display of Structural Model*



Source: Authors' systemisation of Smart-pls output

Table no. 3 - Test of Direct Hypotheses

Hypotheses	Relationships	Beta	Standard Deviation	T Statistics	P Values	Decision
H <sub>01</sub>	DK->PFE	0.271	0.057	4.718	0.000	Rejected
H <sub>02</sub>	FK->PFE	0.100	0.047	2.126	0.034	Rejected
H <sub>03</sub>	ADFR->PFE	0.206	0.040	5.123	0.000	Rejected
H <sub>04</sub>	DFRC->PFE	0.172	0.053	3.243	0.001	Rejected
H <sub>05</sub>	KDFS->PFE	0.145	0.049	2.944	0.003	Rejected
<b>R<sup>2</sup>=0.299</b>						

Source: Authors' systemisation of SmartPLS output (2024)

In Table 3 above, H01 indicates a positive connection between Digital Knowledge (DK) and Female Entrepreneurial Performance (PFE), which is supported by a significant beta coefficient of 0.271, T Statistics of 4.718, and a P-Value of 0.000. This shows that the increased digital knowledge has a beneficial impact on female entrepreneurs' performance. As such, H01 was rejected. Hypothesis 2 (H02) investigates the effect of Financial Knowledge (FK) on PFE and finds a beneficial association with a beta value of 0.100. The T Statistics of 2.126 and a P-Value of 0.034 confirm the relevance of this association, emphasising the importance of financial knowledge in moulding the performance of female entrepreneurs. Thus, H02 is rejected. Hypothesis 3 (H03) investigates the positive connection between Awareness of Digital Finance Risk (ADFR) and PFE, as shown by a significant beta coefficient of 0.206, T Statistics of 5.123, and a P-Value of 0.000. This underscores the importance of risk awareness in shaping the performance of female entrepreneurs in the digital financial ecosystem. Therefore, H03 is likewise rejected. Hypothesis 4 (H04) looks at the beneficial influence of Digital Finance Risk Control (DFRC) on PFE, which is supported by a beta coefficient of 0.172, a T statistic of 3.243, and a P value of 0.001. These results show the need to apply digital finance risk management strategies to improve female entrepreneurs' success. As a result, hypothesis H4 is rejected. Finally, Hypothesis 5 (H05) investigates the positive link between Knowledge of Digital Finance Systems (KDFS) and PFE, as shown by a beta coefficient of 0.145, a T statistic of 2.944, and a P value of 0.003. This highlights the importance of digital finance system expertise in affecting the performance results of female entrepreneurs. Consequently, H5 is rejected.

Meanwhile, the  $R^2$  value of 0.299 indicates that the combined influence of Digital Knowledge (DK), Financial Knowledge (FK), Awareness of Digital Finance Risk (ADFR), Digital Finance Risk Control (DFRC), and Knowledge of Digital Finance Systems (KDFS) can explain approximately 30% of the variation in Female Entrepreneurs' (PFE) performance. As Chin (1998) points out, this shows a modest degree of explanatory ability. It also means that the model does not account for all of the variables that contribute to the remaining 70% of unexplained variability in female entrepreneurial performance. Researchers and practitioners should recognise these possible additional variables in order to have a more complete understanding of the dynamics that affect female entrepreneurs' success in the setting of digital finance.

### *Effect Size ( $f^2$ )*

The f-square ( $f^2$ ) in an ANOVA or regression model, is the amount of variance in an endogenous variable that can be explained by every single exogenous variable (Hair, Black, Babin, & Anderson, 2014). The f-square is the ratio of explained variance to total variance, which indicates the strength of the link between variables (Mustapha, Ojeleye & Salisu, 2022). A higher f-square value indicates a bigger effect size, implying that the target independent variable accounts for a greater share of the variability in the dependent variable. Researchers utilise effect size to supplement statistical significance tests, giving them a more complete picture of the practical or substantive relevance of observed correlations (Ojeleye, Ojeleye, Kareem, & Abdullahi, 2023). Cohen (1988) defines effect sizes of 0.02, 0.15, and 0.35 as small, medium, and large, respectively, providing useful insights into the practical implications of study results that go beyond statistical significance.

*Table no. 4 - Effect Size ( $f^2$ )*

<b>Constructs</b>	<b>PFE (<math>f^2</math>)</b>	<b>Effect Size</b>
ADFR	0.055	Small
DFRC	0.039	Small
DK	0.085	Small
FK	0.010	Nil
KDFS	0.025	Small

*Source:* Authors' systemisation of SmartPLS output (2024)

The table presents the effect sizes ( $f^2$ ) for various constructs in relation to the Performance of Female Entrepreneurs (PFE). The effect sizes quantify the proportion of variance in PFE explained by each construct. The Awareness of Digital Finance Risk (ADFR) demonstrates a small effect size of 0.055, indicating a modest impact on PFE.

Similarly, Digital Finance Risk Control (DFRC) and Knowledge of Digital Finance Systems (KDFS) exhibit small effect sizes of 0.039 and 0.025, respectively, suggesting relatively modest contributions to PFE variance. Digital Knowledge (DK) shows a slightly larger effect size of 0.085, implying a slightly more substantial influence on PFE. Conversely, Financial Knowledge (FK) has a negligible effect size of 0.010, indicating minimal impact. These effect sizes provide insights into the practical significance of the relationships, with ADFR, DFRC, DK, and KDFS showing small effects, while FK appears to have a negligible impact on the performance of female entrepreneurs.

### ***Predictive Relevance ( $Q^2$ )***

Hair et al. (2014) define Predictive Relevance ( $Q^2$ ) as a model's ability to accurately anticipate future observations based on known connections. A positive  $Q^2$  value suggests that the model's predictions outperform the mean of the dependent variable. Higher  $Q^2$  values indicate that the model effectively captures and explains the variability in the dependent variable.  $Q^2$  is used by researchers and practitioners to measure a model's generalizability and reliability in predicting outcomes beyond the sample data used for estimate (Ojeleye et al., 2023).

*Table no. 5 - Assessment Predictive Relevance*

<b>Constructs</b>	<b>SSO</b>	<b>SSE</b>	<b><math>Q^2</math> (=1-SSE/SSO)</b>
<b>PFE</b>	2,779.000	2,371.550	0.147

*Source:* Authors' systemisation of SmartPLS output (2024)

Table 5 shows the Predictive Relevance scores for the different variables, with an emphasis on Female Entrepreneurs' Performance (PFE). The Sum of Squares entire (SSO) depicts the entire variability in PFE, while the Sum of Squares Error (SSE) measures unexplained or residual variance. The  $Q^2$  score for PFE is 0.147, suggesting that the model predicts more variation than the mean. The model's positive  $Q^2$  indicates predictive usefulness, explaining 14.7% of female entrepreneurs' performance variability. The evaluation emphasises the model's capacity to produce meaningful predictions about PFE, which helps to improve knowledge of its forecasting accuracy and generalisation beyond the sample data used for the model estimate.

### ***Discussions***

Hypothesis 1 (H01) investigates the complex link between Digital Knowledge (DK) and the Performance of Female Entrepreneurs. The findings reveal a significant beneficial

influence, demonstrating that as female entrepreneurs increase their digital expertise, so does their performance. The outcomes of the study are congruent with prior research of Khwatenge and Muchelule (2023); Ojobo, Orga, and Okechukwu (2023); Widiastuti, Kurniasih, and Sri Martini (2021); and Fauzi, Antoni, and Suwarni (2020). This finding is consistent with the broader understanding that, in an increasingly digital business landscape, entrepreneurs with enhanced digital knowledge are better positioned to leverage technology, optimise operational efficiency, and tap into digital markets, thereby influencing their overall performance. Furthermore, this finding underlines the critical role that digital literacy plays in the success of female entrepreneurs, emphasising the need of promoting digital education and skill development efforts to empower women in the entrepreneurial sphere.

Financial knowledge improves the performance of female entrepreneurs (PFE). These data indicate that the observed association was unlikely to arise by coincidence. The findings are consistent with past research of Tuffour, Amoako, and Amartey (2022); Frimpong, Agyapong, and Agyapong (2022); Wati, Sumiati, and Andarwati (2021); Ye and Kulathunga (2019); Games and Rendi (2019); Lusardi, Michaud, and Mitchell (2017); Adomako, Danfo, and Ofori (2016); and Eniola, Entebang, and Law (2015). This is consistent with long-held beliefs that financial literacy is an important predictor of company success, since entrepreneurs with a solid grasp of financial concepts are better able to make educated choices, manage resources efficiently, and overcome economic problems. The moderate effect size and statistical significance highlight the practical importance of financial knowledge for female entrepreneurs, emphasising the potential benefits of targeted financial education programmes in improving their business acumen and overall performance in the entrepreneurial landscape.

Hypothesis 3 investigates the association between Awareness of Digital Finance Risk (ADFR) and Performance of Female Entrepreneurs (PFE). The large beta value of 0.206 suggests a significant positive effect, meaning that increased knowledge of digital financial hazards is linked to better entrepreneurial success among women in Kaduna state. The findings are consistent with earlier research, such as Tuffour, Amoako, and Amartey (2022); Ismanto et al. (2021). This finding is consistent with current business perspectives that emphasise the critical role of risk management in the digital era, implying that entrepreneurs who are aware of potential financial risks associated with digital transactions are better positioned to proactively mitigate challenges and seize opportunities. The significant impact size emphasises the practical importance of risk awareness, as well as its potential role in determining the performance results of female entrepreneurs. These results add to the wider discussion of risk perception in entrepreneurship, emphasising the

significance of developing risk intelligence among female entrepreneurs in order to increase their resilience and success in the digital financial ecosystem.

The association between Digital Finance Risk Control (DFRC) and Female Entrepreneurs' Performance (PFE) was significant. The hypothesis proposes that efficient management of digital finance risks is linked to improved entrepreneurial success among women in Kaduna state. The findings contradict earlier research, including those of Ajayi and Osasona (2023), Yakob, Syah, Yakob, and Raziff (2019), Yang, Muhammad, and Muhammad (2018), Gayan and Koperunthevy (2016), Yaakub and Mustafa (2015), and Yusuf and Dansu (2013). The concept of risk control is especially pertinent in the context of digital finance since it suggests proactive steps that entrepreneurs may take to limit possible hazards connected with financial transactions in the digital arena. Successful digital finance risk control techniques may include technology protections, secure financial procedures, and effective management practices. A positive validation of this hypothesis would imply that female entrepreneurs who are skilled at navigating and managing digital finance risks may have better overall company success. This study might have an impact on company strategy by emphasising the significance of risk management in the context of digital financial transactions for female entrepreneurs, eventually leading to a more resilient and successful entrepreneurial environment.

Hypothesis 5 showed that knowledge of digital finance services (KDFS) had a significant influence on the performance of female entrepreneurs (PFE). This hypothesis argues that women's entrepreneurial success improves as their understanding of digital financial systems increases. Understanding and managing financial systems may be critical for entrepreneurs in the digital era, as they become more dependent on technology. A positive validation of this hypothesis would imply that female entrepreneurs with extensive understanding of digital finance systems had a competitive advantage, perhaps leading to more effective financial decision-making and overall company success. This study may highlight the need of digital finance literacy programmes and efforts aimed at female entrepreneurs, which seek to improve their knowledge and competence in using digital financial systems to boost performance and competitiveness in their businesses. The findings are congruent with earlier studies of Zulqarnain, Mustehsan, and Balouch (2023); Tuffour, Amoako, and Amartey (2022); Yuyi (2022); and Fernanda and Rodrigo (2022).

### ***Implications***

The hypothesis analysis results have various practical and theoretical implications for the support and growth of female entrepreneurs in the online financial space. The favourable effect of Digital Knowledge (DK), Financial Knowledge (FK), Awareness of Digital Finance Risk (ADFR), Digital Finance Risk Control (DFRC), and Knowledge of



Digital Finance Systems (KDFS) on Female Entrepreneur Performance (PFE) identifies critical areas for focused interventions. Policymakers and business support organisations might create and execute specialised training programmes to increase female entrepreneurs' digital and financial literacy, promoting a better awareness of digital finance systems, risk management methods, and financial decision-making. Furthermore, activities focused at improving knowledge of digital financial hazards and encouraging appropriate risk management techniques may enable female entrepreneurs to traverse the digital business world more confidently. Overall, these findings highlight the importance of comprehensive education and support mechanisms that go beyond traditional entrepreneurial skills, with a particular emphasis on digital and financial aspects, to foster the viability and adaptability of female entrepreneurs in a progressively technology-driven business climate.

The theoretical implications of investigating the influence of digital financial literacy on female entrepreneurial performance using the resource-based view (RBV) are significant. This strategy emphasises the idea that distinctive skills, such as digital financial literacy, constitute the basis for competitive edge and corporate success. According to RBV, not all resources are equally important; crucial assets are those that are precious, uncommon, unique, and non-substitutable, and may have a major impact on a company's success. This research emphasises the potential for female entrepreneurs to gain long-term competitive advantages by classifying digital financial literacy as a strategic resource. This emphasises the necessity of developing such abilities not just to improve individual business success, but also to promote greater financial empowerment and gender equality in the entrepreneurial environment. Additionally, this approach calls for deeper study into how different types of literacy and digital skills may be used to boost entrepreneurial endeavours, especially those headed by women, extending the conversation on entrepreneurship and resource-based strategies.

### ***Limitations and Suggestions for Further Study***

Despite giving significant insights, this research has numerous limitations that should be considered. First, the cross-sectional character of the study methodology makes it difficult to demonstrate causal linkages, impeding a more in-depth knowledge of dynamic processes across time. Furthermore, relying on survey methodologies may result in answer bias and common method variation. The particular selection of entrepreneurs using an online questionnaire may restrict the generalizability of the results since it does not reflect the experiences of a more varied and representative population. Furthermore, by focusing just on direct links and excluding possible mediators or moderators such as institutional support, entrepreneurial orientation, entrepreneurial network, self-efficacy, resilience, digital financial inclusion, management capabilities and service innovation. The research

offers a limited view on the intricate interaction of variables that influence female entrepreneurs' success in the digital finance industry. Future study should use a wider range of research methods, such as longitudinal technique and qualitative designs, to overcome these constraints and provide a more complete knowledge of the complex dynamics involved in female entrepreneurship in the digital financial ecosystem.

## **Conclusion**

The study's findings demonstrate the importance of digital and financial knowledge, risk awareness, and risk management in determining the performance of female entrepreneurs in the context of digital finance. The good associations seen highlight the necessity of providing female entrepreneurs with the skills and knowledge required to negotiate the intricacies of the digital business sector. However, it is critical to recognise the study's shortcomings, such as its cross-sectional design, dependence on survey techniques, and the absence of possible mediators and moderators. These limitations highlight the need of exercising care when drawing causal conclusions and urge for more study to investigate the complex processes at play. Nonetheless, the practical consequences are significant, emphasising the need of focused training activities and support structures to improve the digital and financial literacy of female entrepreneurs. By addressing these results, policymakers and stakeholders may help to create a more favourable climate for female entrepreneurs' success in the changing terrain of digital finance.

## **REFERENCES**

- Adomako, S., Danso, A., & Ofori D. J., (2016). The moderating influence of financial literacy on the relationship between access to finance and firm growth in Ghana. *Venture Capital*, 18(1), 43–61. <https://doi.org/10.1080/13691066.2015.1079952>
- Alliance for Financial Inclusion, DFSWG and CEMCWG (2021). *Digital financial literacy toolkit, alliance for financial inclusion*. Retrieved from [https://www.ssrn.com/abstract=2715350%0ahttps://www.researchgate.net/profile/dharmendra\\_yadav17/publication/313678763\\_exact\\_definition\\_of\\_mathematics/links/58f4d86f458515ff23b551a0/exact-definition-of-mathematics.pdf%0ahttps://www.g20-insights.org/policy](https://www.ssrn.com/abstract=2715350%0ahttps://www.researchgate.net/profile/dharmendra_yadav17/publication/313678763_exact_definition_of_mathematics/links/58f4d86f458515ff23b551a0/exact-definition-of-mathematics.pdf%0ahttps://www.g20-insights.org/policy)
- Alliance of Financial Inclusion (2016). *Indicators of the quality dimension of financial inclusion* (Issue 22). Retrieved from <https://www.afi-global.org/wp-content/uploads/publications/2016-08/GuidelineNote-22-FID-Quality.pdf>
- Amenawo I. O., Chris O. U. & James G. B. (2019). Financial risk and performance of small and medium enterprises in Nigeria. *Investment Management and Financial Innovations*, 16(4), 110-122. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3502673](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3502673)

- Azeez, N. P. A., & Akhtar, S. M. J. (2021). Digital financial literacy and its determinants: An empirical evidence from Rural India. *South Asian Journal of Social Studies and Economics*, 11(2), 8–22. DOI: 10.9734/sajsse/2021/v11i230279, <https://journalsajsse.com/index.php/SAJSSE/article/view/252>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. <https://doi.org/10.1177/014920639101700108>
- Chin, W. W. (1998). The Partial Least Squares Approach to Structural Equation Modelling. In M. G. A (Ed.), *Modern Methods for Business Research*. London: Lawrence Erlbaum Associates. <https://www.scirp.org/reference/ReferencesPapers?ReferenceID=534264>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioural Sciences* (2nd ed.). New York: Lawrence Erlbaum Associates, Publishers.
- Dickinson. (2001). Enterprise risk management, its origins and conceptual foundation", *Geneva Papers on Risk and Insurance*: 26 (3), 360-366, <https://link.springer.com/article/10.1111/1468-0440.00121>
- Eniola, A., Entebang, H., & Law, K. (2015). Financial literacy and SME firm performance. *International Journal of Research Studies in Management*. 5. <https://doi.org/10.5861/ijrsm.2015.1304>.
- Fauzi, F., Antoni, D., & Suwarni, E. (2020). Women entrepreneurship in the developing country: The effects of financial and digital literacy on SMEs' growth. *Journal of Governance & Regulation*, 9(4), 106-115. <https://doi.org/10.22495/jgrv9i4art9>
- Fernanda, F. O. M & Rodrigo, F. M. (2022). The use of digital financial services and business performance satisfaction in the context of female entrepreneurship. *Journal of Technology Management & Innovation*, 17(3). <http://dx.doi.org/10.4067/S0718-27242022000300003>
- Frimpong, S. E., Agyapong, G. & Agyapong, D. (2022). Financial literacy, access to digital finance and performance of SMEs: Evidence from Central Region of Ghana. *Cogent Economics & Finance*, 10:1, <https://doi.org/10.1080/23322039.2022.2121356>
- Games, D., & Rendi, R. P. (2019). The effects of knowledge management and risk taking on SME financial performance in creative industries in an emerging market: the mediating effect of innovation outcomes. *Journal of Global Entrepreneurship Research*, 9(1), 1–14. <https://doi.org/10.1186/s40497-019-0167-1>
- Gayan, M. A., & Koperunthevy, K., (2016). Financial risk, financial risk management practices and performance of Sri Lankan SMEs: Special reference to Anuradhapura District. *Research journal of Finance and Accounting*. 7(15), 23-43, <https://core.ac.uk/reader/234631560>

- Gosal, G. G., & Nainggolan, R. (2023). The Influence of Digital Financial Literacy on Indonesian SMEs' Financial Behavior and Financial Well-Being. *International Journal of Professional Business Review*, 8(12), e04164. <https://doi.org/10.26668/businessreview/2023.v8i12.4164>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate Data Analysis* (7th ed.). Harlow: Pearson Education Limited.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Cham: Springer Nature Switzerland. <https://doi.org/10.1007/978-3-030-80519-7>
- Hair, J. F., Page, M., & Brunsveld, N. (2020). *Essentials of Business Research Methods* (4th ed.). New York: Routledge.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24, <https://doi.org/10.1108/EBR-11-2018-0203>
- Hassan, I. B. & Mugambi, F. (2013). Determinants of growth for women owned and operated micro-enterprises: The case of Garissa, Kenya. *International Journal of Business and Commerce*, 2(7), 45-55. [http://dx.doi.org/10.21511/imfi.19\(1\).2022.12](http://dx.doi.org/10.21511/imfi.19(1).2022.12)
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic Management Journal*, 20, 195–204. [https://doi.org/10.1002/\(SICI\)1097-0266\(199902\)20:2<195::AID-SMJ13>3.0.CO;2-7](https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7)
- Ismanto, H., Widiastuti, A., Muharam, H., & Pengestuti, I.R.D (2020). The impact of risk and financial knowledge, business culture and financial practice on SME performance. *Quality Access to Success*, 21(179), 3–9. <https://doc-pak.undip.ac.id/id/eprint/13772/1/Full%20paper%20The%20Impact%20of%20Risk%20and%20Financial%20Knowledge.pdf>
- Kevehazi K. (2020). Importance of female entrepreneurship. *China-USA Business Review*, 16(7), 299-305. <https://doi.org/10.17265/1537-1514/2017.07.001>
- Khwatenge, I. E. & Muchelule Y. (2023). Digital Literacy and Firm Performance of Small and Medium Enterprises in Nairobi County Kenya. *World Journal of Innovative Research (WJIR)*, 14(4), 10-17. <https://doi.org/10.31871/WJIR.14.4.4>
- Kline, R. B. (2011). *Principles and Practice of Structural Equation Modeling* (3rd ed.). New York: The Guilford Press.
- Liu, J., Pacho, F.T. & Xuhui, W. (2019). The influence of culture in entrepreneurs' opportunity

- exploitation decision in Tanzania. *Journal of Entrepreneurship in Emerging Economies*, 11(1), 22-43. <https://doi.org/10.1108/JEEE-02-2017-0014>
- Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5-44. <https://www.aeaweb.org/articles?id=10.1257/jel.52.1.5>
- Lusardi, A., Michaud, P. C., & Mitchell, O. S. (2017). Optimal financial knowledge and wealth inequality. *Journal of Political Economy*. <https://doi.org/10.1086/690950>
- Lyons, A., & Kass-Hanna, J. (2021). A multidimensional approach to defining and measuring financial literacy in the digital age. <http://dx.doi.org/10.2139/ssrn.3873386>
- McNamara, C. (2018). Performance management: what is "performance"? (Performance Defined). Retrieved from <https://managementhelp.org/performance>
- Mustapha, H. A., Ojeleye, Y. C., & Salisu, U. (2022). Social media and consumer purchase intentions in telecommunications sector of Nigeria: Moderating role of brand love. *Economics and Management*, 19(2), 57-74. <https://doi.org/10.37708/em.swu.v19i2.7>
- Ojeleye, Y. C., Ojeleye, C. I., Kareem, R. F., & Abdullahi, A. (2023). Proactive personality and entrepreneurial intentions among Nigerian students: Moderating role of perceived institutional support. *Oeconomica Jadertina*, 13(1), 19–34. <https://doi.org/10.15291/oec.4139>
- Ojobo, C. A., Orga, C. C., & Okechukwu, E. U. (2023). Impact of digital literacy on the performance of small-scale business in Enugu State. *Advance Journal of Business and Entrepreneurship Development*, 7(1). Retrieved from <https://aspjournals.org/ajbed/index.php/ajbed/article/view/35>
- Oktasavira, N., & Ismanto, N. (2022). Technological literacy and resource management in SME income. *Ekuitas: Jurnal Ekonomi Dan Keuangan*. <https://doi.org/0.24034/j25485024.y2022.v6.i4.5165>
- Pandey, A., & Gupta, R. (2018). Entrepreneur's performance and financial literacy: A critical review. *International Journal of Management Studies*, 5(3), 1-14. <http://dx.doi.org/10.18843/ijms/v5iS3/01>
- Stanoevska, E. P., Danevska, A. B., Sadiku, L., & Dmitrieska, S. (2023). Development of fintech solutions in the Macedonian banking sector, *Economics and Management*, 20(1),78-105. <https://doi.org/10.37708/em.swu.v20i1.6>
- Prasad, H., Meghwal, D., & Dayama, V. (2018). Digital financial literacy: A study of households of Udaipur. *Journal of Business and Management*. 5, 23-32 <http://dx.doi.org/10.3126/jbm.v5i0.27385>
- Ranatunga, R., Priyanath, H., & Megama, R. (2020). Digital Literacy, Business Uncertainty & Economic Performance: An Empirical Study of Small Businesses in Sri Lanka. *International*

- Journal of Academic Research in Business and Social Sciences*, 10(5), 50-76.  
[https://hrmars.com/papers\\_submitted/7171/Digital\\_Literacy\\_Business\\_Uncertainty\\_Economic\\_Performance\\_An\\_Empirical\\_Study\\_of\\_Small\\_Businesses\\_in\\_Sri\\_Lanka.pdf](https://hrmars.com/papers_submitted/7171/Digital_Literacy_Business_Uncertainty_Economic_Performance_An_Empirical_Study_of_Small_Businesses_in_Sri_Lanka.pdf)
- Ravikumar, T., Suresha, B., Prakash, N., Vazirani, K., & Krishna, T. A. (2022). Digital financial literacy among adults in India: measurement and validation. *Cogent Economics & Finance*, 10(1), 1–21. <https://doi.org/10.1080/23322039.2022.2132631>
- Spillan, J., & Parnell, J. (2006). Marketing resources and firm performance Among SMEs. *European Management Journal*, 24(2–3), 236–245. <https://doi.org/10.1016/j.emj.2006.03.013>
- Tuffour, J. K., Amoako, A. A., & Amartey, E. O. (2022). Assessing the Effect of Financial Literacy Among Managers on the Performance of Small-Scale Enterprises. *Global Business Review*. 23(5), 1200-1217 <https://doi.org/10.1177/0972150919899753>
- Wati, C. R., Sumiati, S., & Andarwati, A. (2021). The effect of financial knowledge on firm performance: The role of financial risk attitude as moderation. *International Journal of Research in Business and Social Science*, 10(8). <https://doi.org/10.20525/ijrbs.v10i8.1450>
- Widiastuti, E., Kurniasih, R., & Martini, S. (2021). Can digital literacy increase SMEs performance? An evidence from SMEs in Banyumas. *International Sustainable Competitive Advantage*, 11(1), 130-139. Retrieved from [www.jp.feb.unsoed.ac.id/index.php](http://www.jp.feb.unsoed.ac.id/index.php)
- Wil G., & Leslie C. (2022). Digital financial literacy. *Adult Literacy Education*. <http://doi.org/10.35847/WGolden.LCordie.4.3.20>
- Yaakub, S., & Mustafa, H. K. (2015). Supply chain risk management for the SME's. *Academic Journal of Interdisciplinary Studies*, 4(1s2), 151. <https://doi.org/10.5901/ajis.2015.v4n1s2p151>
- Yakob, S; Syah, H. B.A.M.; Yakob, R; & Raziff, N. A. M. (2019). The effect of enterprise risk management practice on SME performance. *The South East Asian Journal of Management*, 13(2), [doi.org/10.21002/seam.v13i2.11785](https://doi.org/10.21002/seam.v13i2.11785)
- Yang, S., Muhammad, I. & Muhammad, A. (2018). Enterprise risk management practices and firm performance, the mediating role of competitive advantage and the moderating role of financial literacy. *Journal of Risk and Financial Management*, 11(35). <https://doi.org/10.3390/jrfm11030035>
- Ye, J., & Kulathunga, K. M. M. C. B. (2019). How does financial literacy promote sustainability in SMEs? A developing country perspective. *Sustainability (Switzerland)*, 11(10), 1–21. <https://doi.org/10.3390/su11102990>
- Yusuf, T. O., & Dansu, F. S. (2013). SME, business risks and sustainability in Nigeria. *European Journal of Business and Social Sciences*, 2(9), 45-56, <https://www.semanticscholar.org/paper/SMES%2C-BUSINESS-RISKS-AND->

[SUSTAINABILITY-IN-NIGERIA-Yusuf-Dansu/ea9cd9ae0c03b23907807c03d55cf0403e497b73](#)

Yuyi, Z. (2022). The empirical research on impact of digital finance development on the performance of Small and Medium-sized Company in Manufacture Industry in China. *Frontiers in Business, Economics and Management*. 6(3). 81-84. DOI: 10.54097/fbem.v6i3.3317

Zulqarnain, M., Mustehsan, M., Balouch, U., & Munir, S. (2023). Assessing the influence of financial inclusion and digital finance on SMEs performance: the moderating role of technological adaptation. *Journal of Management: Small and Medium Enterprises (SMEs)*, 16(3), 459-476. <https://doi.org/10.35508/jom.v16i3.11943>

## WAYS TO SUPPORT THE ISLAMIC FINANCIAL INDUSTRY THROUGH THE ADOPTION OF FINTECH

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### **Abstract**

*Based on the role of Islamic financial technology in advancing the Islamic financial, this study came with the aim of addressing the issue of financial technology in Arab Islamic banks, as this sector has constituted, during the past few years, a revolution in the field of global and Arab financial systems. Using a descriptive and analytical study of a sample of Arab countries to show the reality of the Islamic banking sector in light of contemporary digital financial applications through numbers, it has been shown that Financial technology development has an impact on a wide range of financial services and helps drive the expansion of both conventional and Islamic finance, reaching \$3.7 trillion by 2022 compared to \$3.44 trillion in 2021 and \$3.14 trillion in 2020 the size of assets compatible with Islamic Sharia. Regarding sukuk, it has experienced remarkable growth in recent years, particularly following the global financial crisis of 2008, reaching approximately \$1.42 trillion by the end of 2020 before increasing to \$1.6 trillion in 2021, considered the highest value of global sukuk issuances (IFSB. 2022).*

**Keywords:** financial technology; Islamic financial; Islamic banks; Arab Islamic banks; Islamic Sharia;

**JEL Codes:** O12

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### **Introduction**

The banking system is the main artery and the main engine of economic life. The degree of economic development of any country is measured by the level of development of the banking system and its ability to finance various development processes.

The existence of a sound and healthy banking system has become one of the urgent necessities that impose itself on any country, on the one hand, and on the other hand, it will create great and high confidence in the state's economic and social policy and enable it to carry out its various tasks. However, the banking sector, locally and globally, is

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facing many challenges. The strong points, variables, and factors that push it towards adopting the performance evaluation process with the aim of identifying weaknesses and deficiencies and trying to address and mitigate them, as well as identifying strengths and trying to enhance them, so that the banking sector can continue its activity and achieve the best returns.

Among the financial institutions that make up the banking system, we find traditional (commercial) banks and Islamic banks, which represent the backbone of economic activity, and are among the external sources in financing the economy. The experiences and practices performed by them, i.e. accepting deposits from clients and granting loans against interest, as for Islamic banks, the positive role they play cannot be ignored. They provide various forms of financing and investment in various financial, economic and social activities in line with the principles of Islamic Sharia. They were able to impose themselves today to become a difficult figure in the composition of the financial and economic cycle in the world. The evidence for this is that since its inception, it has achieved great success and widespread as it crossed the borders of Islamic countries and established its presence in all parts of the world, and despite its recent existence compared to the experience of traditional banks, its annual numbers and shares of banking markets are constantly increasing, whether at the local level or in the market global banking in general. Based on the foregoing, the following problem can be posed:

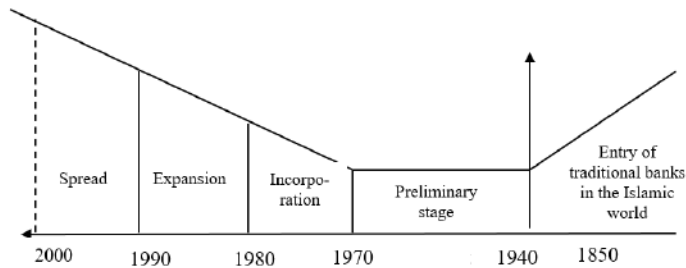
“What is the contribution of financial technology to the advancement of the Islamic banking sector in light of the rapid developments that the technological sector knows?”

To answer this question, we will divide our work into two axes: the first one: Islamic finance and the emergence of Islamic banks in the Arab world. The second one: financial technology and its relationship to Islamic financial services.

### **The First Axis: Islamic Finance and The Emergence of Islamic Banks in The Arab World.**

The idea of the emergence of Islamic banks came in response to the society’s desire to find a formula for banking dealing away from usurious dealings, as the results of the conferences of the Islamic Research Academy in Al-Azhar came to one opinion that “interest on all types of loans is forbidden”. Based on this and on many studies and extensive research, it was necessary to establish a non-interest-based banking system (Obaid, 2019). The emergence and development of Islamic banks can be summarized in five stages as shown in the following figure.

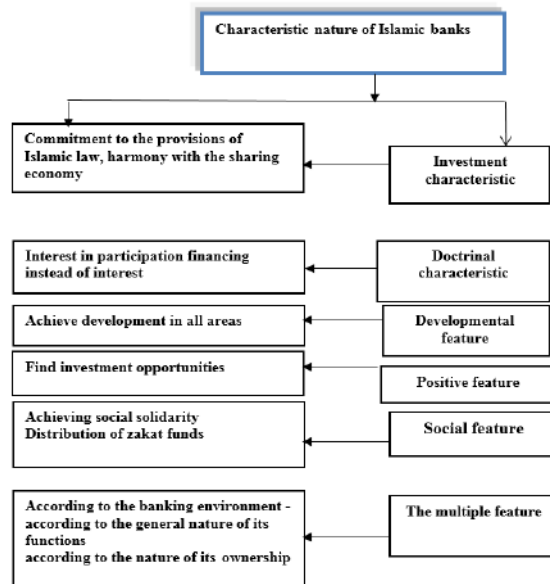
Figure no. 1 The stages of the emergence and development of Islamic banks



Source: Rami Youssef Obaid, The Impact of Islamic Financial Services on Financial Inclusion in Arab Countries, Arab Monetary Fund, United Arab Emirates, 2019, p. 04

The history of the emergence of Islamic financial institutions or Islamic banks goes back to 1940 in Malaysia, where interest-free savings funds were established. In 1950, the idea of adopting financing formulas that adhere to the provisions of Islamic Sharia was transferred to the state of Pakistan. But serious attempts in the modern era to establish banks that provide services and banking activities consistent with the provisions of Islamic Sharia began in 1963 until 1970 through the experience of local savings banks that appeared in Upper Egypt, Dakahlia city hail. Until it became widespread starting in the year 2000, especially after the last major global crisis in 2008.

Figure no. 2 The distinctive nature of Islamic bank



Source: Ben Mostafa for Basel 3 Standards, PhD thesis in Economic Sciences, Abu Bakr Belkaid University, (2017-2018), p. 10

Islamic finance has many institutions. There are Islamic banking and non-banking financial institutions, and there are also supporting financial institutions. Islamic banking is based on foundations and principles derived from the provisions of Islamic Sharia that differ from those principles on which the traditional banking system is based. The work of Islamic banks is distinguished from other banks in contributing to investments and sharing in profits and losses. Accordingly, they do not deal with interest or speculation. They also contribute to achieving social solidarity and distributing zakat funds. This is on the one hand, and on the other hand, Islamic banks do not finance projects other than morally or socially beneficial, such as financing a tobacco project of all kinds and alcohol.

### **Formulas of financing in Islamic banks.**

Islamic banks witnessed a breakthrough: Renaissance and spread in various Islamic and non-Islamic countries of the world, where the latter worked on building their pillars and delving into various types of banking work that are compatible with the provisions of Islamic Sharia. An Islamic frame that agrees with procedure that far from debt and usury produced by traditional banks, where Islamic banks provide financing according to Islamic financing formulas.

*Figure no. 3 Funding formulas in Islamic banks*



*Source:* Created by researcher

There are several financing formulas and methods specific to Islamic banks, the most prominent of which we will summarize as:

## **1. Equity-Based Financing Forms:**

- *Share*: It is a contract between two or more people to work for gain by means of money, business or prestige, so that the sheep will be fined between them according to the agreement (Mahdawi, 2016, p. 32) .

- *Speculation*: It is an agreement between two parties in which one of them exchanges his money and the other exchanges his effort and activity, provided that the profit between them is according to what they stipulate (Khadija, 2017, p. 75).

- *Farming*: It is a partnership between two parties, one of whom has fixed capital represented in the land and may present with it a circulating asset such as seeds, and the second exerts effort and work on the planted, provided that they share a common part of the resulting crop.

- *Musaqat*: It is a person taking care of another person's land planted with trees or plants in exchange for a share of the fruit or plants as agreed upon. (Hachan, 2019)

## **2. Debt-based financing formulas:**

- ✓ *Murabaha*: It is one of the trust sales in Islamic law, where the sale price is determined based on the cost of the commodity plus a profit agreed upon between the seller and the buyer. (Bin-Mustafa, 2016)

- ✓ *Istisna 'a*: It is a contract concluded by a manufacturer, whereby it undertakes to manufacture a commodity according to certain conditions imposed by the Islamic bank, and when the deadline comes, the manufacturer presents his product “accepted by the bank if the required conditions are met,” after which the bank sells it as a “locally manufactured” special commodity, with interest. The bank is the amount in excess of the total cost of the commodity, which is determined by the bank itself. The “made” good is prepared according to demand: buildings, machines, or devices, consumer or production goods...and so on. (Hammadi, 2016, p. 64)

- ✓ *Salam*: It is called immediate sale, present price for the goods, in which the bank obtains the price of the goods from the customer and it is delivered at a later date. (Zaytouni, 2018)

- ✓ *Lease sale*: It is an unconventional financing method where Islamic banks together with the recipient of the financing purchase the equipment required for the projects, for example, for the bank to lease it to the beneficiary for a period of time and under specific conditions. Final purchase. (Issawi, 2014)

- ✓ *Sale in installments*: It is called sale for a specified period, and it means delivery of the appraiser and delaying the price, which is based on enabling the buyer to possess the commodity and benefit from it, provided that he pays its agreed value in

specific installments over a certain period of time, then the seller always becomes the buyer at the sale price (Houhou, 2017).

### 3. Technologies used in financial technology:

Cryptocurrencies: The encrypted currency is a virtual unit of dealing, which exists in an encrypted electronic form, and is characterized by the absence of a physical sup

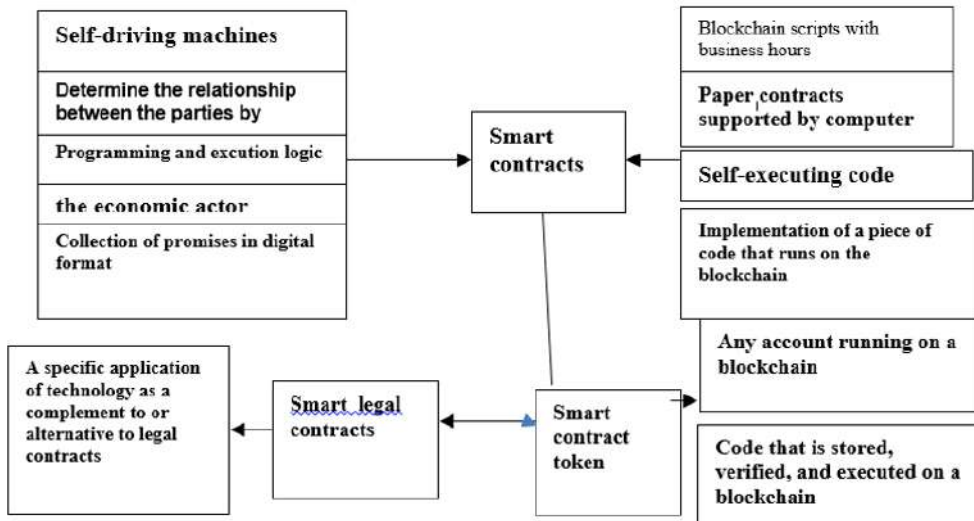
- *Bitcoin*: Bitcoin is defined as a virtual currency based on cryptography in its issuance and circulation, decentralized, and not backed by the government or any other legal entity, and cannot be exchanged for gold or any other commodity.

- *Wealthtech*: Wealth Technology brings the words “wealth” and “technology” together to create a new generation of fintech companies creating digital solutions to transform the investment and asset management industry. Wealthtech has changed how advisors and consumers interact.

- *Insurance Technology*: According to a report prepared by (KMPG), insurance technology is: “Emerging insurance companies are creating new ways and technologies for underwriting”.

- *Cloud computing*: It is simply the use of the Internet to provide computer services, and it is called the cloud because the cloud is the symbol of the Internet.

Figure no. 4 Smart contracts and their various definitions



Source: Pedro J. Bustamante, et all (2019), “A Collaborative Enforcement Mechanism for Spectrum Sharing Using Blockchain and Smart Contracts: An application for the 1695-1710MHz band, p.8

Digital and technical development is one of the most important pillars of the future of the financial and banking sector, as banking transactions are carried out through electronic applications and smart solutions. Financial technologies (FinTech) have a high potential to change the structure and procedures of traditional financial services, except at the level of the banking sector or the financial sector in general.

## **The Second Axis: Financial Technology and its Relationship to Islamic Financial Services.**

### **1. Basic concepts about financial technology**

The term financial technology in its current sense appeared after the global crisis of 2008, and spread and became used globally, and refers to the use of modern technologies in the provision of financial services, as well as the entry of start-up companies that are not specialized in providing these services.

### **2. Definition of financial technology (financial technology)**

It has been defined by the Basel Committee on Banking Supervision as any financial technology and innovation that results in a new business model or product that affects financial markets and institutions (Harfouche, 2019). The FSB also defined financial technology as: “financial innovations using technology that can create new business models, applications, processes or products, and have a material and tangible impact on financial markets and institutions, and on the provision of financial services.” (union of Arab Banks, 2018)

From it, financial technology can be defined as the use of the latest technologies and technological innovations in the provision of financial services, whether by traditional banks or from emerging companies, which raises the efficiency and quality of financial service and reduces its cost with speed and access to larger segments of society (Stanoevska et.al., 2023).

The banking service is characterized as intangible and can only be evaluated after its consumption. There are wide differences between traditional banking services and digital banking services. The latter is characterized by rapid development in various countries of the world and has become the presence of global centers, and even the investments are very active and billions of dollars have been pumped.

*Table no.1 - Islamic Fintech Startups*

<b>Main activity</b>	<b>Country</b>	<b>The name of the Islamic financial technology company</b>	<b>Number</b>
Real estate investment in accordance with the provisions of Islamic law Crowdfunding platform.	Indonesia	Invespropterti.id	1
First Islamic Crowdfunding Platform Investment property.	Singapore	Ethis	2
An Islamic crowdfunding platform focused on small and medium enterprises.	Singapore	KapitalBoost	3
First equity crowdfunding platform in Malaysia.	Malaysia	ATA Plus	4
Big data and analytics using artificial intelligence for Islamic banks.	Malaysia	MyFinB	5
Sharia-compliant online peer-to-peer lending platform via.	Pakistan	InvoiceWakalah	6

*Source:* Rashedul HasanM,Kabir H,SirajoAl,(2020), Fintech and Islamic Finance: Literature Review and Research Agenda, p13.

We note that there are several start-up companies that provide different digital or technological services with economic and social goals that are compatible with Islamic Sharia. Islamic finance offers many banking solutions that suit the needs of various projects. According to the “IFN FinTech report for the year 2020, which is a global network that represents the Islamic part of the financial technology industry, Islamic financial technology institutions are growing at a high pace with 142 companies around the world, and the United Kingdom comes at the foirst place. The United States has 27 companies, then Malaysia has 19 startups, followed by the UAE with 15 companies, Indonesia with 13 companies, and finally Saudi Arabia and the United States with 9 companies.

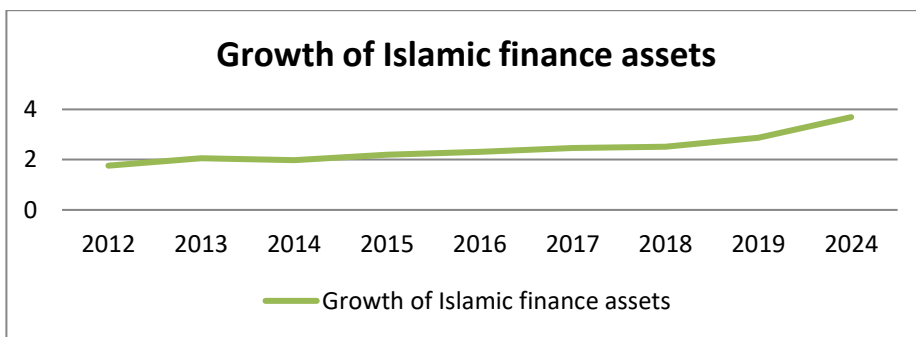
### **3.The concept of Islamic financial technology.**

It is defined as the collection of applications from financial technology products that are compatible with Islamic law and are approved in Islamic financial and banking institutions (Mustafa, 2020). As a result, it can be said that Islamic financial technology is all financial technology innovations that are compatible with Sharia, and are used in Islamic financial services.

The total assets of Islamic banks operating in Arab countries by the end of 2017 amounted to about \$603 billion, which represents about 20 percent of the total Arab banking assets. The ratio of the assets of the Islamic banking sector to the gross domestic product reached about 25 percent at the end of 2017. The size of the assets of Islamic

banks operating in the Gulf Cooperation Council countries reached about 542 billion dollars at the end of 2017. That is, it constituted 90% of the total assets of Arab Islamic banks.

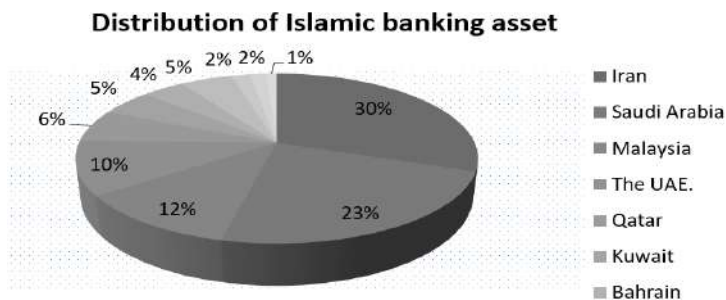
Figure no. 5 Growth of Islamic finance assets (in billion US dollars) between 2012-2024



Source: ICD REFINITIV 2020

Islamic banks are witnessing an increasing growth in the proportion of Islamic financial assets during the period 2012-2024, where they recorded 1.761 trillion US dollars, rising to 3.693 trillion US dollars in 2024.

Figure no. 6 Relative distribution of Islamic banking assets in various countries of the world in 2017



Source: World Bank Group 2017

The previous figure shows that there is a large concentration of banking assets in the countries of the world, with the Arab countries owning 50% of them. Iran is at the forefront of these countries with a percentage of 30.4%, followed by Saudi Arabia with 23.4%, and reaching Pakistan with the lowest percentage of 1.0%. These percentages indicate the expansion of confidence in The Islamic banking industry at the level of all parts of the world.



#### 4.The difference between fintech and Islamic fintech

Both fintech and Islamic fintech share a similar definition, but the main point is that Islamic law (Islamic law, specifically the branch that deals with transactions in the economy) must be taken into account in the latter. For example, fintech is permissible and acceptable in Islam, and is not permitted. unless there is clear evidence that it contravenes the basic rules of Sharia. It should only be used if there is clear evidence that it contradicts the basic rules of Sharia, and it should be noted that from an Islamic perspective any commercial activities, including financial technology, are permitted, unless there is a clear text prohibiting it.

The main types of services offered in Islamic Fintech are:

*Peer-to-peer (P2P) lending, crowdfunding, money transfer, mobile payments and trading platforms.*

For example, the areas of application of Islamic financial technology in financial services can be listed as:

*Table no. 2 - Application areas of Islamic financial technology in financial services*

<b>Islamic financial technology</b>	<b>Islamic financial services</b>	<b>financial services</b>
AmalPay (Malaysia)	Investment accounts Payment and collection operations and liquidity management in accordance with the principles of Islamic Sharia	Deposits
-Ethis Crowd – Singapore, Indonesia, Malaysia, Australia - Blossom Finance	Financing by Murabaha/Mudaraba / Musharaka/ Salam / Istisna / Ijarah and Islamic Finance	Financing

*Source: World Bank Group 2020, p.24*

In order to keep pace with financial technological developments, the establishment of the first Islamic Financial Technology Union was announced on December 13, 2017, as part of the activities of the 24th session of the World Islamic Banking Conference, by the three largest Islamic banks (Al Baraka Banking Group, Kuwait Finance House Bahrain, and Bahrain Development Bank). This union was known as Alco Bahrain (Algo Bahrain).

The Islamic Financial Technology Consortium, ALCO Bahrain, aims to achieve the following goals:

a. Finding innovative banking solutions that are compatible with the provisions of Islamic Sharia. Innovate and implement low-cost and rapid financial technology solutions, as it enjoys full strategic, operational and financial independence to innovate financial solutions that suit the digital economic system.

b. Restoring the growth of global Islamic banking by enhancing financial inclusion, creating new job opportunities, and directing new investments to critical economic sectors in finding innovative banking solutions that are compatible with the provisions of Islamic Sharia.

c. Innovate and implement low-cost and rapid financial technology solutions, as it enjoys full strategic, operational and financial independence to innovate financial solutions that suit the digital economic system.

d. Restoring the growth of global Islamic banking by enhancing financial inclusion, creating new job opportunities, and directing new investments to critical economic sectors in the GCC countries and emerging markets.

e. Reducing the cost of innovation for banks while accelerating their ability to market, which will have a direct impact on improving the profitability and growth of banks in the GCC countries and emerging markets.

f. Reducing the cost of innovation for banks while accelerating their ability to market, which will have a direct impact on improving the profitability and growth of banks.

g. Introducing 15 financial technology platforms in the banking sector until the year 2020, and helping achieve this goal is the joint force based on knowledge of the market, customer base and financial resources, as the union is concerned with innovation for social impact.

h. Create a convenient and fun crowdfunding platform for businesses that will boost the growth of the SME sector.

i. Providing an opportunity to invest outside borders.

Fintech innovations in the GCC countries have the potential to significantly enhance market access and profitability of banks. As a starting point, participatory banks can implement a bold funding management strategy that includes advanced data analytics, robotic process automation, cloud technologies, artificial intelligence and blockchain technology.

## **Conclusion**

According to the World Financial Development Report for 2017, the percentage of the adult population who own bank accounts in 25 countries out of 48 member states of the Organization of Islamic Cooperation (OIC) is less than 20%, and the reason for this is the voluntary exclusion of Muslims from interest-based financial services. In this case, adopting financial technology in the field of Islamic finance to enhance financial inclusion represents a major challenge.

Through the foregoing, it is clear to us that financial technology has a great ability to provide tremendous opportunities to bring about a digital transformation in various financial services, which has greatly helped to develop and modernize these financial services, which have become a competition for financial services provided by traditional financial institutions, at the lowest cost, efficiency and speed. In addition, this transformation has become a necessity for countries after it was an option for them in light of the outbreak of the Covid 19 virus, which resulted in the global economy stopping due to health measures such as closure and social distancing.

As both traditional financial institutions and fintech startups face regulatory challenges in capital requirements, anti-money laundering, privacy and security laws, and with regulatory changes lagging innovation in the industry, fintech companies need to be more alert to potential changes and find ways to deal with these changes (Bogdanova, 2022). The regulatory and supervisory authorities should take these issues and challenges into consideration in order to support the development of a strong and sustainable system.

We conclude from the above that according to the Global Competitiveness of Islamic Banks Report (2016), the number of Islamic banking clients around the world has approached 100 clients. However, 75.12% of the potential client base for Islamic finance is still untapped, and the sector still has a large capacity that can accommodate More Arab and international customers, as soon as the Islamic banking sector is able to face the challenges that stand in the way, which can be divided into internal and external challenges.

It now meets many needs and provides services in the financial field in advanced ways that largely compete with traditional financial services in terms of speed and cost. It was concluded through this study that Islamic banks' adoption of Islamic financial technology may currently be just an option, but the technological developments that have occurred in order to ensure continuity and development have made it imperative for Islamic banks to support the innovation of digital products, in line with Islamic law.

## REFERENCES

- Bogdanova, M. (2022). Globalisation and the impact of new technologies on the economy and the labor market. *Economics and management*,19(2),21-26. DOI: 10.37708/em.swu.v19i2.3
- Bustamante, P., Gomez, M., Weiss, M., Znati, T., Das, D. & R. Stephanie. (2019). A Collaborative Enforcement Mechanism for Spectrum Sharing Using Blockchain and Smart Contracts: An Application for the 1695-1710MHz Band. TPRC47: The 47th Research Conference on Communication, *Information and Internet Policy*, <http://dx.doi.org/10.2139/ssrn.3427469>, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3427469](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3427469)

- Hachan, A. H. K.(2019). General Provisions for Islamic Banks. *Journal of the Legal and Political Research and Studies Department-Information of Constitutional Institutions and Political Systems*, Issue 6, p. 103, <https://www.asjp.cerist.dz/en/article/132148>
- Hasan, R., Hassan, M. K. & Aliyu, S. (2020). Fintech, Blockchain and Islamic Finance: Literature Review and Research Agenda. *International Journal of Islamic Economics and Finance*, 3(1), 75-94. DOI: <https://doi.org/10.18196/ijief.2122>
- Hammadi, M. (2016). The Islamic Banking System in the Face of Global Financial Crises, - Challenges and Prospects- Case Study, *Economic Sciences. Doctorate*, p 64-72. [https://bibfac.univ-tlemcen.dz/bibcentrale/opac\\_css/index.php?lvl=author\\_see&id=27522](https://bibfac.univ-tlemcen.dz/bibcentrale/opac_css/index.php?lvl=author_see&id=27522)
- Harfouche, S. (2019). Financial technology is a promising industry in the Arab world. *Horizons Scientific Journal*, p.4. <https://www.asjp.cerist.dz/en/article/96371>
- Houhou, F., I. S. (2017). Evaluating the Efficiency of Algerian Islamic Banks Using Financial Performance Indicators. *Journal of Economic and Financial Studies* , 10 (1), p. 266, <https://www.asjp.cerist.dz/en/article/37113>
- Issawi, L. (2014). Islamic Banks: A Distinguished Financial Reality. *Journal of Communication in Economics, Administration and Law*, 38, p. 44. <https://www.asjp.cerist.dz/en/article/41781>
- Khadija, S. (2017). The problem of applying the capital adequacy standard in banks according to the requirements of the Basel Committee - a case study. *Doctorate*, p75.
- Mahdawi, H. (2015/2016). Islamic banking finance as an alternative solution to the global financial crises. *Thesis submitted for obtaining a Ph.D. in economic sciences*, p. 32.
- Mustafa B, A.,Q. (2016). Islamic Banks and their Response to Basel 3 Standards: An Applied Study on the Countries of the Gulf Cooperation Council Saudi Arabia, Kuwait, UAE - for the period 2013-2016. Doctorate. p 50
- Mustafa, R. & al (2020). FinTech, Blockchain and Islamic Finance: An Extensive Literature Review, *International Journal of Economics and Business Administration*, 2(7), pp. 65-86, [https://www.researchgate.net/publication/339573432\\_FinTech\\_Blockchain\\_and\\_Islamic\\_Finance\\_An\\_Extensive\\_Literature\\_Review](https://www.researchgate.net/publication/339573432_FinTech_Blockchain_and_Islamic_Finance_An_Extensive_Literature_Review)
- Obaid, R. Y. (2019). The Impact of Islamic Financial Services on Financial Inclusion in Arab Countries. *Arab Monetary Fund, United Arab Emirates*, p. 4. [https://www.researchgate.net/publication/363173937\\_alshmw\\_l\\_almaly\\_fy\\_alawl\\_alrbyt\\_aljhd\\_walsyasat\\_waltjarb](https://www.researchgate.net/publication/363173937_alshmw_l_almaly_fy_alawl_alrbyt_aljhd_walsyasat_waltjarb)
- Stanoevska, E., A. Danevska, L. Sadiku, S. Dimitrieska. (2023). Development of fintech solutions in the macedonian banking sector. *Economics and management*, 20 (1), 78-105, DOI: 10.37708/em.swu.v20i1.6
- Union of Arab Banks. (2018). Financial technology and artificial intelligence in the financial and banking sectors, *Journal of the Union (454)*, p. 1-8. <https://uabonline.org/ar>
- Zaytouni, K.M. (2018). Financial transactions in Bank: A Comparative study between Islamic Banks and commercial banks. *Al-lhya Journal*, 11, p.243.

## **ASSESSING THE INFLUENCE OF ICT INFRASTRUCTURE ON BUSINESS STARTUP EASE: QUANTITATIVE ANALYSIS IN ALGERIA (2004-2020)**

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### ***Abstract***

*The aim of this paper is to investigate whether advances in Algeria's fixed broadband infrastructure from 2004 to 2020 influenced progress in the country's business startup climate over the same period. The research goals are to empirically assess if greater information and communication technology adoption facilitated entrepreneurship growth. It is expected that increasing broadband access had a statistically significant positive impact. By highlighting the enabling potential of ICT investment for economic diversification, this study provides an evidence-based model for comparable emerging economies seeking to improve startup rates through a more supportive entrepreneurship environment.*

**Keywords:** *ICT infrastructure; fixed broadband subscriptions; FBS; starting a business – score; SB; Algeria; entrepreneurship*

**JEL Codes:** *O14; O30; O33; O38; L96*

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### **1. Introduction**

Information and communication technology (ICT) is widely recognized as a key driver of economic growth, innovation, and competitiveness in a globalized world. ICT infrastructure, which includes hardware, software, networks, and services, enables the creation, storage, processing, and dissemination of information and knowledge across various sectors and domains. It may also facilitate the emergence and development of new businesses, especially in the digital economy, by reducing entry barriers, enhancing productivity, expanding markets, and fostering entrepreneurship.

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In the realm of economic development, fostering entrepreneurship stands as a key objective for nations. This has led to increased academic interest in analyzing and evaluating entrepreneurial ecosystems. With the aim of extracting successful models to project other experiments (Saoud & Meddahi, 2023). The escalating focus in this area underscores the critical need to comprehend the various determinants that shape entrepreneurial endeavors, notably the role played by ICT infrastructure.

Algeria is considered the largest country in Africa and the Arab world, with a population of about 44 million and a GDP of \$147 billion in 2020. Algeria's economy is heavily dependent on hydrocarbon exports, accounting for approximately 93% of total exports and 38% of budget revenue (The World Bank in Algeria, n.d.). In 2021, Algeria was one of the top 10 largest natural gas producers globally, occupying the tenth position (Hadj & Djamel, 2023). However, the hydrocarbon sector has been subject to volatility and uncertainty due to fluctuations in global oil and gas prices as well as domestic political and social unrest. During recent decades, Algeria focused on diversifying its economy and reducing its reliance on hydrocarbon exports. This diversification strategy focuses on developing the ICT sector as a potential driver of economic growth and job creation, with the deployment of fiber-optic networks, mobile and fixed broadband services, and satellite communications.

There is a lack of rigorous empirical evidence on how the level of the national broadband infrastructure in developing countries influences the conditions for entrepreneurship over time. This is especially relevant for Algeria, a country that relies heavily on hydrocarbons and aims to diversify its economy by expanding its private sector. Algeria has invested in building large-scale fiber optic and Internet networks to promote business growth, but to our knowledge, we have not come across any academic study that measures the impact of the progress of ICT infrastructure on actually improving the business climate, particularly in Algeria.

This paper fills this gap by using the World Bank's Starting a business - Score index (SB), and the fixed broadband subscriptions indicator - per 100 people - (FBS) data from 2004 to 2020. Our paper contributes to the literature by providing a context-specific empirical analysis to evaluate the impact of a country's ICT infrastructure on the ease of starting a business.

### *1.1. Problem statement*

While many countries have invested substantially to expand their ICT infrastructure over the past two decades, few studies have quantitatively examined whether the

development of fixed broadband translates into a fundamental improvement in the business environment. This poses a critical knowledge gap, inhibiting evidence-based policymaking. Therefore, this study aims to conduct an econometric analysis to assess whether Algeria's investments in fixed broadband have significantly influenced the ease of starting new businesses. Findings will provide robust insights into the role of ICT infrastructure in enabling entrepreneurship and alleviating barriers to entrepreneurship in Algeria. Policy recommendations will be derived on the basis of research findings.

### *1.2. Research question*

This led us to address the following question.

RQ: How does the level of ICT infrastructure, as measured by the FBS indicator, affect the ease of starting a business, as measured by the SB index, in Algeria from 2004 to 2020?

### *1.3. Research objectives*

The overarching objective of this study is to assess the influence of investments in ICT infrastructure on the ease of business startup in Algeria between 2004 and 2020. More specifically, this study aims to:

a. Examine the relationship between investments in ICT infrastructure (independent variable) measured by FBS indicator by population and business startup rates, procedures, time, and costs. Measured by the SD index (dependent variables) in Algeria over the 2004-2020 period.

b. Determine the extent to which advances in ICT infrastructure have facilitated and enabled entrepreneurial activities by reducing administrative burdens and requirements for starting a business in Algeria.

### *1.4. Significance of this research*

The analysis will generate scholarly evidence and practical insights on how ICT adoption influences startup rates at the country level, while also identifying the remaining challenges in Algeria's business climate. Overall, the findings stand to meaningfully inform policymakers, companies, and researchers on leveraging ICT advancement to foster private sector development in Algeria. By examining this technology-entrepreneurship nexus over the past two decades, this study can provide a model for similar emerging economies.

## **2. Literature Review**

### *2.1. Impact of ICT infrastructure*

The impact of information and communications technology (ICT) on infrastructure at the macro level has been the subject of some significant research and empirical evaluation. Studies have shown that ICT infrastructure plays a crucial role in economic growth and development. Toader et al. (2018) emphasize the increasing interest among researchers in measuring the impact of ICT on economic growth, highlighting the accelerated development of ICT over the past two decades. Czernich et al. (2011) further support this by suggesting that broadband infrastructure, a key component of ICT, acts as a general-purpose technology that fundamentally changes how and where economic activity is organized. This indicates that ICT infrastructure, particularly broadband, can significantly influence macroeconomic outcomes. Moreover, Pradhan et al. (2018) stressed the fundamental role of infrastructure, including ICT, as a driver of long-term economic growth. They highlighted that ICT has supported and accelerated the growth of the global economy in unprecedented ways.

The impact of ICT infrastructure at the macro level is substantial and influences economic growth and other aspects of societal development. The evidence from these studies collectively supports the notion that ICT infrastructure plays a pivotal role in shaping macroeconomic outcomes and broader societal dynamics.

### *2.2. Fixed broadband infrastructure*

Fixed broadband infrastructure refers to the physical network that enables high-speed internet access for residential and business users, including fiber-optic cables, digital subscriber lines (DSL), and cable modems (Stork et al., 2014; Czernich et al., 2011). The standardization of this infrastructure across access networks improves effectiveness and efficiency (Wijaya, 2021). National policies often control the provision and adoption of fixed broadband (Whitacre & Gallardo, 2020).

Several studies have examined the impact of fixed broadband infrastructure. Czernich et al. (2011) found that broadband infrastructure enhances economic growth by facilitating business and household adoption. Bahrini and Qaffas (2019) further established causal relationships between ICT infrastructure, including broadband, and economic growth. Additionally, Hagsten (2022) revealed positive correlations between firms' broadband infrastructure and online sales.



These studies provide evidence and rationale suggesting that fixed broadband subscriptions rates could serve as a valid proxy measure for assessing the overall level of ICT infrastructure development in Algeria.

- Fixed broadband subscriptions indicator (FBS): Fixed broadband subscriptions refer to citizen subscriptions that provide high-speed access to the public Internet over a TCP/IP connection with speeds of 256 kilobits per second or greater. This includes subscriptions using cable modem, DSL, fiber optic cable directly to the home or building, other fixed wired connection, satellite broadband, and terrestrial fixed wireless broadband. The indicator is calculated by the total number of fixed broadband subscriptions regardless of the payment method, but excludes access via mobile cellular networks. It includes subscriptions using technologies such as fixed WiMAX and other fixed wireless networks. Both residential and organizational fixed broadband subscriptions are included in the total (Fixed Broadband Subscriptions (Per 100 People), 2023).

### *2.3. ICT infrastructure in Algeria*

The development of the telecommunications and digital sector is a priority set by Algeria. Since 2000, the opening up of the telecommunications market to competition following the publication of General Law No. 2000-03 of August 5, 2000 setting the general rules relating to the post office and telecommunications, has radically changed the public authorities' approach to telecommunications and has made it possible to achieve remarkable results, particularly in the mobile technology market, which introduced 2G in 2001, 3G from December 2013, and 4G from September 2016. To further improve this market, Law 18-04 of May 10, 2018 setting the general rules relating to the post office and electronic communications introduced provisions in favor of the establishment of a climate conducive to entrepreneurship, improving the conditions of access to the electronic communications market, and improving the quality of service for the benefit of all citizens without exception. This report provides an overview of developments observed in fixed telephony, mobile telephony and fixed, and mobile broadband up to the end of 2022 (Direction des Statistiques, des Etudes et de la Prospective, 2022).

On the basis of the aforementioned discussion, we propose the following hypothesis:

*H1: The FBS indicator, increased by at least 5 points in Algeria from 2004 to 2020.*

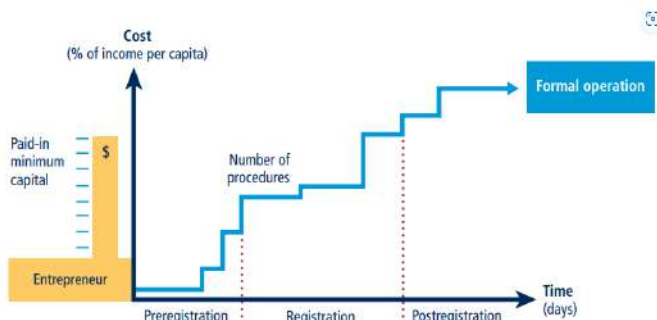
### *2.4. Business startup ease*

Business startup ease refers to the level of simplicity and convenience involved in establishing a new business. This encompasses various factors such as government support, access to finance, entrepreneurship assistance, and key success factors. Research has shown that startups play a significant role in the economy (Giardino et al., 2014).

- Starting a business – Score index: The World Bank's Doing Business report analyzes the ease of legally establishing and operating a small or medium-sized business across 190 economies. It documents required procedures, timeframes, costs, and minimum capital involved in starting a business. Data is collected on laws, regulations, public information, and via questionnaires completed by legal and government professionals. The methodology examines hypothetical identical domestic limited liability companies differing only by owner gender composition. It looks at obtaining licenses, permits, clearances, and completing mandatory notifications and registrations.

The Starting a Business Index averages economies' scores on number of procedures, time, costs, and minimum capital requirements to formally commence operations for two standardized companies. Scoring each economy from 0-100 relative to the highest globally observed best practices over time. For example, a score of 75 in 2019 denotes a 25-percentage point gap from the historical optimal score. Thus, an increase to 80 in 2020 reflects advancement towards global best practices. This standardized longitudinal scoring enables assessing absolute improvement in the overall environment for operating a business within an economy over time. The index quantifies the distance in regulatory performance of each economy compared historically across sample countries. It highlights where economies stand versus global good practices and their progress in adopting business-friendly regulations. (The World Bank, n.d.)

*Figure no. 1 Composition of the Starting a business – Score (SB) indicator*



Source: (The World Bank, n.d.)

On the basis of the aforementioned discussion, we propose the following hypothesis:

*H2: The SB index improved by at least 10 points in Algeria from 2004 to 2020*

### *2.5. ICT infrastructure and business startup ease*

The literature review shows that ICT and broadband infrastructure are crucial factors for promoting and supporting entrepreneurship in various settings. By having access to ICT, entrepreneurs can overcome many challenges and costs related to information, communication, coordination, and training (Duvivier et al., 2021). ICT also affects the rate of new firm creation (Gomes & Lopes, 2022). Several studies have demonstrated the positive effects of broadband infrastructure on entrepreneurship in countries such as Germany and China (Zhang et al., 2019; Ajide, 2022), as well as in rural areas and small businesses (Deller et al., 2021). Furthermore, internet access at home enables home-based businesses, which contribute to economic growth (Czernich et al., 2011).

In developing countries, mobile phones and internet connectivity enhance entrepreneurial activity by providing access to information, markets, and resources (Akerman et al., 2015). Regions with better ICT infrastructure have more new business creation (Aparicio et al., 2016). Transition economies also benefit from ICT as skilled entrepreneurs use it to create successful new ventures (Cieřlik & van Stel, 2014).

On the other hand, the ICT infrastructure within the firm also plays a role in creating opportunities by reducing costs and increasing efficiency (Sin Tan et al., 2010). Mobile broadband offers lower costs and better reach (Alderete, 2017). ICT infrastructure also fosters technology entrepreneurship (Colovic & Lamotte, 2015) and innovation, R&D, and new business models (Ramasamy, 2016). Similar positive impacts were observed in the African context (Ajide, 2020).

Therefore, the literature review clearly indicates the importance of ICT and broadband infrastructure for facilitating and enabling entrepreneurship across contexts by lowering barriers and costs and providing access to information, resources, efficiency gains and new opportunities.

*H3: An increase in the FBS indicator in Algeria from 2004 to 2020 leads to an improvement in the SB index in the same period.*

### 3. Research Methodology

This quantitative study uses a regression analysis approach to examine the relationship between investments in ICT infrastructure, measured by fixed broadband subscriptions (FBS), and the ease of starting a business in Algeria from 2004 to 2020, measured by the World Bank Starting a business - Score (SB) index.

#### 3.1. Data Collection

Secondary data on Algeria's FBS indicator and SB index from 2004 to 2020 was collected from the World Bank's World Development Indicators database. This enabled the consistent measurement of Algeria's FBS indicator and SB index aligned with international standards.

The time period from 2004 to 2020 was selected for analysis in this study due to data availability and the ability to examine the relationship between variables over the same time frame. Specifically, data for FBS indicator was available from 2003 to 2022. However, data for SB index was only available from 2004 to 2020. When conducting time series analysis to study the impact between variables, it is important that the data for both variables cover the same time span.

#### 3.2. Data Analysis

Descriptive statistics, including means, medians, maximums, minimums, standard deviations and, skewness, were calculated for the FBS and SB variables to characterize trends over the sample period.

An ordinary least squares regression model was estimated with the SB score as the dependent variable and FBS as the main independent variable. Diagnostic testing evaluated assumptions such as normality and absence of autocorrelation in the residuals.

$$SB = \beta_0 + \beta_1(FBS) + U$$

The model's statistical significance, predictive power, and reliability were assessed before hypothesis testing on whether increases in FBS led to higher S.

#### 3.3. Statistical tools

All data preparation and sorting leveraged Microsoft Excel spreadsheets, while statistical analysis employed the Eviews 13 software system packages, including its tools for data manipulation, econometric modelling, and graphical visualization.

### 3.4. Validity and reliability

The World Bank indicators provide standardized, consistent measurements vetted by statistical experts, ensuring validity and reliability. Using rigorous econometric diagnostics further enhances analysis credibility.

Causality is supported by theory and the literature review of ICT's enabling effects. A time lag with FBS presaging changes in SB also indicates potential causal direction. Controlling for other macroeconomic and regulatory factors impacting new firm startup offers partial endogeneity between the main variables studied.

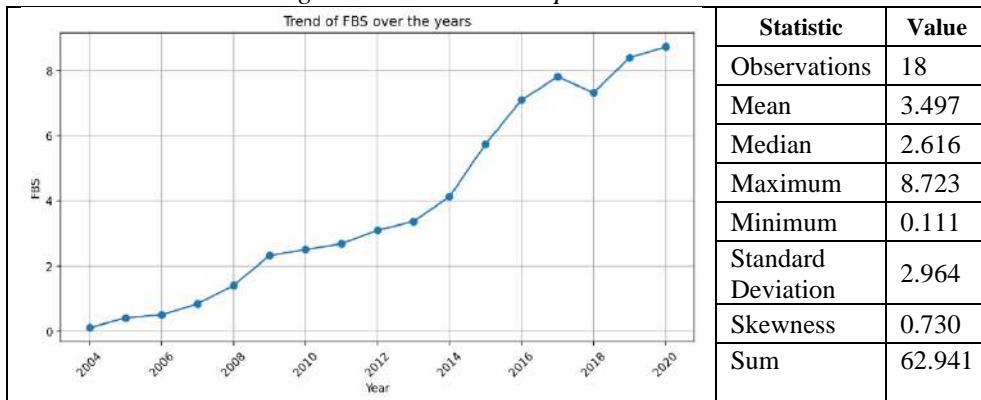
By leveraging internationally comparable index metrics over a 17-year period, this methodology enables a reasonably robust investigation of the research question on the influence of ICT infrastructure in improving entrepreneurial conditions in Algeria.

## 4. Results and Discussion

### 4.1. Descriptive statistics

- Fixed broadband subscriptions (FBS):

Figure no. 1 FBS descriptive statistics



Source: Elaborated by the author

Fixed broadband subscriptions (FBS) indicator in Algeria shows an increasing trend over the years from 2004 to 2020 based on the data. The mean subscription is 4.06 per 100 people, with a median of 3.37. The maximum subscription reached was 8.72 in 2020, while the minimum was 0.11 in 2004.

The standard deviation is 2.96, indicating decent variability in the data. The skewness is positive at 0.90 showing that the data is slightly skewed to the right. From 2004

to 2009, there was slower growth, increasing from 0.11 to 2.32 per 100 people. From 2010 to 2020, there was more rapid growth, climbing from 2.51 per 100 people to 8.72 in 2020. Overall, there has been a clear increasing trend in fixed broadband adoption over the years in Algeria. Factors driving this growth include government infrastructure investments, falling technology costs, increased consumer demand for home internet access, and faster speeds over time.

Based on this we can test the first hypothesis (H1):

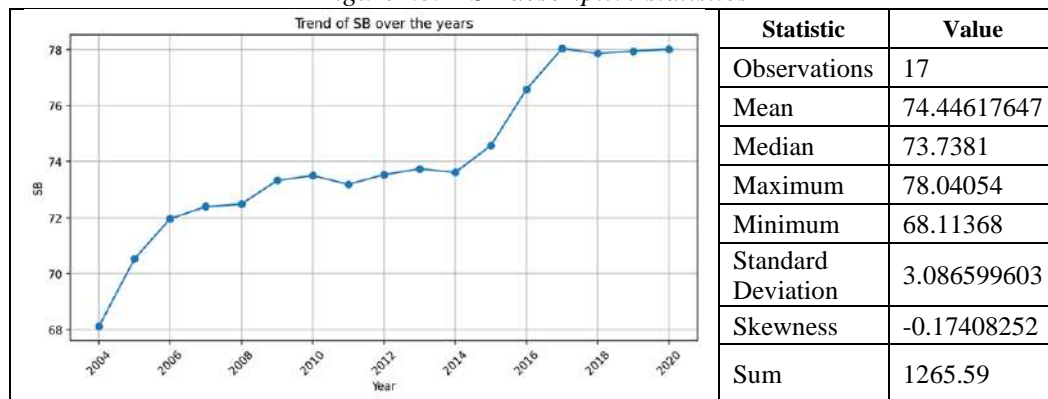
$H_0$ : FBS indicator has not increased by at least 5 points in Algeria from 2004 to 2020.

$H_a$ : FBS indicator increased by at least 5 points in Algeria from 2004 to 2020.

According to the data, the FBS indicator in Algeria was 0.11 in 2004, indicating that there were 0.11 fixed broadband subscriptions per 100 people. The indicator increased substantially to 8.72 in 2020, meaning that there were 8.72 fixed broadband subscriptions per 100 people. The difference between the two years is 8.61, which is calculated by subtracting 0.11 from 8.72. We tested the null hypothesis that the FBS indicator did not increase by at least 5 points from 2004 to 2020. Since the observed difference of 8.61 is larger than 5, we rejected the null hypothesis and accepted the alternative hypothesis that the FBS indicator in Algeria increased by more than 5 points from 2004 to 2020.

- Starting a business – Score (SB):

Figure no. 2 SB descriptive statistics



Source: Elaborated by the author

The data on the SB score in Algeria shows a general increasing trend from 2004 to 2020. The mean score was 74.45 out of 100, with a median of 73.74. The maximum score reached was 78.04 in 2017, while the minimum was 68.11 in 2004.

The standard deviation of 3.09 indicates there is some variations in the data from year-to-year. The skewness of -0.17 indicates that the data distribution is approximately symmetrical. From 2004 to 2009, there were minor fluctuations in the score between 68.11 and 73.32. From 2010 to 2017, there was steady growth from 73.50 up to the peak of 78.04. The score has levelled off since 2017 between 77.86 and 78.01.

Overall, this reflects gradual improvements in the ease of starting a business in Algeria over the years. Driving factors likely include government initiatives to reduce bureaucratic hurdles, increased access to credit and financing options, and a growing entrepreneurial culture. Sustaining and enabling further growth requires maintaining political stability and policy consistency in the business regulatory environment.

Based on this, we can test the second hypothesis (H2):

*H<sub>0</sub>: The SB index has not improved by at least 10 points in Algeria from 2004 to 2020.*

*H<sub>a</sub>: The SB index improved by at least 10 points in Algeria from 2004 to 2020.*

The data shows that in 2004, Algeria's SB index was 68.11. By 2020, it had increased to 78.01. The difference between these two years is  $78.01 - 68.11$ , which equals 9.90. Given the null hypothesis that the SB index has not improved by at least 10 points from 2004 to 2020, we fail to reject this because the actual difference of 9.90 is less than the 10-point threshold. Therefore, we fail to reject the null hypothesis that the SB index has not increased by at least 10 points. Instead, based on this dataset, we accept that there is not enough evidence to support the alternative hypothesis that Algeria's SB improved by at least 10 points from 2004 to 2020.

#### *4.2. Simple linear regression model*

- Building a standard model: An econometric model will be developed to analyse the effect of ICT infrastructure measured by FBS indicator, the independent variable, on the ease of starting a business measured by SB index, the dependent variable. Model parameters will be estimated first, followed by hypothesis testing of the estimated parameters. Next, the magnitude and significance of the estimated parameters will be evaluated. Finally, the model's predictive ability is tested.

The model includes the stability of other factors that affect the dependent variable; therefore, the model is as follows:

$$SB = \beta_0 + \beta_1(FBS) + U$$

FBS: Fixed broadband subscriptions

SB: Starting a business – Score

$\beta_0$ : Constant for Starting a business – Score function

$\beta_1$ : Coefficient of the independent variable (Fixed broadband subscriptions)

- Normality test: To check the normality of the data, the Jarque-Bera test was applied. This test has a null hypothesis that the data is normally distributed. The null hypothesis is not rejected if the p-value from the test is more than 0.05. The table (1) shows that the p-values for FBS (0.450) and for SB (0.917) are both more than 0.05. This means that the data for both FBS and SB can be assumed to be normal, as the Jarque-Bera test does not reject the normality hypothesis. The normality of the data is important for many statistical methods that need this assumption. More statistical analysis can be done using these methods.

*Table no.1 - Jarque-Bera tests*

	<b>FBS</b>	<b>SB</b>
<b>Jarque-Bera</b>	1.596971	0.172360
<b>Probability</b>	0.450010	0.917429

*Source:* EViews 13 outcomes

- estimation and evaluation of the Regression Model: The simple linear regression model method was adopted to estimate the econometric model measuring the effect of FBS on SB according to the following equation:

$$SB = \beta_0 + \beta_1(FBS) + U$$

Table (2) shows the results of the analysis.

*Table no.2 - OLS regression of SB on FBS*

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>C</b>	70.60195	0.376952	187.2970	0.0000



<b>FBS</b>	0.890289	0.077317	11.51486	0.0000
<b>R-squared</b>	0.898368	Mean dependent var		74.08186
<b>Adjusted R-squared</b>	0.891593	S.D. dependent var		2.821391
<b>S.E. of regression</b>	0.928949	Akaike info criterion		2.800605
<b>Sum squared resid</b>	12.94419	Schwarz criterion		2.898630
<b>Log likelihood</b>	-21.80514	Hannan-Quinn criter.		2.810349
<b>F-statistic</b>	132.5919	Durbin-Watson stat		0.767429
<b>Prob(F-statistic)</b>	0.000000			

*Source:* EViews 13 outcomes

The constant term coefficient of 70.601 represents the value of the SB when the independent variable (FBS) equals zero. The FBS coefficient of 0.890 indicates a positive relationship between FBS and SB. A p-value of 0.000, which is less than 0.01, signifies this relationship is statistically significant at the 99% confidence level. As such, SB is influenced by changes in FBS. Specifically, as FBS increases, SB also tends to increase as well.

The correlation coefficient R-squared of 0.898 indicates a positive association between SB and FBS. It signifies that 89.8% of variations in SB can be explained by changes in FBS, while other factors account for the remaining 10.2% of SB fluctuations.

The F-statistic value of 132.591 with a p-value of 0.000, which is less than 0.01, denotes the overall significance of the regression model and the significant effect of the FBS on the SB.

- Testing the autocorrelation between random errors: The autocorrelation of errors is considered one of the most significant issues that estimators face when modelling, leading to biased standard errors and consequently erroneous statistical tests. This problem occurs when the error term in one period is positively correlated with the errors from the previous period. The presence of first and higher-order autocorrelation can be tested using several methods, including: 1) the Durbin-Watson test, which compares the computed test statistic to critical values from tables, 2) the Breusch-Godfrey Lagrange multiplier test, which tests for autocorrelation at specified lags using an F-test or LM test, and 3) plotting the autocorrelation function and partial autocorrelation function and looking for significant lags. In this analysis, both the Durbin-Watson and Breusch-Godfrey tests are used to check

for first and second-order autocorrelation before proceeding with modeling or inference in order to ensure the reliability of results.

*Table no.3 - Breusch-Godfrey serial correlation LM test*

<b>Breusch-Godfrey Serial Correlation LM Test</b>			
<i>Null hypothesis: No serial correlation at up to 2 lags</i>			
<b>F-statistic</b>	1.820284	Prob. F(2,13)	0.2009
<b>Obs*R-squared</b>	3.719203	Prob. Chi-Square(2)	0.1557

Source: EViews 13 outcomes

*Table no.4 - Auxiliary regression of residuals on original regressors and lagged residuals*

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>C</b>	-0.014592	0.358023	-0.040759	0.9681
<b>FBS</b>	0.003575	0.073513	0.048628	0.9620
<b>RESID(-1)</b>	0.472111	0.263342	1.792769	0.0963
<b>RESID(-2)</b>	-0.328135	0.263919	-1.243315	0.2357
<b>R-squared</b>	0.218777	Mean dependent var		2.15E-15
<b>Adjusted R-squared</b>	0.038494	S.D. dependent var		0.899451
<b>S.E. of regression</b>	0.881969	Akaike info criterion		2.789005
<b>Sum squared resid</b>	10.11231	Schwarz criterion		2.985055
<b>Log likelihood</b>	-19.70654	Hannan-Quinn criter.		2.808493
<b>F-statistic</b>	1.213523	Durbin-Watson stat		1.383344
<b>Prob(F-statistic)</b>	0.343939			

Source: EViews 13 outcomes

Based on the Breusch-Godfrey test results, there is no evidence of statistically significant autocorrelation in the residuals up to 2 lags.

The null hypothesis of no autocorrelation cannot be rejected at the 5% significance level based on the F-test ( $F=1.820$ ,  $p=0.200$ ) and LM test ( $LM=3.719$ ,  $p=0.155$ ). All p-values are above typical cut-offs as 0.05.

Additionally, the coefficients on the lagged residual terms (RESID(-1)) and RESID(-2)) are not statistically significant based on the t-tests, with p-values of 0.0963 and 0.235 respectively.

Furthermore, the Durbin Watson statistic of 1.38 is between the bounds of 0 and 2, indicating no evidence of positive autocorrelation according to this test.

In summary, the array of Breusch-Godfrey, Durbin-Watson, and individual parameter significance tests indicates no statistically conclusive evidence of autocorrelation within the residuals through the second lag. Thus, corrective actions are likely unnecessary given this sample and the defined model. However, these results pertain strictly to the current data and equation specifications.

- Estimating the regression model equation: Based on the previous results, the relationship between FBS as an independent variable and SB as a dependent variable was estimated according to the following equation:

$$SB = \beta_0 + \beta_1(FBS) + U$$

$$SB = 70.601 + 0.890*FBS + U$$

Through this equation, we can predict the value of SB based on the value of FBS. We find that for every one unit increase in FBS, the SB score increases by 0.890 units.

Based on this we can test the third hypothesis (H3):

*H<sub>0</sub>: An increase in the FBS indicator in Algeria from 2004 to 2020 does not lead to an improvement in the SB index in the same period.*

*H<sub>a</sub>: An increase in the FBS indicator in Algeria from 2004 to 2020 leads to an improvement in the SB index in the same period.*

Based on the regression analysis results, there is strong statistical evidence to reject the null hypothesis that increases in Algeria's FBS indicator from 2004-2020 do not lead to improvements in SB index over the same period. The model estimation found a significant positive relationship between FBS and SB, with a 0.890 unit increase in SB per one unit increase in FBS. With an R-squared of 0.898, almost 90% of the variance in SB is explained by changes in FBS. Furthermore, diagnostic testing showed no problematic autocorrelation. Given the model's statistical significance, explanatory power, estimated positive effect magnitude, and reliability, the data support the alternative hypothesis - that increases in Algeria's FBS from 2004-2020 do lead to increases in the country's SB index over the same timeframe when controlling for other pertinent factors.

### *4.3. Results discussion*

The results of the regression analysis provide evidence for a statistically significant positive relationship between FBS and the ease of SB in Algeria from 2004 to 2020. As hypothesised, increases in Algeria's FBS over time led to corresponding improvements in the country's SB score.

Specifically, the model results estimate that on average, every additional 1 percentage point increase in Algeria's FBS indicator is associated with a 0.89-point increase in Algeria's overall 100-point scale SB score. This means that advances in nationwide fixed broadband infrastructure access and usage have a marked influence in explaining progress achieved in streamlining bureaucratic and procedural burdens for new firm creation in the country.

The model achieves a very high R-squared value of 0.898, signifying that nearly 90% of the historical variation observed in Algeria's ease of entrepreneurship conditions is explained by ongoing ICT infrastructure deepening measured through rising broadband subscriptions. The regression also passes key specification and reliability tests, giving credence to the positive relationship found between our independent and dependent variables of interest.

On the surface, this finding confirms previous international research findings that highlight the essential role of broadband as an indispensable digital public infrastructure to support entrepreneurship in various countries. It acts akin to traditional hard infrastructure as roads or electricity in engendering spillover externalities, productivity gains, and knowledge exchange. There appears to be a direct relationship with the solutions and efforts provided by Algeria regarding the development of ICT infrastructure. With the gradual lifting of restrictions on difficulties related to starting commercial projects, such as registration procedures and reducing material and moral costs.

Despite this, Algeria did not achieve the expected progress in the SB index during the period 2004 to 2020. This may be due to many reasons, including the difficulty and stringency of the indicator, and other factors that may have an impact. Persistent state domination and limited competition in key ICT and industrial segments also qualifies inferences on the growth-enabling impacts of infrastructure advancement. Sustainable policy support is vital for unlocking the still untapped promise of digital transformation and entrepreneurship in diversifying Algeria's hydrocarbon-centered economy.

## **Conclusion**

### *- Summary of the findings*

This study empirically examined the relationship between advances in ICT infrastructure and improvements in the ease of entrepreneurship conditions in Algeria from 2004 to 2020. A time-series regression analysis found evidence supporting the research hypothesis of a statistically significant positive link between rising fixed broadband adoption levels and Algeria's progress in key indicators related to bureaucratic burdens and time and cost requirements for formally starting a new business.

The model results estimate that on average, every additional 1 percentage point increase in Algeria's fixed broadband subscriptions (FBS) indicator is associated with a 0.89-point rise in the country's 100-point overall score on the World Bank's Starting a Business-score (SB) index. With an R-squared of 0.898, nearly 90% of the variation in ease of entrepreneurship over time was accounted for by deepening of broadband connectivity. This aligns with existing theory and literature on ICT's role as a transformational technology infrastructure that enables private sector dynamism.

### *- Implications and contributions*

This analysis makes both scholarly and practical contributions. It provides original empirical insights into the ICT-entrepreneurship nexus within Africa's largest Arab state by GDP. Findings can inform policymakers on productive public infrastructure investments while also highlighting the interplay with governance, skills and access to finance barriers. For researchers, the quantitative methodology and leverage of internationally comparable World Bank data offers a model for investigation across developing economies.

### *- Limitations and Future Research*

This conclusion summarizes the key findings while considering scope conditions. However, the study suffers from being limited to data over a period of only 17 years, and the number of observations is considered somewhat small. A possible way to address this limitation is to expand the sample by conducting a cross-sectional study that includes several countries with similar characteristics as Algeria, such as North African countries. This would allow for a more robust and generalizable analysis of the impact of ICT infrastructure investments on startup outcomes. Avenues for future research also include sectoral and provincial analyzes within Algeria, as well as comparative studies across different regions and contexts. As digital connectivity and entrepreneurial dynamism

become increasingly vital in the 21st century, evidence-based assessment of how ICT infrastructure investments shape business outcomes can positively impact both theory and practice.

## REFERENCES

- Ajide, F. (2020). Infrastructure and entrepreneurship: evidence from Africa. *Journal of Developmental Entrepreneurship*, World Scientific Publishing Co. Pte. Ltd, 25, 03, 1-23. <https://doi.org/10.1142/s1084946720500156>
- Ajide, F. (2022). Economic complexity and entrepreneurship: insights from Africa. *International Journal of Development Issues*, 21, 367–388. <https://doi.org/10.1108/ijdi-03-2022-0047>
- Akerman, A., Gaarder, I., & Mogstad, M. (2015). The Skill Complementarity of Broadband Internet. *The Quarterly Journal of Economics*, 130, 1781–1824. <https://doi.org/10.1093/qje/qjv028>
- Alderete, M. (2017). Mobile Broadband: A Key Enabling Technology for Entrepreneurship. *Journal of Small Business Management*, 55, 254–269. <https://doi.org/10.1111/jsbm.12314>
- Aparicio, S., Urbano, D., & Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship and economic growth: Panel data evidence. *Technological Forecasting and Social Change*, 102, 45–61. <https://doi.org/10.1016/j.techfore.2015.04.006>
- Bahrini, R., & Qaffas, A. (2019). Impact of Information and Communication Technology on Economic Growth: Evidence from Developing Countries. *Economies*, 7, 21. <https://doi.org/10.3390/economies7010021>
- Cieřlik, J., & van Stel, A. (2014). Comparative Analysis of Recent Trends in Private Sector Development in CEE Transition Economies. *Entrepreneurship Research Journal*, 4. <https://doi.org/10.1515/erj-2013-0054>
- Colovic, A., & Lamotte, O. (2015). Technological Environment and Technology Entrepreneurship: A Cross-Country Analysis. *Creativity and Innovation Management*, 24, 617–628. <https://doi.org/10.1111/caim.12133>
- Czernich, N., Falck, O., Kretschmer, T., & Woessmann, L. (2011). Broadband infrastructure and economic growth. *The Economic Journal*, 121, 505–532. <https://doi.org/10.1111/j.1468-0297.2011.02420.x>
- Deller, S., Whitacre, B., & Conroy, T. (2021). Rural broadband speeds and business startup rates. *American Journal of Agricultural Economics*, 104, 999–1025. <https://doi.org/10.1111/ajae.12259>

- Direction des Statistiques, des Etudes et de la Prospective. (2022). Rapport sur le développement des Indicateurs. *Direction des Statistiques, des Etudes et de la Prospective*. <https://www.mpt.gov.dz/wp-content/uploads/2023/09/Rapport-indicateurs-TIC-Annee-2022.pdf>
- Duvivier, C., Cazou, E., Truchet-Aznar, S., Brunelle, C., & Dubé, J. (2021). When, where, and for what industries does broadband foster establishment births?. *Papers in Regional Science*, 100, 1377–1401. <https://doi.org/10.1111/pirs.12626>
- Fixed Broadband Subscriptions (Per 100 People). (2023). Retrieved 11 30, 2023, from the world bank: <https://datacatalog.worldbank.org/indicator/584dad86-bfce-eb11-bacc-000d3a3b9510/Fixed-broadband-subscriptions--per-100-people->
- Giardino, C., Unterkalmsteiner, M., Paternoster, N., Gorschek, T., & Abrahamsson, P. (2014). What do we know about software development in startups? *IEEE*, 31, 28–32. <https://doi.org/10.1109/ms.2014.129>
- Gomes, S., & Lopes, J. M. (2022). ICT access and entrepreneurship in the open innovation dynamic context: evidence from oecd countries. *Journal of Open Innovation: Technology, Market, and Complexity*, 8, 102. <https://doi.org/10.3390/joitmc8020102>
- Hadj, K., & D. Dekkiche (2023). Determinants of Algeria natural gas exports: Using a vector error correction model (VECM). *Economics and management*, 20 (2), 1-14. Doi:10.37708/em.swu.v20i2.1
- Hagsten, E. (2022). ICT infrastructure in firms and online sales. *Electronic Commerce Research*, 23, 2239–2258. <https://doi.org/10.1007/s10660-022-09533-z>
- Pradhan, R. P., Mallik, G., & Bagchi, T. P. (2018). Information communication technology (ICT) infrastructure and economic growth: A causality evinced by cross-country panel data. *IIMB Management Review*, 30, 91–103. <https://doi.org/10.1016/j.iimb.2018.01.001>
- Ramasamy, R. (2016). Official statistical leadership at the crossroads again: An information age perspective. *Statistical Journal of the IAOS*, 32, 211–221. <https://doi.org/10.3233/sji-150953>
- Saoud, W., & M. Meddahi (2023). A comparative analysis of the startups ecosystem in the UAE and KSA with reference to Algeria. *Economics and management*, 20 (2), 67-92. Doi:10.37708/em.swu.v20i2.5.
- Sin Tan, K., Choy Chong, S., Lin, B., & Cyril Eze, U. (2010). Internet-based ICT adoption among SMEs: Demographic versus benefits, barriers, and adoption intention. *Journal of Enterprise Information Management*, 23, 27–55. <https://doi.org/10.1108/17410391011008897>

- Stork, C., Calandro, E., & Gamage, R. (2014). The future of broadband in Africa. *Emerald insight*, 16, 76–93. <https://doi.org/10.1108/info-10-2013-0055>
- The World Bank in Algeria. (n.d.). Retrieved 11 30, 2023, from The World Bank: <https://www.worldbank.org/en/country/algeria>
- The World Bank. (n.d.). Starting a Business. Retrieved 11 30, 2023, from SUBNATIONAL STUDIES: <https://subnational.doingbusiness.org/en/data/exploretopics/starting-a-business/what-measured>
- Toader, E., Firțescu, B., Roman, A., & Anton, S. G. (2018). Impact of information and communication technology infrastructure on economic growth: An Empirical Assessment for the EU countries. *Sustainability*, 10, 3750. <https://doi.org/10.3390/su10103750>
- Whitacre, B., & Gallardo, R. (2020). State broadband policy: Impacts on availability. *Telecommunications Policy*, 44, 102025. <https://doi.org/10.1016/j.telpol.2020.102025>
- Wijaya, J. (2021). Determination of network technology of fixed broadband with fuzzy multiple criteria for decision making method. *Research Horizon*, 1, 237–243. <https://doi.org/10.54518/rh.1.6.2021.237-243>
- Zhang, L., Jiang, W., & Tang, Z. (2019). Study on the promotion effect of informationization on entrepreneurship: an empirical evidence from China. *Journal of Global Entrepreneurship Research*, 9, 45. <https://doi.org/10.1186/s40497-019-0171-5>



## THE DEATH OF TRADITIONAL ADVERTISING

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### **Abstract**

*Many experts believe that with the advent of the Internet in the 1990s, traditional advertising began to fade. The Internet overshadowed the media, such as TV, radio, print and OOH (out-of-home media as billboards and posters), which reached their zenith in the middle of the last century. The Internet started the Digital revolution that brought new digital media into existence, such as websites, social media (Facebook, TikTok, Instagram, Twitter), influencers, digital billboards. The younger generations immediately “grabbed” these media that offer a personalized, exciting and authentic communication experience. With the further evolution of digital media, the appearance of artificial intelligence, generative intelligence, virtual reality, augmented intelligence, the metaverse, young consumers are moving even more away from the traditional way of advertising. Each advertising medium lives in its own time, following its consumers.*

*This paper aims to collect primary and secondary data that will answer the following research questions: What is the future of traditional advertising? Will traditional advertising continue to live in convergence with digital media? What does the young population think about traditional advertising? The expected result is that traditional media will remain among us, but with time their utility value will decrease intensively. That value is seen in personalization, i.e. if traditional media talk at people, new digital media talk with people.*

**Keywords:** *traditional advertising; digital revolution; digital media; personalization*

**JEL Codes:** M30, M31, M37

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### **Introduction**

Traditional advertising reached its zenith in the middle of the 20th century. Consumers were informed, persuaded and reminded to buy and consume certain products or services by advertisements on TV, radio, newspapers, magazines and billboards (OOH – out of home advertising medium). In this period, the traditional media have been effective in generating leads and addressing the large masses (Assaf, 2023).

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Television was a very important medium, which offered visualization, storytelling, musical background and memorable narratives to the consumers. Television commercials have captivated all human senses essential for product perception and brand awareness. Radio with its great coverage and cheap accessibility captivated consumers with the power of the voice and sound effects. Print media, ranging from newspapers to magazines, provided more detailed information and real illustrations about products. Billboards, signage and posters, as OOH (out-of-home) media dominated the urban environments and attracted the attention of consumers beyond their homes (Wilson, 2023).

However, over time traditional advertising has declined in popularity (DeMers, 2020). Some authors believe that the advent of the Internet in the 1990s opened Pandora's box for traditional advertising. The Internet overshadowed traditional media and enabled the appearance of new digital media. The biggest innovation brought by these media is the personalization and offering a distinctive communication experience to consumers (Muhammad, 2023). According to Assaf (2023), the Deloitte study shows that 84% of consumers do not like traditional advertising and 69% of them skip all the advertisements shown on traditional media. This means that consumers change their behavior, becoming immune to the traditional advertising. The same author says that 80% of consumers are more likely to purchase from a company that offers personalized experience. The new targeted advertising media include websites, banners and pop-ups, social media (Facebook, Twitter, Instagram, TikTok), influencers, digital billboards, that offer real-time consumer interaction and brand awareness (Assaf, 2023). Young people especially trust and follow influencers, mainly celebrities, but also ordinary people who have substantial followings and promote the companies' products. Digital billboards also emerged as a dynamic and flexible form of advertising that display messages in real time (Wilson, 2023).

According to Dimitrieska, et.al. (2018), we step in a new era when using advanced technologies can easily identify future consumer trends and more deeply analyze the way consumers decide about purchases. Atanasova (2022) will confirm that new digital media will dictate the market and impose new rules. Brand new digital forms of advertising are on the horizon, such as artificial intelligence, chatbots, voice assistants, augmented and virtual reality, which further will distance consumers from traditional advertising. Virtual and augmented reality technology offers businesses the opportunity to create immersive, interactive experiences for customers (Assaf, 2023). In near future, computers will undertake reasoning and common sense tasks, such as vision and knowledge, which were formerly only undertaken by humans. They will have an ability to learn, observe, understand, talk, socialize, plan, produce creative things and solve problems (Dimitrieska, Stankovska, Efremova, 2018). The implementation of these new digital technologies is going to change the global economic and business landscape (Kyurova, et.al, 2023). Digital

mediums are no longer the distant future, but they are our present, a new way of perceiving and participating in real life. (Antova, 2023). In this sense, the fact that more than 500 companies from different fields, such as IT, education, real estate, fashion, food and beverages, automotive industry, tourism are involved in the metaverse, is interesting. (Dimitrieska, et.al, 2023).

The research questions that need to be answered are: What will happen to traditional advertising? What is its future? Will digital media completely replace traditional advertising? Can we expect some convergence between the traditional and new media? Today, the partnership between traditional and digital media is noticed. For example, TV channels direct consumers to social networks in order to obtain exclusive offers. The radio presenter asks consumers to scan codes from online newspapers to receive various discounts. We are witnessing an omnichannel communication experience of consumers who really enjoy and demand connectivity, trust, and assurance (Muhammad, 2023). The death of traditional marketing is a wake-up call for businesses to evolve and adapt to the changing landscape of consumer behavior (Assaf, 2023).

### Literature Review

According to the Economic Times (2023), traditional advertising is offline advertising that is realized through TV, radio, print media and billboards. Digital marketing is marketing that occurs via digital channels such as the internet, email, or mobile devices. Their differences are presented in the following table:

*Table no. 1 – Differences Between Traditional and Digital Marketing*

<b>TRADITIONAL ADVERTISING</b>	
<b>Positive sides</b>	<b>Negative sides</b>
Trustworthy (old marketing method)	Expensive
Local reach of people	One-way communication
Attractive to older demographic	Low conversion rate
Easy to understand	Not easy to measure
	Less flexible to change
	Less engaging, passive form of marketing
	Static nature
	Standardized targeting
<b>DIGITAL ADVERTISING</b>	
<b>Positive sides</b>	<b>Negative sides</b>
Cost-effective, less expensive	Coping with negative feedback
Interactive, two-way communication	Training and skills requirements

Global reach of audience	Maintanance
High conversion rate	
Measurable effects (ROI-Return on Investment)	
Attractive to young demographic	
Dynamic nature	
Customized targeting	
Immediate response	
High level of engagement	
Personalized content	

*Source:* Author's own research

The fate of traditional vs. digital advertising has split experts into two major groups. According to some experts, traditional advertising is fatalistically fading away, and according to others, they are still alive and kicking (Vidyasagar, 2019).

According to the first group of experts, traditional advertising is beginning to die out after the swing of the Digital revolution. Namely, according to the report “Digital Around the World” (Datareportal, 2024), 8.08 billion people live on the planet at the beginning of 2024. 5.35 billion people use the Internet, which is equivalent to 66.2% of the total population, and social media is used by 5.04 billion people, or 62.3% of the total population. Around 2.74 billion people in the world do not use the Internet, and they predominantly live in Southern and Eastern Asia, and in Africa. Also, fewer and fewer young people watch TV, read newspaper or pay attention to traditional media (Stanimirovic, 2020). Consumers are changing their habits and are increasingly interested in digital personalized experiences. Walker (2023) states that 67% of consumers like to experince personalized brands and if they do not, 66% of consumers will not make a purchase. With the further evolution of digital media, the appearance of artificial intelligence, generative intelligence, virtual reality, augmented intelligence, the metaverse, young consumers are moving even more away from the traditional way of advertising.

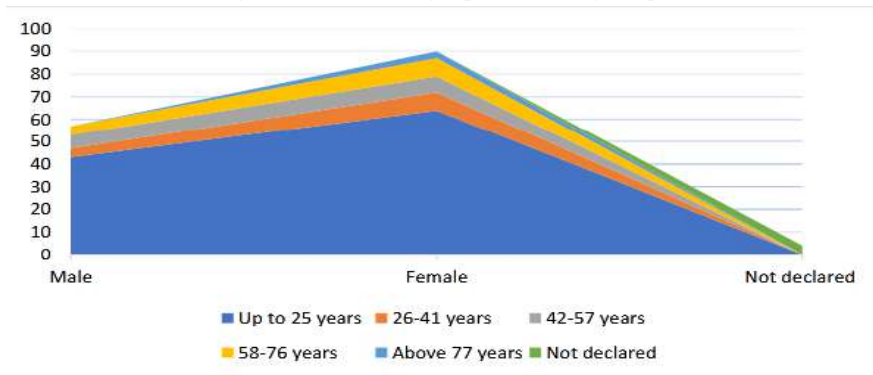
According to the second group of experts, traditional advertising is alive and kicking! (Vidyasagar, 2019). According to them, people still watch TV, listen to the radio and massively read newspapers and magazines. About 3 billion people still do not use online media and social networks, and some people do not like aggressive digital advertisements. Traditional advertising is easier to process mentally. Offline ads require less cognitive effort, meaning that they are easier to remember (Vidyasagar, 2019).

Personally, I think that the Digital revolution has dramatically changed the media. Traditional media need to converge with digital media and complement each other, giving the consumer a comprehensive omnichannel communication experience. Offline media can drive consumers to digital media by offering them various engaging experiences.

## Analysis and Discussion

This paper explains how the Digital revolution is affecting generations by examining their purchasing habits. There are six large groups of generations: Silent Generation (1928-1945), Baby Boomers (1946-1964), Generation X (1965-1980), Generation Y (Millennials) (1981-1996), Generation Z (1997-2012) and Generation Alpha (2012-2022) (Dimitrieska, S & Efremova, T., 2022) The primary research was conducted in November 2022 electronically and physically, during which responses from 151 respondents were collected and processed (Dimitrieska, et.al., 2022). In Figure 1, the demographic data of the respondents was presented, according to which the largest participation in the research had the young population from Generation Z.

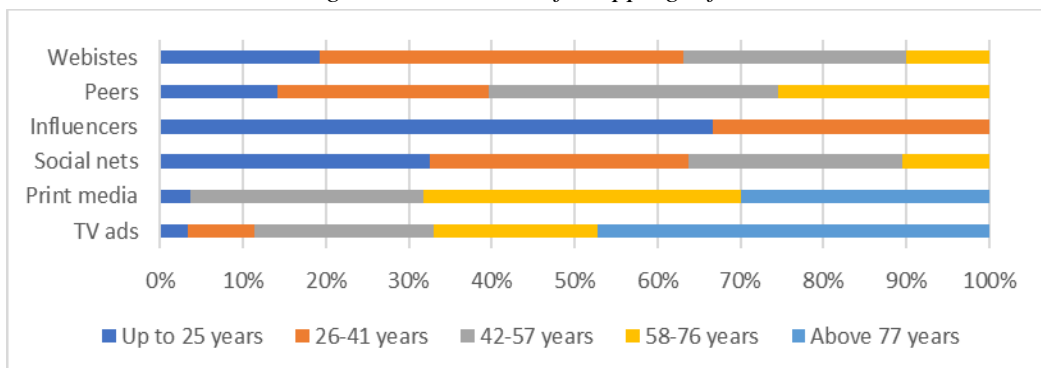
*Figure no.1 Demographic data of respondents*



Source: Own research

The most important question of this research is the source of shopping information for different generations. The answers are shown in Figure 2:

*Figure no. 2 Source of shopping information*



Source: Author's own research

The results show large discrepancies between generations (Dimitreska, et.al., 2022). The research confirms that older generation (above 77 years) mostly watch and follow TV and printed ads. They still believe in traditional advertising. This data cannot be neglected as this group of people have stable and solid financial resources and can have a great impact on the market. The youngest avoid traditional advertising at the expense of influencers, social media and websites. They neither watch TV nor read printed media, which is the reason why some experts believe that this media will disappear soon. The “middle” generations use a mixture of media for communication (traditional and contemporary).

## **Conclusion**

Traditional media do not dominate advertising as they did in the last century. Television, radio, newspapers, magazines, billboards and posters have been present for a long period of time and were very effective and popular with consumers. However, the digital revolution, i.e. the advent of the Internet in the 1990s, changed the advertising landscape. Social networks, influencers, digital billboards, artificial intelligence, generative artificial intelligence, voice assistants, chatbots have forced companies to redefine their marketing strategies in order to engage the audience more effectively. In the new reality, traditional advertising is undergoing a massive transformation to stay relevant in the digital age. It must keep up with consumers who are becoming more demanding, sophisticated, sensitive, and requiring new exciting, digital interactive experiences. Research shows that younger generations are moving away from traditional media seeking more personalized, customized, and interactive advertising messages.

A notable trend that can help traditional media in their transformation is their convergence with digital media. The future is in building a new hybrid advertising environment that will enable easier connection, engagement, and inspiration of consumers in a meaningful way.

## **REFERENCES**

- Antova, R. (2023). Innovative techniques for communication in Digital learning. *Entrepreneurship, 11 (1)*, pp. 31-40, ISSN 2738-7402, DOI: 10.37708/ep.swu.v11i1.3
- Assaf, A.F. (2023). *The Death of Traditional Marketing – Are We witnessing the end of an era?* LinkedIn, <https://www.linkedin.com/pulse/death-traditional-marketing-we-witnessing-end-era-firas-abo-assaf/>
- Atanasova, A. (2022). Characteristics of Digital Entrepreneurship. *Entrepreneurship, 10 (2)*, pp. 7-21, ISSN: 2738-7402, DOI: 10.37708/ep.swu.v10i2.1

- Datareportal. (2024). *Digital Around the World*. <https://datareportal.com/global-digital-overview#:~:text=4.95%20billion%20people%20around%20the.our%20journey%20towards%20universal%20accessibility>.
- DeMers, J. (2020). *Is Traditional Advertising Dead?* Medium blog. <https://jaysondemers.medium.com/is-traditional-advertising-dead-ca2d1ef774b2>
- Dimitrieska, S., Danevska, B, A., & Stanoevska, P. E. (2023). Brands in the Metaverse. *Entrepreneurship*, 11 (2), pp. 31-42, DOI: 10.37708/ep.swu.v11i2.3
- Dimitrieska, S., & Efremova, T. (2022). Problems of the Generational Marketing. *Economics and Management*, 19 (2), pp. 48-56, DOI: 10.37708/em.swu.v19i2.6
- Dimitrieska, S., Stankovska, A., & Efremova, T. (2018). Artificial Intelligence and Marketing. *Entrepreneurship*, 7 (2), pp. 298-304, ISSN 1314-9598, <https://ep.swu.bg/images/pdfarticles/2018/ARTIFICIAL%20INTELLIGENCE%20AND%20MARKETING.pdf>
- Dimitrieska, S., Stanoevska, P, E., & Danevska B, A., (2023). Generation Z: Analysis of its purchasing and payment behavior. *Trends in Economics, Finance and Management Journal (TEFMJ)*, 5 (2), pp. 1-10, <https://tefmj.ibupress.com/uploads/pdf/65.pdf>
- Dimitrieska, S., Stanoevska, P, E., & Danevska B, A., (2022). Generation Gap in the purchase and payment process. *Trends in Economics, Finance and Management Journal (TEFMJ)*, 4 (2), pp. 19-28, <https://tefmj.ibupress.com/uploads/pdf/58.pdf>
- Kyurova, V., Zlateva, D., Davidkova, B., Vladov, R., & Mirelus-Mazilu, I. (2023). Digital Technologies as an opportunity for business development. *Entrepreneurship*, 11 (2), pp 43-57, DOI: 10.37708/ep.swu.v11i2.4
- Muhammad, F. (2023). *Advertising Evolution: How Personalization has Improved over time*. Blog, Instapage, <https://instapage.com/blog/advertising-evolution-how-personalization-has-improved-over-time-4/>
- Stanimirovic, U. (2020). *Is Traditional Advertising a Thing of the Past?* Targetvideo blog, <https://target-video.com/traditional-advertising-vs-modern-advertising/>
- The Economic Times. (2023). *Digital Marketing vs, Traditional Marketing: What's the difference?* <https://economictimes.indiatimes.com/jobs/mid-career/digital-marketing-vs-traditional-marketing-whats-the-difference/articleshow/102196585.cms>
- Vidyasagar, A. (2019). *Is Traditional media really dead?* LinkedIn, <https://www.linkedin.com/pulse/traditional-media-really-dead-ashok-vidyasagar/>
- Walker, J. (2023). Pros and Cons of Traditional Marketing and Digital Marketing. T.E. Digital blog, <https://tedigitalmarketing.com/digital-marketing/pros-and-cons-of-traditional-marketing-and-digital-marketing/>

Wilson, C. (2023). The Evolution of Advertising: From Traditional to Digital. LinkedIn, <https://www.linkedin.com/pulse/evolution-advertising-from-traditional-digital-chris-wilson/>



## DIGITAL MARKETING STRATEGIES FOR BLACK FRIDAY AND CHRISTMAS

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### *Abstract*

*This article explores digital marketing strategies that can be used to drive sales during the Black Friday and Christmas shopping periods. It starts by discussing the importance of these periods for retailers, and how e-commerce has changed how people shop during these events. The research then goes on to formulate different digital marketing strategies that retailers and marketers can utilize during these events, including social media advertising. The article offers some tips for retailers to optimize their digital marketing efforts. It also presents 20 practical solutions for creating suitable advertising messages for both events to personalize the shopping experience for customers. It concludes by emphasizing the importance of having a comprehensive and integrated digital marketing strategy that takes into account the unique characteristics of these shopping periods. Overall, the study provides valuable insights into the best practices for digital marketing during the Black Friday and Christmas shopping periods and offers actionable advice for retailers and marketers looking to maximize their sales during these significant shopping events.*

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**Keywords:** *e-commerce, social media advertising, personalization, socio-economic analysis, sales optimization, shopping events*

**JEL Codes:** *M31, M37*

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### **Introduction**

Two of the biggest highlights of the annual sales cycle in the Western economies are undoubtedly Black Friday and Christmas Holidays.

Black Friday and Christmas are suitable occasions for all the long-postponed and dearly desired purchases by wide groups of customers. Both events fulfil an enormous sales

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potential. Thus, they receive a serious financial resource for advertising. Digital marketers usually load their biggest and most funded campaigns and expect the corresponding results.

In a highly dynamic business environment of ever increasing competition and globalization, the application of modern and effective marketing tools is a key factor for the creation of consumer opinion, a high degree of trust and loyalty to the product, brand and company and the formation of corporate identity (Kyurova, Yaneva, 2017). It is the adaptability of modern entrepreneurs resulting from their ability to reflect changes in terms of technology application and digitalization to changes in consumer needs and attitudes that leads to an increase in sales return on investments and achievement of financial stability (Yaneva, Kiryakova-Dineva & Bozkova, 2021). Digital transformation, however, displaces the traditional approaches, management concepts and strategies requiring the application of innovative strategic thinking and behavior by imposing the need for deeper analysis, research and optimization of marketing planning (Filipova, Yaneva, Mierlus-Mazilu, 2023). The use of modern digital technologies requires adequate organizational changes of a structural and functional nature. It is extremely important that the company should have a well-functioning IT infrastructure that fits into the overall organizational structure (Kalaydzhieva, 2023). Good planning and management can lead to a significant spike in sales. According to Atanasova (2021, p. 41), “this ensures the long-term sustainability of the company over time in conditions of dynamic changes in the environment.” At the same time, some companies ignore the need to plan their business activities because they rely more on their intuition and react according to the situation (Madgerova, Atanasova, 2021, p.114). Therefore, omissions in the planning of communication with the audience, poorly formulated advertising concept and incorrect targeting will lead to missed benefits.

How to choose the optimal advertising strategy for both cases and avoid mistakes? What messages should we send to consumers? Are they looking for the same thing on both occasions? How to recognize their desires to obtain maximum results? Should we use a similar or a different concept? This article focuses on answering these important questions.

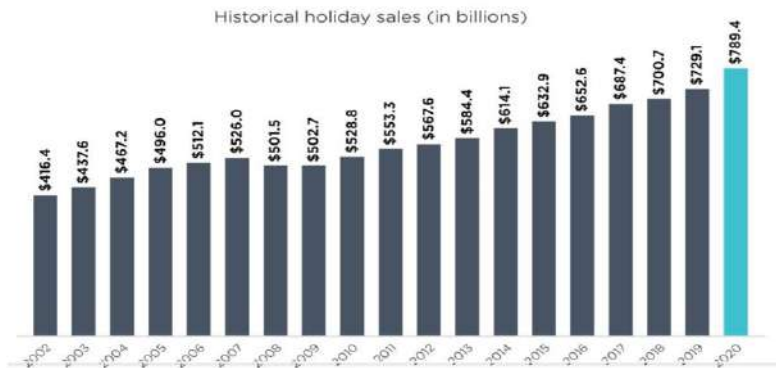
Black Friday and Christmas are distinguished by different consumer attitudes. They must be taken into account by the marketers and the managers to achieve the best results.

According to the established digital marketer and founder of ‘Marcademics’ Viktor Stoilov, on Black Friday, customers usually shop for themselves. On the other hand, at Christmas time, people mostly shop for others, such as friends and family (Stoilov, 2022). In other words, the focus during Black Friday is on oneself, and at Christmas, it is on others.

From a digital marketing perspective, this requires using different strategies to increase sales. These two shopping events cannot be approached in the same way.

In the United States, the period between Thanksgiving and Christmas is one of the busiest shopping seasons of the year. According to the National Retail Federation (NRF 2020), holiday sales in the United States totaled \$789.4 billion in 2020, which represented an 8.3% increase from 2019. This was despite the impact of the COVID-19 pandemic on the economy and consumer behavior.

Figure no. 1 Holiday sales in the USA, according to the NRF, 2002-2020



Source: National Retail Federation of the US, 2020

In general, retailers often heavily discount merchandise during this period in order to attract shoppers and boost sales. The days after Thanksgiving, known as Black Friday, are one of the biggest shopping days of the year. However, in recent years, retailers have started offering discounts earlier in November, which has led to the emergence of "Cyber Monday" and "Small Business Saturday".

Figure 1 illustrates the holiday sales in the USA between 2002 and 2020, as reported by the NRF and measured in billions of dollars.

The types of products that are popular during the holiday season can vary from year to year, but some of the top categories include electronics, toys, clothing, and home decor. Online shopping has also become increasingly popular during the holiday season, with many shoppers choosing to purchase gifts online and have them shipped directly to their recipients.

It is worth noting that sales volumes can be influenced by a variety of factors, including consumer confidence, economic conditions, and consumer behavior. Additionally, the COVID-19 pandemic has introduced additional uncertainties into the retail industry, including supply chain disruptions and changing consumer preferences.

## **Literature review**

There is a large body of research in this area, and many different approaches and theories have been proposed to explain the relationship between psychology and consumer behavior.

In "Customer Attitudes and Purchase Intentions: The Role of Consumer Personality" by Yoon-Joo Lee and Hyun-Joo Kim (2019), the relationship between consumer personality traits and their attitudes and purchase intentions toward various products have been explored.

In the article "The Psychology of Consumer Behavior and the Marketing Strategy" Emily Walshe (2018) reviews different psychological factors that influence consumer behavior and how marketers can use this knowledge to develop effective marketing strategies.

The study "The Role of Emotions in Consumer Behavior" by Rajat Gera and Vaibhav Mishra (2020) examines the role of emotions in shaping consumers' attitudes and behaviors towards different products and services.

The classic study "Cognitive and Affective Determinants of Attitude Formation and Change" by Richard E. Petty and John T. Cacioppo (1981) explores the cognitive and affective factors that influence the formation and change of attitudes.

The study "The Power of Brand Personality: Exploring Its Influence on Consumer Behavior" by Jennifer Aaker (1997) examines the concept of brand personality and how it can influence consumers' attitudes and behavior towards a brand.

The seminal study - "The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research" by Martin Fishbein and Icek Ajzen (1975), proposes the Theory of Reasoned Action, which suggests that a person's behavioral intention is influenced by their attitudes and subjective norms. The study reviews and synthesizes previous research on attitudes and behavior, providing a framework for understanding how attitudes affect consumer behavior.

In "The Elaboration Likelihood Model of Persuasion (ELM)" Richard E. Petty and John T. Cacioppo (1986) propose that the way people process persuasive messages is dependent on their motivation and ability to process information. The study reviewed previous research on persuasion and proposed the ELM as a model for understanding how attitudes are formed and changed through persuasion.

The study "Brand Personality: A Strategic Concept for Multinational Advertising" by Jennifer L. Aaker (1997) proposes the concept of brand personality, which suggests that brands can be personified and have human-like traits that consumers can relate to. The study reviewed previous research on personality and branding and suggested that brand

personality can be a powerful tool for creating strong emotional connections with consumers.

In "The Role of Emotions in Marketing" Stephen J. Gould (1993) reviews previous research on emotions and marketing and suggests that emotions play a critical role in shaping consumer attitudes and behavior. The study proposes a framework for understanding how different emotions can affect consumer behavior and provides recommendations for how marketers can use emotions to their advantage.

In the book "The Psychology of Attitudes" Icek Ajzen and Martin Fishbein (2005) provide a comprehensive overview of the psychology of attitudes, reviewing previous research on attitudes and behavior and presenting a theoretical framework for understanding how attitudes are formed and changed. The book covers topics such as the measurement of attitudes, the relationship between attitudes and behavior, and the role of social influence in shaping attitudes.

The study "Hedonic Consumption: A Literature Review" by Jenny Yim and Dae-Young Kim (2019) presents previous research on hedonic consumption, which is a type of consumer behavior that involves purchasing products or experiences for the sake of pleasure or indulgence. The study found that consumers who feel they deserve to reward themselves are more likely to engage in hedonic consumption and that this behavior can be influenced by various factors, including emotions, personality traits, and social norms.

"Consumer Entitlement: The Roots of a Controversial Concept" by Kelly L. Haws and Kristin Diehl (2018). This study explored the concept of consumer entitlement, which refers to the belief that consumers have a right to certain rewards or benefits. The study found that consumers who feel entitled are more likely to engage in indulgent behavior and that this attitude can be influenced by a variety of factors, including past experiences, social comparisons, and cultural values.

"Self-Entitlement and Consumer Behavior" by Alokparna Basu Monga and Eun-Ju Lee (2012). This study examined the relationship between self-entitlement and consumer behavior. The study found that consumers who feel entitled to rewards are more likely to engage in impulsive buying behavior and that this behavior can be influenced by various factors, including emotions, self-esteem, and perceived social status.

"The Power of Self-Reward: Rewarding Oneself with Material Rewards Leads to Prosocial Behavior" by Lily Jampol, Hal Hershfield, and Ayelet Fishbach (2018). This study explored the relationship between self-reward and prosocial behavior, which refers to behavior that benefits others. The study found that consumers who reward themselves with material goods are more likely to engage in prosocial behavior, such as charitable

giving, and that this behavior can be influenced by various factors, including the type of reward and the context in which the reward is given.

"Consumer Deservingness and Entitled Behaviors" by Soo Kim and Vanessa Patrick (2011). This study examined the relationship between consumer deservingness and entitled behavior. The study found that consumers who feel they deserve to be rewarded are more likely to engage in entitled behavior, such as complaining or demanding special treatment, and that this behavior can be influenced by various factors, including personal values and situational cues.

"The Influence of Gift-Giving Motives on Consumers' Attitudes and Purchase Behavior" by Minjeong Kim and Juran Kim (2018). This study examined the influence of gift-giving motives on consumers' attitudes and purchase behavior. The study found that consumers who buy gifts for their loved ones are more likely to have positive attitudes toward the gift and the brand, and are more likely to make repeat purchases.

"Consumer Motives and Attitudes towards Buying Gifts for Others" by Rachel Shaw and Marzena Nieroda (2019). This study explored the motives and attitudes of consumers who buy gifts for others. The study found that consumers who buy gifts for their loved ones are motivated by the desire to express affection, strengthen relationships, and create meaningful experiences and that this behavior can lead to positive emotional and social outcomes.

"The Role of Gift-Giving in Relationship Marketing" by Anne-Laure Marteaux and Véronique Plichon (2015). This study examined the role of gift-giving in relationship marketing, which is a marketing strategy that focuses on building long-term relationships with customers. The study found that gift-giving can be an effective tool for creating emotional connections with customers, strengthening relationships, and increasing customer loyalty.

"Gift-giving to Others and the Reciprocal Benefits to the Self" by Frank Flynn and Gabrielle Adams (2014). This study explored the reciprocal benefits of gift-giving to others, which refers to the idea that giving to others can also benefit the giver. The study found that consumers who buy gifts for others experience positive emotions, such as happiness and gratitude, and that this behavior can lead to increased well-being and social connections.

"Exploring the Gift-Giving Experience: A Consumer Perspective" by Jennifer L. Laing and Warwick Frost (2015). This study examined the gift-giving experience from a consumer perspective, focusing on the emotions, motivations, and behaviors of gift-givers. The study found that consumers who buy gifts for their loved ones are motivated by a desire

to express care and affection and that this behavior can lead to positive emotional and social outcomes for both the giver and the recipient.

### **Hypothesis**

The main difference between Black Friday and Christmas, from a digital marketing point of view, is that:

- On Black Friday customers usually *shop for themselves*.
- At Christmas customers usually *shop for others* (friends and family).

On Black Friday, customers are motivated by big promotions and low prices. They mostly choose electronics, as well as more expensive and larger products because they want to reward themselves and the moment is very profitable. At Christmas, customers purchase a larger number of cheaper gifts for their closest people.

Additionally, Black Friday and Christmas shopping are distinguished by at least 5 different aspects:

- Customers' Purchase Attitudes
- Most Purchased Types of Products
- Suitable advertising conceptions
- Targeted Audiences for the Advertising Campaign
- Budgeting and Timing the Advertising Campaign

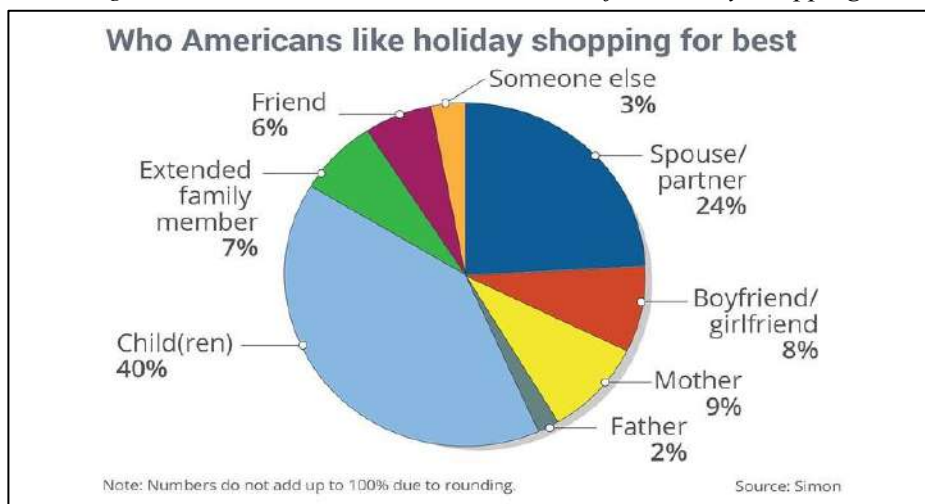
### **Theoretical implications**

The most essential differences between Black Friday and Christmas Shopping are presented according to the abovementioned 5 approaches of comparison between the two events.

- Christmas – the essential concept that advertisers and marketers should adopt when creating their campaigns should have the following customer focus:

*"I reward the people I love"*

Figure no. 2 Customers' Purchase Attitudes for Holiday Shopping



Source: Hill C., citing Simon, 2014

This concept has been examined in a large volume of scientific works, some of which are reviewed here. Practical guidelines on how to use this strategy in real business situations are presented in Table 4 and Table 5 of this research.

#### ✓ *Customers' Purchase Attitudes*

Investigating consumer attitudes, Stoilov (2022) argues that Black Friday and Christmas are distinguished mostly by who is the ultimate recipient of the purchase. Accordingly, in the first event, it is the user himself, and in the second (Christmas) it is his closest people - family and friends. These differences in targeting also explain the difference in consumer models, the assortment, and the turnovers that consumers generate.

According to the online journal Market Watch (Hill C., citing Simon, 2014), most American citizens do their holiday shopping for the members of their families – nearly 75 % for a family member, and 90 % of their shopping if we are talking about the extended family and for a boyfriend or a girlfriend for those who are not formally married (Fig. 2).

The most important conclusions from the conducted research are systematized in tabular form for maximum convenience in Table 1.



Table no. 1 - Digital Marketing Comparison of Black Friday vs. Christmas Shopping

Approaches	Black Friday	Christmas Shopping
Customers' Purchase Attitudes	"Buying things for myself."	"Buying things for my family and the people I love."
Most Purchased Types of Products	Big and expensive electronics <i>(Big screen TVs, Expensive smartphones, High-class laptops, E-scooters, Hover-boards)</i>	Variety of smaller-scale products <i>(Toys, Jewelry, Souvenirs, Small-scale electronics, Gift vouchers, Gaming consoles)</i>
Suitable advertising conceptions	"I deserve the best for me." "I worked hard all year, I will reward myself now."	"My family is the most important." "I can't be happy if my dearest people aren't happy."
Targeted Audiences for the Advertising Campaign	<ul style="list-style-type: none"> <li>• Working people</li> <li>• Active people</li> <li>• People who can afford to spend more money</li> <li>• Young adults to middle-aged people</li> </ul>	<ul style="list-style-type: none"> <li>• Family people – mothers and fathers, grandparents</li> <li>• People who have children                             <ul style="list-style-type: none"> <li>• Empathic people</li> <li>• Working people</li> </ul> </li> <li>• Middle-aged to elderly people</li> </ul>
Budgeting and Timing the Advertising Campaign	<ul style="list-style-type: none"> <li>• Large-scale and intensive campaign over a short period (One week or ten days)</li> <li>• Most importantly, Black Friday is a short-term event and must be acted upon quickly.</li> </ul>	<ul style="list-style-type: none"> <li>• Prolonged campaign (Starting in late November or the beginning of December until the end of the year)</li> <li>• People have more time to decide what to buy and when.</li> <li>• Strongest accent in the last week before Christmas.</li> </ul>

Sources: Stoilov (2022), Uyehara (2022), Creahan (2022), and the author's empirical experience.

#### ✓ *Most Purchased Types of Products*

As the analyses of Uyehara (2022) and Creahan (2022) reveal, the two major shopping events differ in the volume of money spent on an average product and the number of gifts purchased. At Black Friday, fewer products with a higher unit value are purchased, such as big-screen televisions, expensive smartphones, high-class laptops, e-scooters, hover-boards, etc. On the other hand, at Christmas, a much larger number of products with a lower unit cost are purchased (toys, jewelry, souvenirs, small-scale electronics, gift vouchers, gaming consoles, etc.).

✓ *Suitable Advertising Conceptions*

This chapter of the study examines the advertising conceptions most suitable for Black Friday and Christmas. They are suggested as a piece of advice for retailers, who are looking to maximize their sales during these significant marketing events.

• Black Friday – the essential concept that advertisers and marketers should adopt when creating their campaigns should have the following customer focus:

*"I reward myself"*

✓ *Targeted Audiences for the Advertising Campaign*

A significant number of current business leaders acknowledge that prioritizing the needs and preferences of customers is a more viable method for attaining a durable edge over competitors in the long run, compared to concentrating on developing new products or refining operational efficiency. A mandatory condition for the purpose is the conduct of thorough market research and the identification of current and future market needs (Dimitrova, 2013, p. 78). As a result, a lot of organizations place a high emphasis on strengthening their customer connections (TTEC, 2023).

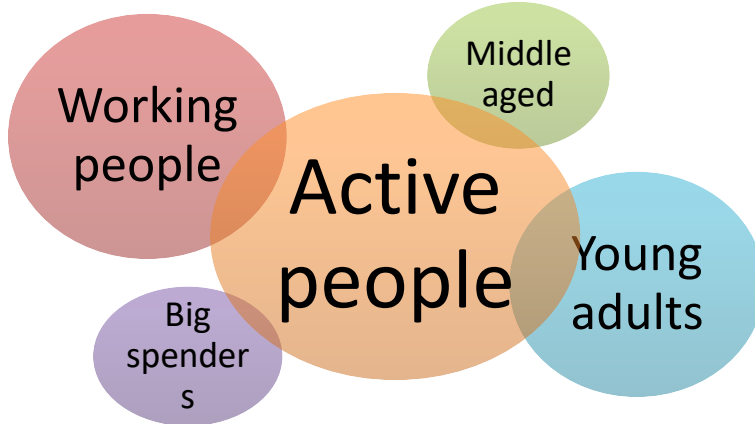
*Table no. 2 - Suggested target audiences for Black Friday social media advertising campaigns*

Target audiences for Black Friday	Percentage of the effort (total exceeds 100 % since audiences overlap)
People with a proactive lifestyle (Active people)	90 %
Working people	85 %
Young adults	70 %
Middle-aged people	40 %
People who can afford to spend more money (Big spenders)	35 %

*Source:* authors' research

The authors also imply that the cornerstone of this strategic approach is the belief that customers are valuable assets, and similarly to other corporate assets, they can contribute to higher profitability if their worth is assessed, supervised, and exploited effectively.

Figure no. 3 Visualization of the most relevant audiences when advertising for Black Friday



Source: authors' research

For instance, comprehending the value of each customer empowers a company to enhance its acquisition methods, securing new customers who are likely to generate significant profits in the long run. It also allows the company to channel its investments towards existing customers to realize their maximum growth potential and ensure the retention of its most valuable customers.

Based on the author's experience in digital marketing and social media advertising, it is suggested that for Black Friday campaigns it is most suitable to target the following groups of customers (as shown in Table 2).

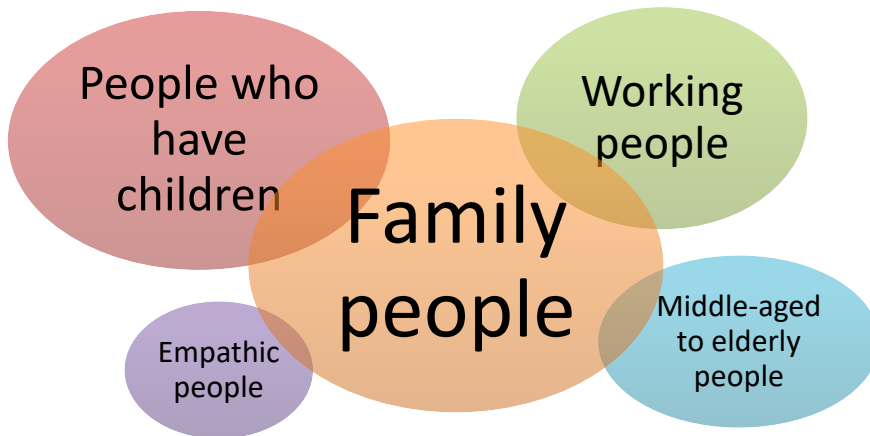
Table no. 3 - Suggested target audiences for Christmas social media advertising campaigns

Target audiences for Christmas	Percentage of the effort (total exceeds 100% since audiences overlap)
Family people – mothers and fathers, grandparents	95 %
People who have children	90 %
Empathic people	50 %
Working people	45 %
Middle-aged to elderly people	30 %

Source: authors' research

These groups of people are solvent, stressed, and busy all year round and are always ready to reward themselves with gifts at a convenient occasion or a big discount.

Figure no. 4. Visualization of the most relevant audiences when advertising for Christmas



Source: authors' research

For Black Friday shopping campaigns, it is most suitable to target the following groups of customers (as shown in Figure 3):

For Christmas shopping campaigns, it is most suitable to target the following groups of customers (as shown in Figure 4).

These groups of people are dedicated to family, relatives, family values, and friendship (Table 3). They will do everything in their power to make their closest people happy during the holidays. If the marketer can find the right message for this group, his company's sales will get boosted.

As the data in Figure 5 shows, companies that focus on an individual approach to their customers realize the best results. What's more, this approach is no longer just desirable, it is now expected by users.

#### ✓ *Budgeting and Timing the Advertising Campaign*

Drawing on the authors' background in digital marketing and social media advertising campaigns, the following principal recommendations for effective budgeting and timing of your advertising campaign are presented.

For *Black Friday*, it is most appropriate to use a large-scale and intensive campaign over a short period, for example, one week or ten days. Take into account that Black Friday is a short-term event and must be acted upon quickly.

For *Christmas* shopping, it is most appropriate to use a lengthy campaign that creates an impression over time. It is good to start in late November or the beginning of December and leave the campaign open until the end of the year. You may add the strongest and most funded accent in the last week before Christmas. People prepare for the winter holidays for almost an entire month and have more time to decide what to buy and when to do it.

### Practical implications

Psychological techniques in determining marketing strategies are not new to marketing science. As Bălan (2014) argues, the field of digital business is undergoing significant development, as novel technologies challenge established business models and present opportunities for innovation. In the current landscape, it is possible for any business unit to operate like a technology start-up, while e-commerce is expanding the limits of consumer behavior within the context of omnichannel experiences. Yuleva-Chuchulaina mentions that, in the long term, digital business transformation changes the foundations of any company from its strategy, structure and culture, to the various processes, through the possibilities and potential of digital media and the Internet. This affects the organization through change management (Yuleva-Chuchulaina, 2021, p.54). However, digital marketing is much faster than traditional marketing in every aspect. Therefore, it demands the latest results as quickly as possible. In addition, it implements the novelties instantly, loading a new advertising strategy on social networks with one mouse click.

*Figure no. 5 Personalization matters more than ever before.*

#### Nonpersonalized communications pose a business risk in a low-loyalty environment.

Loyalty is up for grabs...

...and consumers expect personalization from the brands and businesses they choose.



**75%**

of consumers tried a new shopping behavior during the pandemic<sup>1</sup>



**71%**

of consumers expect personalization<sup>2</sup>



**76%**

of consumers get frustrated when they don't find it<sup>2</sup>

Source: McKinsey Report, 2021

Human behavior plays a fundamental role in every adequate marketing strategy. According to Istudor and Pelau (2011), understanding consumer behavior has become a crucial factor in the decision-making process and strategic development of companies. By gaining insight into consumer motivations and purchasing behaviors, companies can tailor their strategies to effectively persuade consumers to make more purchases. In this way, a thorough analysis of consumer behavior has become a fundamental component of successful business operations.

According to Dimitrieska and Efremova (2021), consumers view products as bundles of benefits and satisfactions. They always choose products that give them the best bundle for their money. What consumers really want are offers that dazzle their senses, touch their hearts and stimulate their minds. They want offers that deliver an experience.

The Mc Kinsley & Co. “Report on Personalization in 2021” (Arora et. al., 2021) highlights that companies that are highly skilled at showcasing customer intimacy experience quicker revenue growth than their counterparts. Moreover, the more companies establish a close relationship with their customers, the greater the benefits they can gain.

The authors claim that using a non-personalized approach to customers creates risks for sales and the overall market results of the companies (Figure 5). What they call a “low-loyalty environment” is a risky environment for any company.

According to their findings consumers do not just want personalization, they demand it. With store and product loyalty more elusive, getting it right matters. Roughly 75 percent of consumers tried a new shopping behavior in the last 18 months, and more than 80 percent of those intend to continue with new behaviors.

Studies indicate *that personalization is typically responsible for generating a 10-15% increase in revenue* (although the specific percentage may vary between companies, ranging from 5-25%, depending on the industry and their execution abilities). The more proficient a company becomes in utilizing data to enhance customer understanding and closeness, the higher the rewards they can reap.

This chapter of the study presents some practical messages and slogans suitable for the two events, according to the strategies proposed in the Practical implications chapter.

Here is a list of suggestions. For best results, managers should use their own approach and message for the target group of their customers.

*Table no. 4 - Examples of advertising slogans for the strategy: "I reward myself" (suitable for Black Friday)*

• Treat Yourself to Something Special	• Don't Just Survive, Thrive
• Indulge in the Good Life	• Experience the Best Things in Life
• You've Earned It	• You Deserve a Break Today

• Pamper Yourself with the Best	• Treat Yourself Like Royalty
• Satisfy Your Cravings	• Because You're Worth It

Source: authors' research

Table no. 5 - Examples of advertising slogans for the strategy: "I reward the people I love" (suitable for Christmas)

• Spread Love and Joy with Our Products	• Spread Happiness with Our Products
• Show Your Love with the Perfect Gift	• Celebrate Love with Our Products
• Make Someone's Day with a Thoughtful Gift	• Gifts That Show You Care
• Give the Gift of Love	• Love Deserves the Best
• Make Memories with the Ones You Love	• Make Your Loved Ones Feel Special

Source: authors' research

The conclusions of the present study will help digital marketers offer managers advertising strategies adequate to consumer attitudes. This will make it easier to achieve higher sales and marketing results. Advertising is not a cheap process and therefore every interested party strives to make the most of every cent spent.

What is presented in this article can make a tangible financial contribution to digital advertising campaigns, save advertisers money and increase their sales. This is the practical advantage of the study.

### **Further research**

The current research was conducted in late 2022 and early 2023, immediately after the Covid-19 pandemic. During the last two pandemic years (2020 and 2021) the market was heavily distorted by the new realities. The world was locked down, and online shopping became the predominant type and entered unsuspected niches – like even ordering dinner, grocery shopping, and other items that 5 years ago were unusual to order online. Deliveries were taken by courier companies, and people did not personally go shopping in malls and stores. All these aspects of the past two years have changed consumer attitudes and market practices. We are now in a new, post-pandemic situation. Therefore, it is necessary to upgrade existing commercial and economic practices, which will support the sustainable development of digital business (Yuleva-Chuchulaina and Filipova, 2023, p. 843).

For the results of the present study to be objective and valid, it should be carried out again in another two years (hopefully in which there will be no new pandemics). After that,

periodic monitoring of market performance by major retail players (such as Amazon) should be carried out to watch for changes in attitudes.

Maintaining interest in the topic and new research will be of great practical benefit to sales managers and digital marketers.

## **Conclusions**

The research conducted revealed significant differences in consumer attitudes between two of the biggest marketing and consumer events of the year, Black Friday and Christmas. Therefore, using different marketing strategies for each event is necessary to achieve maximum sales with minimum advertising expenditure. The aim is to optimize advertising messages for maximum effectiveness and increased sales.

The study also offers practical guidance to marketers and traders on how to take advantage of the proposed strategies. In conclusion, a differentiated approach based on the psychology of the user is much more effective than using a template or standardized advertising message. By following the two advertising strategies suggested here, marketers can see a significant increase in their results.

This research provides new insights that can assist digital marketers in tailoring their advertising strategies to align with consumer attitudes, leading to increased sales and improved marketing outcomes. As advertising can be a costly process, all parties involved aim to maximize the return on their investment.

The findings from this study can offer a significant financial benefit to digital advertising campaigns, helping advertisers save money while simultaneously boosting sales. This practical application of the study makes it a valuable resource for those in the industry.

In conclusion, digital marketing during Black Friday and Christmas is a critical part of any retail strategy. However, it is essential to recognize that these events have distinct differences in consumer behavior, advertising slogans, and strategies. By tailoring your digital marketing efforts to the specific event, you can maximize your sales and achieve greater success with fewer advertising funds.

Whether it is Black Friday or Christmas, understanding your target audience and budget is crucial in developing effective marketing campaigns. Marketers and managers can capitalize on these events by implementing the right strategies to generate increased revenue and achieve long-term success. Remember, effective digital marketing is not just about reaching a larger audience but connecting with the right audience in a meaningful way that drives results. With the right approach and planning, your business can leverage



the opportunities presented by Black Friday and Christmas to drive increased sales and achieve your marketing goals.

## REFERENCES

- Aaker, J. (1997). "The power of brand personality: Exploring its influence on consumer behavior", *Journal of Marketing Research*, 34(3), 347-356. DOI: 10.1177/002224379703400304
- Ajzen, I. (1991). "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. DOI: 10.1016/0749-5978(91)90020-T
- Arora, N., D. Ensslen, L. Fiedler, W. W. Liu, K. Robinson, E. Stein, G. Schüler (2021). "Next in Personalization 2021 Report", *Mc Kinsey & Company* <https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/the-value-of-getting-personalization-right-or-wrong-is-multiplying> (Accessed March 25, 2023)
- Atanasova, A. (2021). Influence of strategic planning on entrepreneurial small and medium-sized business. *Economics and Management* 18(2):35-49
- Bălan, C. (2014), "Dave Chaffey, Digital Business and E-commerce Management: Strategy, Implementation and Practice", *Management & Marketing. Challenges for the Knowledge Society*, Vol. 3/2014, pp. 379-381, ISSN 1842-0206, Romania.
- Creahan D. (2022). „The most popular gifts for Christmas 2022, according to Google“, CBS News, New York, USA, available at <https://www.cbsnews.com/essentials/googles-gift-guide-the-most-popular-presents-of-the-year-according-to-search-trends/> (accessed January 17, 2023)
- Dimitrieska. S & Efremova.T. (2021). "The Weird side of Experience Marketing", *Economics and Management* 18 (2), 140-148
- Dimitrova, R. (2013). Possibilities for the increase of competitiveness of a product through the implementation of active methods for direct connection with the consumers, *Entrepreneurship*, 1(1&2), pp. 77-84, ISSN 1314-9598
- Filipova, M., Yaneva, D. & Mierlus-Mazilu, I. (2023). Specific of digital transformation in business. *Journal of Economics and Management*, 10 (2), "Neofit Rilski" University Publishing House, Blagoevgrad, ISSN: 2683-1325, pp. 110-121, available at <https://em.swu.bg/images/SpisanieIkonomikaupload/SpisanieIkonomika2023/7.%20Filipova%20Yaneva%20Ion.pdf>
- Fishbein, M., & Ajzen, I. (1975). "Belief, attitude, intention, and behavior: An introduction to theory and research". Addison-Wesley, Boston, USA.
- Flynn, F. J., & Adams, G. S. (2014). "Gifting to Others and the Reciprocal Benefits to the Self", *Social and Personality Psychology Compass*, 8(12), 670-681. DOI: 10.1111/spc3.12147
- Gera, R., & Mishra, V. (2020). "The role of emotions in consumer behavior", *International Journal of Management Studies and Research*, 8(3), 31-40. DOI: 10.18488/journal.69.2020.83.31.40
- Haws, K. L., & Diehl, K. (2018). "Consumer entitlement: The roots of a controversial concept", *Journal of Consumer Psychology*, 28(1), 143-166. DOI: 10.1002/jcpy.1010

- Hill, C. (2014). "This is your least favorite person to shop for", Online Journal "Market Watch", Available at: <https://www.marketwatch.com/story/this-is-your-least-favorite-person-to-shop-for-2014-11-10> (Accessed April 25, 2023)
- Istodor, N & Pelau, C. (2011). "Clusters of consumer behavior for food and near-food products in Romania", *Management & Marketing. Challenges for the Knowledge Society*, Vol. 4/2011, ISSN 1842-0206, Romania.
- Jampol, L., Hershfield, H., & Fishbach, A. (2018). "The power of self-reward: Rewarding oneself with material rewards leads to prosocial behavior", *Journal of Personality and Social Psychology*, 114(1), 119-134. DOI: 10.1037/pspi0000106
- Kalaydzhieva, V. (2023). Fostering Sustainable Development: The Crucial Impact of Digital Technologies. *Annals of Spiru Haret University. Economic Series*, 23(4), 667-680, doi: <https://doi.org/10.26458/23437>
- Kim, M., & Kim, J. (2018). "The Influence of Gift-Giving Motives on Consumers' Attitudes and Purchase Behavior", *Journal of Retailing and Consumer Services*, 42, 84-92. DOI: 10.1016/j.jretconser.2018.01.003
- Kim, S., & Patrick, V. M. (2011). "Consumer deservingness and entitled behaviors", *Journal of Consumer Research*, 38(4), 677-687. DOI: 10.1086/660047
- Kyurova, V. & Yaneva, D. (2017). Research on the impact of the corporate image on the competitiveness of interior design enterprises, *CBU International Conference on Innovations in Science and Education, Prague, Czech Republic*, vol. 5, pp. 495-498, DOI: <http://dx.doi.org/10.12955/cbup.v5.973>
- Laing, J. L., & Frost, W. (2015). "Exploring the Gift-Giving Experience: A Consumer Perspective", *Journal of Consumer Behavior*, 14(4), 249-256. DOI: 10.1002/cb.1507
- Lee, Y.-J., & Kim, H.-J. (2019). "Customer attitudes and purchase intentions: The role of consumer personality", *Journal of Retailing and Consumer Services*, 46, 150-158. DOI: 10.1016/j.jretconser.2018.10.001
- Madgerova, R., A. Atanasova (2021). Implementation analysis of the business planning in entrepreneurial small and medium-sized business in Bulgaria. *Entrepreneurship* 9(1):96-118 DOI: 10.37708/ep.swu.v9i1.9
- Marteaux, A.-L., & Plichon, V. (2015). "The Role of Gift-Giving in Relationship Marketing", *Journal of Consumer Marketing*, 32(1), 1-9. DOI: 10.1108/JCM-05-2014-1025
- Monga, A. B., & Lee, E.-J. (2012). "Self-entitlement and consumer behavior", *Journal of Marketing Research*, 49(2), 257-267. DOI: 10.1509/jmr.10.0383
- National Retail Federation of the US (2020), NFR Press release on 2020 holiday sales, <https://nrf.com/media-center/press-releases/nrf-says-2020-holiday-sales-grew-83-percent-despite-pandemic> (Accessed March 23, 2023)
- Petty, R. E., & Cacioppo, J. T. (1981). "Cognitive and affective determinants of attitude formation and change", *Journal of Personality and Social Psychology*, 41(5), 1037-1050. DOI: 10.1037/0022-3514.41.5.1037

- Petty, R. E., & Wegener, D. T. (1986). "The elaboration likelihood model: Current status and controversies", In S. Chaiken & Y. Trope (Eds.), *Dual-process theories in social psychology* (pp. 41-72). Guilford Press, New York, USA.
- Shaw, R., & Nieroda, M. (2019). "Consumer Motives and Attitudes towards Buying Gifts for Others", *Journal of Retailing and Consumer Services*, 48, 1-12. DOI: 10.1016/j.jretconser.2019.01.007
- Stoilov V. (2022), "Difference in consumers' attitudes between Black Friday/Cyber Monday and Christmas holidays", *Marcademics*, Sofia, Bulgaria, available at <https://www.instagram.com/p/C16ZftkIVH4/> (accessed January 19, 2023)
- TTEC Company (2023), "The Value of Individual Customers", *Customer Strategist Journal*, Colorado, USA, available at: <https://www.ttec.com/articles/value-individual-customers> (accessed April 10, 2023)
- Uyehara S. (2022), "25+ bestselling products from Black Friday 2022". NBC News, Shopping, New York, USA, available at <https://www.nbcnews.com/select/shopping/black-friday-most-popular-deals-2022-nca1301053> (accessed January 17, 2023)
- Walshe, E. (2018). The psychology of consumer behavior and the marketing strategy. *Journal of Consumer Marketing*, 35(6), 605-616. DOI: 10.1108/JCM-03-2018-2456
- Yaneva, D., Kiryakova-Dineva, T. & Bozkova, R. (2021). Needs for Remodeling the Entrepreneurship Education for the Post-COVID-19 Era, Resilience and Economic Intelligence Through Digitalization and Big Data Analytics, *Sciendo*, ISBN 9788366675704, pp. 244-253, available at: <https://sciendo.com/book/9788366675704>
- Yim, J., & Kim, D.-Y. (2019). "Hedonic consumption: A literature review", *Journal of Tourism and Leisure Research*, 31(4), 153-171. DOI: 10.26719/jtlr.2019.12.31.4.153
- Yuleva-Chuchulayna, R. (2021). Digitalna transformatsia na biznesa, *Sbornik s nauchni dokladi - yubileyna nauchna konferentsia „Predizvikatelstva pred savremennata Ikonomicheska nauka – Ustoychivost i digitalizatsia“*, Blagoevgrad, ISBN 978-954-00-0307-8 , pp..54-60
- Yuleva-Chuchulayna, R. & Filipova, M. (2023). The Future of Sustainable Business: The Case For a "Green Economy" of Enterprises in Bulgaria, *Proceedings of the 6th International Conference on Economics and Social Sciences*, ISSN 2704-6524, pp. 841-848, DOI: 10.2478/9788367405546-077.

## **PREDICTORS OF CUSTOMER SATISFACTION IN FAST FOOD RESTAURANTS**

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### ***Abstract***

*No matter how long a company has been in operation, achieving customer satisfaction (CS) is the ultimate goal. Businesses are able to generate profits and succeed if their customers are delighted with the services they provide. The goal of the study, therefore, is to identify some factors that determine CS in FFRs in Delta State, Nigeria. Using a structured questionnaire, data were collected from 309 respondents drawn from 12 FFRs. Data analysis was based on inferential and descriptive statistics. From the results, the bulk of clients are unmarried men with an average age of 39, and 69% of them had tertiary education. The findings also show that though SQ is the main predictor, FQ, PV, and RE all significantly affect CS. Given the fierce competition in the market, managers of FFRs must make sure that the food they serve is consistently of high quality and offers good value for the money, while creating a visually appealing environment to minimize customers' complaints and switching behaviour.*

**Keywords:** *customer satisfaction; fast food restaurants; food quality; restaurant environment; perceived product value; Nigeria*

**JEL Codes:** *D12, M30, M31*

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### **Introduction**

Nowadays, consumers of fast foods have become more sophisticated due to changing market trends thereby demanding high quality services. Companies are devoting a significant portion of their finance and time to a better understanding of their clientele and offering them quality services. The benefits to a restaurant's reputation grow with the number of happy patrons; after all, the development of profitable client relationships that both increase and sustain the level of customer satisfaction is what drives business success. Thus, companies are continually struggling for consumers (existing and potential) because

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they depend on them for their survival, turnover and profitability (Dimitrieska & Efremova, 2021).

Besides, keeping customer satisfied will not only lead to customer retention, but also engender customer loyalty. Apart from the question of CS, factors such as FQ, SQ, PV and the engagement of courteous and humble employees, friendly, polite and skilful customer-oriented management staff, all play a significant role in ensuring survival in the fiercely competitive FFRs industry. However, with rapid expansion in the FFRs sub-sector, location and restaurant environment (RE) are now playing more significant roles. Due to the stiff competition in the sub-sector, and given the propensity to switch among customers, it has become expedient for FFRs managers to work extra-hard and develop result-oriented marketing strategies to retain their customers and expand their market share.

The rate of entry and exit of firms from the FFR sub-sector in Delta State has been high in recent times. Although the cause of this high turnover of operators is not known, the current harsh economic condition prevalent in the country is partly to blame. With constantly rising inflation rate, devaluation of the naira exchange rate to the dollar, and the high cost of energy and petroleum products, many restaurateurs that are unable to cope with the harsh business climate are closing down. Furthermore, the exit of many operators could be due to poor patronage by clients that are dissatisfied with the offerings of such enterprises, as dissatisfaction on the part of customers will lead to switching behaviour and negative word of mouth that can harm the image of such FFRs. Since customers are the determinants of success of any product or service, therefore, managers of FFRs need to produce products and services that meet their customers' expectations. The study addressed the following research question: what are the effects of FQ, SQ, PPV and RE on CS among customers in FFRs in Delta State, Nigeria? Thus, the determination of the impact of SQ, FQ, RE and PV on CS is the purpose of the study because CS is absolutely crucial to restaurateurs, as it is the fulcrum around which their industry's survival revolves. This is so because it leads to customer loyalty which in turn facilitates customer retention, as customers satisfied with a given service will re-visit the restaurant, and also recommend it to relations.

## **Literature Review and Conceptual Framework**

### ***Service Quality***

Service quality concept has been difficult to define for researchers due to the manner services which are produced and traded. SQ is usually regarded as a critical prerequisite for competitiveness and for establishing and sustaining satisfying relationships with customers. It is the general assessment made by customers of the quality of services

provided, and it is influenced by an organization's capacity to live up to customer expectations (Caruana, 2002). Furthermore, service quality is the extent of discrepancy between customers' perceptions and expectations about that service (Parasuraman, Zeithaml, and Berry, 1988). Thus, to be able to measure the quality of services provided, customers compare the level of the service offered based on their own personal expectations from past experiences. Parasuraman et al. (1988) developed the SERVQUAL instrument for measuring the scale of performance in the service industry. The instrument attempts to measure and hypothesize the service performance of any product or service. Thus, if a customer's expectation exceeds their perception of the quality of the service, the service is therefore of low quality. The SERVQUAL scale was measured on the basis of five dimensions: Reliability, Assurance, Tangibles, Empathy and Responsiveness. Reliability has been defined by Kotler and Armstrong (2021) as the ability to perform the promised service exactly and dependably. In FFRs, assurance implies engagement of well-mannered, friendly, and knowledgeable employees with requisite skills and traits to provide confidence and ensure trust to the consumers. Tangibles imply physical facilities, equipment and material of the firm and employees. Empathy (including understanding, communication, and access of consumer) refers to individualized attention, caring, and understanding that the company gives to its clients. Staff preparation to offer clients reliable, beneficial assistance is known as responsiveness. Thus, managers of FFRs should prioritize their leadership style as a pedestal for organisational development and business success (Ajani, Salau, Kowo, & Ajeigbe, 2023)

### ***Food Quality***

Food is the core product in FFRs and its quality is a crucial determinant of business success because of its significant positive effects on a firm's profitability. The quality of food served has largely been acknowledged as an important component in the operation of any restaurant, and has a major effect on CS and purchase intention. FQ can stimulate customers' preference for a firm's products making it possible for consumers to differentiate the quality of its products from those of competing enterprises. It is an assessment of the quality of food that is felt differently and in accordance with customer expectations which can affect behavioural intentions (Serhan & Serhan, 2019). Although many scholars agree that FQ plays an important role in determining CS and consequently loyalty, the definition of FQ has generated serious debate among researchers on the need to distinguish between objective and subjective food quality. While objective quality addresses the physical attributes of food and the quality control in the food production process, subjective quality focuses on consumers' view of the quality (Wen et al., 2021). Thus, it is important for managers of FFRs to understand the customers' perception about the quality of food served

in order to ensure they are satisfied.

### ***Perceived Value***

Zeithaml (1988) defined PV as “the consumer's assessment of the service or product's utility due to divergence between what is received and what is offered”. Since value is the centre of exchange, customers will thus compare offerings received with the monetary value given. Thus, if customers received 'value for money', they are likely to make repeat purchase, thereby establishing a link between PV, CS and behavioural intention (Soraya, Sudarmiati & Dhew, 2023). It can also be argued that a consumer's value is determined by how he personally weighs the advantages he has received against the financial costs he has incurred. The ability to determine whether a product is valuable or not rests with the customer who can determine value objectively, not the seller (Joung, Choi & Wang, 2016). Although, the effects of SQ and FQ as predictors of CS have been widely studied, a customer satisfied with a product might not receive commensurate value for money, and thus may not re-buy the particular product.

### ***Restaurant Environment***

Many people now prefer to eat out more frequently than they did a few years ago, reflecting the enormous changes in culture and lifestyle that societies are witnessing. Therefore, with many years of dining experience the expectations of consumers with regards to offerings of FFRs and aesthetic environment have also increased. Nowadays, customers prefer atmosphere that is more innovative and pleasant to dine in because the surroundings create aesthetic dining experience. Although food and service quality are major determinants of CS, today's customers crave improved quality of life and want to enjoy a more comfortable dining space. Therefore, improvement in FQ alone cannot necessarily satisfy consumers of this age (Horng, Chou, Liu, & Tsai, 2013). Since customers are constantly demanding enhanced eating environment, it has become incumbent on restaranteurs to continually modernize FFRs surroundings to arouse favourable feelings in customers and encourage them to come back. A pleasant and arousing atmosphere will not only make customers stay longer in the restaurant, but also make them spend more thereby increasing profitability. Apart from the aesthetics, restaurant cleanliness is another crucial element that customers consider when evaluating the dining area in FFRs. Thus, to remain in business in today's intensely competitive environment, restaurants' managers should take customers opinion very seriously and respond to their concern promptly to earn their continued trust, win their loyalty, and attract prospective patrons.

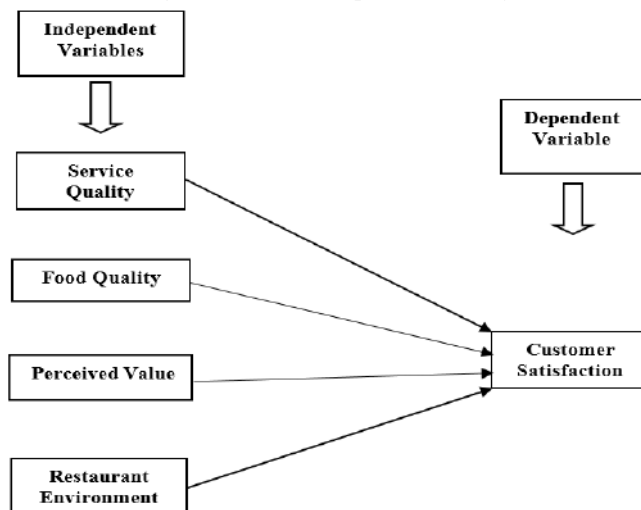
## ***Customer Satisfaction***

Due to the highly competitive nature of the FFRs business, strengthening their bonds with consumers, increasing market share, and boosting overall profitability, a lot of businesses are developing strategic marketing plans. According to Oliver (2014), CS is a pleasurable fulfilment, or a cognitive assessment of service or food quality and affective elements created by consumption experiences (Raghavendra, Mallya & Mukherjee et al., 2019). CS, then, is a gauge of how well a restaurant meets its patrons' expectations in terms of services. Sometimes, there are situations where customers are more satisfied, where the service or product performance exceed their expectations (Kotler & Armstrong, 2021). Moreover, achieving a high level of CS is essential for business success since contented clients are devoted, make repeat purchases, and recommend the firm to relatives and friends (Jung, Sydnor, Lee & Almanza, 2015) and also purchase other services provided by the firm (Cheng, Gan, Imrie & Mansori, 2019). Therefore, FFRs managers must strive to meet or rather exceed consumers' expectations to be on top of the competition and remain in business.

## ***Conceptual Framework and Hypotheses***

The conceptual framework for the study leaned on extant literature on determinants of CS. Consequently, it is hypothesized that CS in FFRs is significantly affected by SQ, FQ, PV and RE (Figure 1).

*Figure no.1 Conceptual Model for the Study*



Source: Author's research



### ***Research Hypotheses***

- H<sub>1</sub>:** Service quality exerts a positive influence on CS
- H<sub>2</sub>:** Food quality has significant influence on CS
- H<sub>3</sub>:** The effects of perceived value on CS is positive.
- H<sub>4</sub>:** Restaurant environment has a positive impact on CS

### **Research Methods**

A structured questionnaire is the instrument for data collection, and is composed of two sections. Section A includes the socio-economic features of the customers while Section B consisted of 36 statements used to measure the five constructs CS, SQ, FQ, PV, and RE. The items were developed based on those used in previous studies (Liang and Zhang, 2009; Qin & Prybutok, 2009). Fourteen (14) re-worded items of the original SERVQUAL scale are adopted to measure perceived SQ, while FQ, PV, CS were measured with five statements each, but RE with seven items. The descriptive statistics of constructs' statements are shown in Table 1. From 1 (strongly disagree) to 5 (strongly agree), a 5-point scale was used to score each item.

Primary data were collected from a diverse range of clients from twelve (12) FFRs in Effurun, Ughelli, Sapele, Abraka and Orhuwhorun in the Central Senatorial district, Delta State. They are Kilimanjaro, Chicken Republic, EJ, Rodinia, Foodland, AJ, Efemena, Teas Treat, Taste Alive, Fiesta, Sizzlers, Richtaste. Three hundred and nine (309) consumers were drawn from a population of 1,575,738 (Federal Republic of Nigeria, 2009) using simple random and convenience sampling techniques. The estimate of the population of FFRs patrons in the study area is unknown, therefore the Krejcie and Morgan (1970) formula for infinite population is used to determine the optimal sample size:

$$n = \frac{Z^2 P(1-P)}{M^2} \dots\dots\dots(1)$$

Where:

- n* = Sample Size for infinite population
- Z* = Z value (e.g. 1.96 for 95% confidence level)
- P* = population proportion (expressed as decimal) (assumed to be 0.5 (50%))
- M* = Margin of Error at 5% (0.05)

Data were analysed using descriptive statistics to illustrate the demographic profile of FFRs' customers, using mean, frequency table, and percentages, while multiple

regression was applied to determine the impact of SQ, FQ, PV and RE on CS. The survey was conducted between 1st October and 15th December, 2022.

## Results and Discussion

### *FFRs Patrons' Socio-demographic Features*

The outcome of socio-demographic analysis of fast foods consumers reveals that the majority are male (53.1% ), while female are 46.9%, with age ranging between 16 and 60 (Table 2). Thus, the majority of the customers are among the economically active work force with an average age of 39. Household size ranged from 1 to 12, with an average of 6 persons, though majority (72.1%) of consumers live in households of 5 to 10 persons. While 53.6% of them are unmarried, 46.3% of the patrons are married. Moreover, about 69% of the customers had acquired tertiary education. The average monthly income of N,= 106,814.83 suggests that the income is somewhat normally distributed. The patrons of FFRs identified include students, traders, civil servants, artisans, private-sector employees, teachers, and retirees, but private-sector employees had the highest frequency.

*Table no.1 - Measurement and Operationalisation of Constructs*

<b>Construct statements</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Service Quality</b>		<b>3.7644</b>	<b>0.58078</b>
The FFR's physical amenities match the caliber of the high-caliber services it offers.	309	3.5146	0.99542
The workers seem well-groomed.	309	3.5469	1.00092
They fulfill their promises to deliver their services on time.	309	3.5146	1.17769
When their staff members commit to doing something by a specific time, they follow through on it.	309	3.3366	1.27793
The employees at the fast-food business personally attend to my request.	309	3.3204	1.23961
Customers are given trust by the FFR staff's demeanor.	309	3.6926	0.98329
Employees are earnest in their efforts to address consumers' concerns.	309	3.4142	1.08857
The staff members offer timely assistance.	309	3.4757	1.12681
The staff is never too busy to answer my questions.	309	3.3398	1.16122
This establishment is trying to do what's best for me.	309	3.3430	1.16724
The staff is always happy to assist me.	309	3.7702	1.15754
I always receive polite treatment from the staff.	309	3.4498	1.13457
The workers are knowledgeable enough to respond to my inquiries.	309	3.3754	1.11141
All patrons can conveniently access the fast food restaurant's operation hours.	309	3.5987	1.09343
<b>Food Quality</b>		<b>3.7644</b>	<b>0.58078</b>
Customers can purchase sanitary and safe products from the fast food establishment.	309	3.7120	1.13012
The amount of food provided in the restaurant is sufficient to sate my hunger.	309	4.0324	0.91821

This quick-service restaurant serves high-quality meals.	309	3.7249	1.11724
This fast-food restaurant offers tasty meals that taste good.	309	3.7282	1.10726
This fast-food establishment offers its patrons a variety of culinary options.	309	3.6246	1.14126
<b>Restaurant Environment</b>		<b>3.6791</b>	<b>0.47081</b>
The eatery has a pleasant odor.	309	3.7896	1.09207
The restaurant's surroundings have a pleasant scent.	309	3.7799	1.20205
The eating area is immaculate.	309	3.7767	1.13331
The restaurant is more comfortable when the air is pleasant.	309	3.7120	1.07112
It always smells so good, the restaurant.	309	3.6861	1.06379
The trash area is orderly and clean.	309	3.5081	1.11837
Flies are kept at bay in the restaurant food.	309	3.5016	1.24740
<b>Perceived Value</b>		<b>3.6757</b>	<b>0.61799</b>
The restaurant offers reasonably priced food.	309	3.5631	1.00972
My satisfaction with the price I pay for fast food is commensurate.	309	3.7314	1.04556
The cost of the food at the restaurant is commensurate with the quality of the ingredients.	309	3.5599	1.09328
The fast-food establishment provides services that are reasonably priced.	309	3.8608	1.05839
Given the prices, the food offered by the restaurant is a great deal.	309	3.6634	1.01450
<b>Customer Satisfaction</b>		<b>3.7081</b>	<b>0.60525</b>
I made a smart decision by choosing to eat at this establishment.	309	3.6958	1.11862
The goods I receive from my preferred restaurant make me feel satisfied.	309	3.8188	0.92556
Every time I eat here, my mood is upbeat.	309	3.6861	1.01379
When I eat at this fast food restaurant, I enjoy myself.	309	3.5469	1.08198
When I eat here for takeout, I am completely satisfied with the products.	309	3.7929	1.01410

*Source:* Author's computation. Constructs statements adapted from Qin & Prybutok (2009) and Liang & Zhang (2009)

The descriptive statistics of the model variables showing the mean, minimum and maximum values, the standard deviation, skewness and kurtosis are presented in Table 3. All the variables are normally distributed with skewness values ranging from  $-0.187$  to  $0.098$  and kurtosis,  $-0.813$  to  $-0.068$ . The rule of thumb is that when skewness and kurtosis values are within the range of  $-1$  to  $+1$ , then the variables are normally distributed (Malholtra, Nunan & Birks, 2017).

The Cronbach's coefficient alpha, a measure of reliability for a multi-item scale with an acceptable cut-off point greater than  $0.70$  (Hair, Black, Babin and Anderson, 2014) is used to assess the reliability of the scale. The values for the constructs ranged between  $0.865$  to  $0.923$ , while the value for the entire instrument is  $0.911$  (Table 4). This means that the construct guaranteed sufficient internal consistency and were higher than the minimal acceptable level of reliability.

### ***Regression Results***

The results of the effects of SQ, FQ, PV and RE on CS are shown in Table 5. The adjusted  $R^2$  is  $0.82$  indicating that  $82\%$  of the variance in CS is explained jointly by

all independent variables in the model, while the Durbin-Watson statistic is 1.84. The ANOVA result shows the model is significant ( $F_{(4, 304)} = 355.332, p < 0.01$ ), and has a good fit. Furthermore, the results indicate that RE, PV, SQ and FQ, exert positive and significant influence on CS. The variance inflation factor (VIF) values show the absence of multicollinearity as all values lie between 1.557 and 3.050, below the threshold of 5.0 (Hair et al., 2014). The magnitude of standardized beta coefficients is an indication of the relative influence of the predictors on CS. SQ is the predominant predictor ( $\beta = 0.449, p < 0.01$ ), followed by PV ( $\beta = 0.27, p < 0.01$ ), RE ( $\beta = 0.163, p < 0.01$ ) and FQ ( $\beta = 0.159, p < 0.01$ ).

*Table no.2 - Socio-demographic Profile of Respondents (n=381)*

<b>Parameter</b>	<b>Frequency</b>	<b>Percentage(%)</b>	<b>Mean (mode)</b>
<b>Sex</b>			
Male	164	53.1	(Male)
Female	145	46.9	
<b>Age</b>			
16-24	37	12.0	39 years
25-33	56	18.1	
34-42	89	28.8	
43-51	86	27.8	
52-60	41	13.3	
<b>Marital Status</b>			
Unmarried	166	53.7	(Unmarried)
Married	143	46.3	
<b>Level of Education</b>			
Primary education	26	8.4	(ND/NCE)
Secondary education	70	22.7	
ND/NCE	95	30.7	
HND/First Degree	75	24.3	
M.Sc./Ph.D	43	13.9	
<b>Household size</b>			
1-2	36	11.7	6 persons
3-4	50	16.2	
5-6	76	24.6	
7-8	90	29.1	
9-10	57	18.4	
<b>Occupational status</b>			
Student	41	13.3	(Private sector employee)
Trader	51	16.5	
Civil servant	50	16.2	
Artisan	42	13.6	
Private sector employee	54	17.5	
Teacher	40	12.9	
Retiree	31	10.0	
<b>Monthly Income (N,= *)</b>			

N,= 15,000.00 – N,= 45,000.00	38	12.3	
N,= 45,001.00– N,= 75,001.00	44	14.2	
N,= 75,002.00– N,= 105,002.00	75	24.3	N,= 106,814.83
N,= 105,003.00– N,= 135,003.00	61	19.7	
N,= 135,004.00– N,= 165,004.00	48	15.5	
N,= 165,005.00– N,= 195,005.00	43	13.9	

*Source:* Author's computation (2023)

*Note:*\* 1US Dollar = N,= 800 (Nigerian Naira)

The beta value implies that a unit increase in SQ will lead to 0.449 rise in CS. Therefore, H<sub>1</sub> is supported. As customers perceive and experience reliable and consistent quality service in the FFRs, their expectation would be met and satisfied. The results align with Chun and Nyam-Ochir's (2020) report from Ulaanbaatar, Mongolia, which found that service quality significantly influenced both CS and behavioral intention. Comparable results were also reported by Rajput and Gahfoor (2020), who also found SQ to exert positive and significant influence on CS in FFRs in Pakistan. Therefore, maintaining a high level of service quality is one means by which FFRs can continue to sustain the patronage of existing customers and attract new ones (Syah, Alimwidodo, Lianti, Hatta, 2022).

Perceived value is another variable that has significant influence on CS as shown in Table 5. The beta value indicates that a one-percentage increase in perceived product value would raise the level of CS by 0.27%, thereby supporting H<sub>2</sub>. The positive and significant effects of PV on CS is based on the fact that as customers evaluate that the product price is reasonable and competitive, their perception of value would increase and this would impact positively on CS (Konuk, 2019). Purwanto, Rahayu & Megawati (2022) reported similar findings in their study of customers in dining restaurants in Surabaya, Indonesia.

Table no. 3 - Descriptive Statistics of Model Variables

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Customer Satisfaction	309	2.00	5.50	3.9129	0.68359	-0.263	0.139	-0.576	0.276
Service Quality	309	2.00	5.00	3.9437	0.62963	-0.228	0.139	-0.525	0.276
Food Quality	309	2.00	5.00	3.9995	0.69495	-0.468	0.139	-0.469	0.276
Perceived value	309	2.00	5.00	3.8576	0.81319	-0.584	0.139	-0.336	0.276
Restaurant Environment	309	1.75	5.00	3.5442	0.70144	-0.415	0.139	-0.377	0.276
Valid N (listwise)	309								

Source: Author's computation (2023)

Food quality also impacted positively and significantly on CS, thus supporting H<sub>3</sub>. The positive and significant influence of FQ on CS is very well known. Nevertheless, considering the stiff rivalry in the FFRs market and the similarity of their offerings, good quality of food alone may not be able to retain and continue to draw in enough customers to ensure these businesses' survival. Thus, restaranteurs should maintain a high-quality menu consistently, with enhanced visual appeal, freshness and the inclusion of local cuisines for the varied clientele they serve.

Table no.4 - Cronbach's Coefficient Alpha Values of the Constructs

Construct	No. of Items	Cronbach's coefficient alpha
Customer Satisfaction	5	0.865
Service Quality	14	0.878
Food Quality	5	0.894
Perceived value	5	0.891
Restaurant Environment	7	0.923
Research Instrument	36	0.911

Source: Author's computation (2023)

This result is in conformity with the report of Chun and Nyam-Ochir (2020) which found FQ to exert significant impact on CS and revisit intention in a research conducted in Mongolia. Similar findings were also reported by Rajput and Gahfoor (2020) in their study of famous FFRs in Rawalpindi and Islamabad, Pakistan where FQ was found as a major predictor of CS and loyalty.

The quality of the physical environment of the FFRs is another variable that significantly ( $\beta = 0.163$   $p < 0.01$ ) affected customers' dining experience and overall satisfaction. This result is in agreement with the report of Syah et al., (2022) in a study of

international FFRs chain operating in Indonesia where restaurant physical environment was a dominant predictor of CS, apart from perceived price.

*Table no.5 - Regression Results of Determinants of Purchase Decision*

<b>A. Model Summary<sup>a</sup></b>										
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R <sup>2</sup> Change	F Change	df1	df2	Sig. F Change	
1	0.908 <sup>b</sup>	0.824	0.821	0.2888	0.824	355.33	4	304	0.000	1.842
<b>B. ANOVA<sup>a</sup></b>										
Model			Sum of Squares	df	Mean Square	F	Sig.			
1	Regression		118.568	4	29.642	355.332	0.000 <sup>b</sup>			
	Residual		25.360	304	0.083					
	Total		143.928	308						
<b>C. Coefficients<sup>b</sup></b>										
Model 1	Unstandardized Coefficients		Standardized Coefficient	T	Sig.	Collinearity Statistics				
	B	Std. Error				Beta	Tolerance	VIF		
(Constant)	-0.071	0.111		-0.633	0.527					
servqual	0.487	0.046	0.449	10.671	0.000**	0.328	3.050			
fooqual	0.156	0.037	0.159	4.240	0.000**	0.412	2.425			
pervalue	0.227	0.032	0.270	7.118	0.000**	0.403	2.479			
restaurantenv	0.159	0.029	0.163	5.418	0.000**	0.642	1.557			

*Source: Author's computation (2023)*

*Notes:* a. Dependent Variable: Customer Satisfaction

b. Predictors(Constant), restaurantenv, fooqual, pervalue, servqual; \*\* (p < 0.01)

An exquisite, aesthetic, modern and attractive environment in the restaurant will trigger positive emotional responses such as happiness on the part of customers and ultimately CS. Happy and satisfied customers could take photos of themselves while dining and share such images on social media with relatives, friends and acquaintances. Similar findings were reported by Rajput and Gahfoor (2020) and Le, Nguyen, Le, Nguyen and Vu (2023) in Pakistan and Vietnam respectively, where one key factor that was discovered to influence CS was restaurants' physical environment.

## Conclusion

Service quality is a critical determining factor of CS, revisit intention and consequently business success among operators in the FFRs and hospitality industry in Nigeria. The study examined the effects of SQ, FQ, PV and RE on CS among patrons FFRs in the Central Senatorial district of Delta State, Nigeria. The results revealed that all the independent variables exerted positive and significant impact on customer satisfaction in

the study area, with SQ as the predominant predictor of CS. Because customers want good food, quality service and comfortable environment whenever they dine out, restaurateurs must ensure that the totality of their products either matches or surpasses the expectations of the clients. Since the quality of service alone may not guarantee customers' re-patronage decision and loyalty, managers of FFRs must ensure that the food served is of consistently high quality and good value for money, to avoid complaining and switching among unhappy consumers. Therefore, FFRs should do their best to deliver promised services accurately, promptly and dependably. Also, since individualised attention and personalised service play a critical role in building up a long-term relationship with customers, restaurateurs should train and retrain their employees to apply a more personalised approach when dealing with their customers and to have the customer's best interest at heart. Customers attach great importance to value for money when choosing a FFR to dine, and even to have a meal. Thus, it is recommended that FFRs managers should offer reasonable and competitive prices to make customers satisfied. Customers are price-sensitive and they will try to get the lowest price for a product or service by comparing prices offered by competing restaurants. Therefore, FFRs managers should pay attention to price competition to improve revenue and profit in their operations.

## REFERENCES

- Ajani, A. O., Salau, A. A., Kowo, S. O. & Ajeigbe, M. B. (2023). Change Management Practices in Fast Food Firms. *Economics and Management*, XX (1), 16-31. DOI:10.37708/em.swu.v20i1.2
- Caruana, A. (2002). Service Loyalty: The Effects of Service Quality and the Mediating Role of Customer Satisfaction. *European Journal of Marketing*, 36 (7), 811-828.
- Cheng, B. L., Gan, C. C., Imrie, B. C., & Mansori, S. (2019). Service Recovery, Customer Satisfaction and Customer Loyalty : Evidence from Malaysia's Hotel Industry. *International Journal of Quality and Service Sciences*, 11(2), 187-203. <https://doi.org/10.1108/IJQSS-09-2017-0081>.
- Dimitrieska, S & Efremova, T. (2021). Loyalty Programs: Do Companies Really Make Consumers Loyal? *Entrepreneurship*, IX (2), 23-32. DOI: 10.37708/ep.swu.v9i2.2
- Chun, S. H & Nyam-Ochir, A. (2020). The Effects of Fast Food Restaurant Attributes on Customer Satisfaction, Revisit Intention, and Recommendation Using DINESERV Scale. *Sustainability*, 12, 7435; doi:10.3390/su12187435
- Federal Republic of Nigeria, (2009). 2006 Census Final Results. FRN Official Gazette, 96 (2). Federal Government Printer, Abuja, Nigeria.



- Hair J.F., Black W.C., Babin B. J. & Anderson R.E. (2014). *Multivariate Data Analysis. 7th revised edition*. Upper Saddle River, N.J.: Pearson Prentice Hall.
- Hornig, J.-S., Chou, S.-F., Liu, C.-H. & Tsai, C.-Y. (2013). Creativity, Aesthetics and Ecofriendliness: A Physical Dining Environment Design Synthetic Assessment Model of Innovative Restaurants. *Tourism Management*, 36,15- 25.
- Joung, H.-W., Choi, E.-K. & Wang, E. (2016). Effects of Perceived Quality and Perceived Value of Campus Foodservice on Customer Satisfaction: Moderating Role of Gender. *Journal of Quality Assurance in Hospitality & Tourism*, 17,101-113.
- Jung, J. M., Sydnor, S., Lee, S. K., & Almanza, B. (2015). A Conflict of Choice: How Consumers Choose where to go for Dinner. *International Journal of Hospitality Management*, 45, 88–98. <https://doi.org/10.1016/j.ijhm.2014.11.007>.
- Konuk, F. A. (2019). The Influence of Perceived Food Quality, Price Fairness, Perceived Value and Satisfaction on Customers' Revisit and Word-of-Mouth Intentions towards Organic Food Restaurants. *Journal of Retailing and Consumer Services*, 50, 103–110. <https://doi.org/10.1016/j.jretconser.2019.05.005>
- Kotler, P. & Armstrong, G. (2021). *Principles of Marketing (18th Ed.)*. Harlow, England: Pearson Education Ltd.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*, 30(3), 607-610.  
doi:10.1177/001316447003000308.
- Le, T. M. H., Nguyen, V. K. L., Le, T. T. H., Nguyen, T. T. H. & Vu, K. N. (2023) Customer Satisfaction and Fast-Food Restaurants: An Empirical Study on Undergraduate Students, *Journal of Foodservice Business Research*, 26 (6), 771-792. DOI: 10.1080/15378020.2022.2056396
- Liang, X and Zhang, S. (2009). Investigation of Customer Satisfaction in Student Food Service: An example of Student Cafeteria in NHH. *International Journal of Quality and Service Sciences*, 1 (1),113-124. DOI:10.1108/17566690910945903.
- Malholtra, N. K. Nunan, D. & Birks, D. F. (2017). *Marketing Research; An Applied Orientation*, 5th edition.Upper Saddle River, New Jersey; Pearson Prentice Hall.
- Oliver, R. L. (2014). *Satisfaction: A Behavioral Perspective on the Consumer*. (e-book). New York: Routledge.
- Parasuraman, A., Zeithaml, V. A., Berry, L. L. (1988). SERVQUAL: a Multiple Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*, 64, (1),12-40.

- Purwanto, A. P., Rahayu, S. & Megawati, V. (2022). Customer Satisfaction and Revisit Intention Modeling for Dining Restaurants in Surabaya. *Advances in Economics, Business and Management Research*, 223, 1032–1038. [https://doi.org/10.2991/978-94-6463-008-4\\_128](https://doi.org/10.2991/978-94-6463-008-4_128)
- Qin, H., & Prybutok, V. R. 2009. Service Quality, Customer Satisfaction, and Behavioral Intentions in Fast-Food Restaurants. *International Journal of Quality and Service Sciences*, 1(1), 78-95.
- Raghavendra, G., Mallya, J. and Mukherjee, A. (2019). The Influence of Physical Environment Factors of Multicuisine Restaurants on Overall Service Quality, Satisfaction and Loyalty. *African Journal of Hospitality, Tourism and Leisure*, 8, (5), 14pp.
- Rajput, A & Gahfoor, R. J.(2020). Satisfaction and Revisit Intentions at Fast Food Restaurants. *Future Business Journal*, 6(1):13 <https://doi.org/10.1186/s43093-020-00021-0>
- Serhan, M. & Serhan, C. (2019). The Impact of Food Service Attributes on Customer Satisfaction in a Rural University Campus Environment. *International Journal of Food Science*. 1 (1), Article ID 2154548, 12 pp. <https://doi.org/10.1155/2019/2154548>.
- Syah, T. Y. R., Alimwidodo, P. C., Lianti, L. & Hatta, H. (2022). Perceived Price as Antecedent of Satisfaction and Loyalty: Learn from Fast Food International Restaurants. *Central European Business Review*, 11 (4), 63 – 84. <https://doi.org/10.18267/j.cebr.304>.
- Soraya, N. C. T., Sudarmiatin, Dhew, T. S. (2023). The Effect of Food Quality and Perceived Value on Behavioral Intention Using Customer Satisfaction as A Mediation Variable:Study of Gacoan Noodle Restaurant in Surabaya. *International Journal of Humanities Education and Social Sciences*, 2 (5), 1761 – 1771.
- Wen, H., Wong, I. A., Kim, S., Badu-Baiden, F., Ji, K. M.(2021). A Multilevel Synthesis of Subjective and Objective Measures of Food Services in the Experience Process, *International Journal of Hospitality Management*, 99, 103059. [doi.org/10.1016/j.ijhm.2021.103059](https://doi.org/10.1016/j.ijhm.2021.103059).
- Zeithaml, V. A. (1988). Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. *Journal of Marketing*, 52, pp. 2–22.

**THE IMPACT OF TRANSPORTATION SERVICE QUALITY ON  
CUSTOMER SATISFACTION ACCORDING TO FRENCH AND  
EUROPEAN STANDARD 13816. A FIELD STUDY OF A SAMPLE OF  
TRAVELERS FROM THE NATIONAL RAILWAY TRANSPORT  
COMPANY SNTF ANNABA, ALGERIA**

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**Abstract**

*In today's increasingly competitive environment, companies are striving to improve customer satisfaction by enhancing the quality of their services. This study examines the impact of transport service quality on customer satisfaction at the national rail transport company (SNTF) in Annaba. Focusing on a spectrum of indicators - ranging from service offering, accessibility and information provision to time efficiency, customer care, comfort, safety and environmental impact - we sought to quantify their influence on customer satisfaction. Using a quantitative approach, we circulated 277 questionnaires at random among SNTF Annaba train passengers, and analyzed the collected data using SPSS statistical software. The results confirm the existence of a positive correlation between transport service quality indicators and increased customer satisfaction. Significantly, there is a strong commitment to adhering to the AFNOR NF EN 13816 standard, with passengers showing a high level of satisfaction with the services provided. While confirming the company's sound approach to implementing a quality-focused policy, our analysis has identified areas for further improvement to enhance customer satisfaction. These findings underline the need for continued efforts to remedy existing shortcomings and enhance customer satisfaction.*

**Keywords:** *transport service quality; the NF EN 13816 Standard; customer satisfaction; SNTF.*

**JEL Codes :** *L92, M31, O18, R41*

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## **Introduction**

The transport sector has an important role to play in the economic development of countries, as it is the backbone of economic and social growth (Makhlouf, 2020). And yet, transport sector services are often insufficient to meet demand, and even when they are available, they are deficient (Amponsah, 2016). Although some forms of daily transport, such as buses and cars, are available, these modes of transportation are a source of disruption due to traffic congestion on the roads, extremely poor conditions within them and the lack of quality of services offered, if services exist at all. This leads to individual impatience and irritation (Amirouche, 2019). This is why most transport companies are making efforts to be more customer-oriented, and service quality is the customer's assessment of the overall superiority or excellence of the service. As a result, the quality of ground transportation services is the passengers' overall assessment of public transportation performance, the higher the performance of the transport service, the greater the positive passenger perception of that quality, and vice versa. This is what has led to the attempt to develop these means and provide quality services, in an attempt by the stakeholders to retain their clientele and achieve what they want (Getachew, 2019). The growing trend towards sustainability issues, particularly sustainable transport, has led to the rise of rail transport in many heavily populated cities due to its multiple advantages, such as the ability to handle large numbers of passengers at once, its safety and on-time performance, as well as its energy efficiency (Wang, Zhang, Zhu and Wang, 2020). Furthermore, it is worth pointing out that this is the only type of transport that has registered a reduction in harmful CO<sub>2</sub> emissions (Tzvetkova, 2021).

For this reason, there is a fast-growing trend towards rail transport, especially in urban areas, in many countries around the world (Wang, Zhang, Zhu, & Wang, 2020). The best illustration of this is provided by the countries of the European Union, which have designated 2021 as the "European Year of Railways". This was based on the enormous potentials it offers, as well as on the stable growth of the pan-European transport system as a whole (Tzvetkova, 2021). The same is true in Algeria, which is experiencing a major transport crisis. Roads are congested, with heavy traffic chaos and a large number of road accidents due to drivers' over-speeding. This leads to delays in people's mobility. All these difficulties in getting people to their destination, combined with the vast geographical size of Algeria, has driven the Ministry of Transport to work towards the development of new modes of mass transit in urban areas, such as the Algiers metro and tramway projects in several wilayas (Sétif, Constantine, Oran, Sidi Bel Abbès and Ouargla). In addition, there are urban and semi-urban public transport companies in all the country's wilayas. (Mekhlouf, 2020) Not forgetting trains, to which the Algerian government devotes the

highest priority in order to improve services, due to their importance in the economic sphere, such as the transport of goods, as well as in the social sphere, such as the transportation of people (Amirouche, 2019). It was therefore necessary to find out whether government policy and expenditure on the public transport development program had effectively contributed to improving rail transport. The purpose of this study is to assess the quality of the transport service provided by the National Rail Transport Company (SNTF) in Annaba, Algeria and its impact on customer satisfaction, while also providing recommendations for improving the service on the basis of the study's findings.

### **1. Research Question:**

The low quality of transport services and infrastructure inefficiencies are major factors fueling transport crises (Tzvetkova, 2020). In this field, the French standard NF EN 13816 on the quality of transport services, particularly public transport services, is considered to be the most important and comprehensive specification, since it focuses on customer needs and expectations and it represents one of the best options for assessing the quality of rail transport service as perceived by passengers and for detecting any shortcomings likely to affect the quality of this service (AFNOR, 2002), on the basis of the independent variable "quality of transport service" and the dependent variable "customer satisfaction", this study will attempt to answer the following question:

**What are the main indicators of quality of transport service -according to the French standard AFNOR NF EN 13816- that influence customer satisfaction at SNTF Annaba?**

Based on the results of research conducted by a group of researchers such as Bouanane (2007); Kechkoush (2018); Mekhlouf (2020); Shen, Wang, & Xiao (2016); Amponsah (2016) and Getachew (2019), we adopt the following hypothesis to answer this question:

**Main hypothesis H1:** There is a positive influence of the quality of transport service indicators provided by the national rail transport company SNTF in Annaba on customer satisfaction.

#### **Secondary hypotheses:**

- There is a positive effect of the "Service provided" indicator from SNTF in Annaba on customer satisfaction.
- There is a positive effect of the indicator "Easiness of access" to the services provided by SNTF in Annaba on customer satisfaction.
- The indicator "Availability of information" on the services provided by SNTF in Annaba has a positive effect on customer satisfaction.

- There is a positive effect of the indicator "Timing" of the services provided by SNTF in Annaba on customer satisfaction.
- There is a positive effect of the "Customer care" indicator for services provided by SNTF in Annaba on customer satisfaction.
- There is a positive effect of the "Comfort" indicator of the services provided by SNTF in Annaba on customer satisfaction.
- The "Safety" indicator for services provided by SNTF Annaba has a positive effect on customer satisfaction.
- There is a positive effect of the indicator "Environmental impact" of the services provided by SNTF in Annaba on customer satisfaction.

### **Literature Review**

Among the reference studies adopted by researchers to determine the research trajectory are:

Amponsah's (2016) study, aimed at assessing the correlation between tangible and intangible dimensions of service quality and the level of customer satisfaction with transit operations in the British Columbia region. The author used an analytical method with a random sample of 205 urban residents. The SERVQUIL model was adapted to study this sample, revealing a statistically significant correlation between service quality and customer satisfaction, as well as a significant negative impact of service delays and fare paid on overall satisfaction.

Getachew's (2019) study, intended to measure the influence of transport service quality, in terms of reliability, safety, comfort, security and convenience, on the satisfaction of customers using vehicles such as tuk-tuks, commonly known as bajajs in Asian and Middle Eastern countries. A descriptive and conclusive methodology was used to analyze closed and open-ended questionnaires obtained from 320 participants. Regression analysis indicated that reliability, safety, comfort and security had a significant impact on customer satisfaction.

Amirouch (2019) studied the contribution of reforms implemented in the Algerian rail sector to the achievement of service quality, focusing on the National Rail Transport Company (SNTF) in Constantine. The theoretical part of the study used a descriptive-analytical approach, while the empirical part employed a survey method. The SPSS analysis of the results showed that the company studied lacks a clear and defined quality policy, requiring detailed and simplified programs to improve the quality of rail services.

The study by Wang, Zhang, Zhu, & Wang (2020) focused on evaluating the important dimensions of service quality and customer satisfaction for rail trips in order to

improve service, increase passenger numbers and achieve a sustainable transport policy. The researchers used a structural equation model (SEM) to design service quality, including functional quality, technical quality, comfort, cleanliness, service planning and reliability. This research used a descriptive-analytical methodology and cluster sampling to collect 220 complete questionnaires, showing that service quality has a positive impact on reuse intention through improved customer satisfaction.

Mekhlouf's (2020) paper measured user satisfaction with Annaba's public and semi-urban transport services, within the context of the government's efforts to improve the quality of public transport service. It used an inductive approach for the theoretical part and a survey and observation methodology with 314 respondents in the field. It adopted the ServPerf model, using AFNOR service quality indicators instead of the model's dimensions, revealing that people's journeys in the urban environment are bound by fixed schedules such as work and study, and that the quality of the public transport service offered by the ETUS company is acceptable but fails to fully meet users' expectations in all its aspects. Although user satisfaction rates are acceptable compared with those of private bus services, they are still insufficient.

Summarizing the main findings of the previous studies:

- Quality of transport service and customer satisfaction have attracted a great deal of interest both at local and global level.
- The majority of previous studies concentrated on the practical side, looking at samples of the industry as a whole.
- This present study stood out by tackling an important sector, rail transport, to investigate passenger satisfaction, unlike the study by Amirouch (2019) which targeted employees and their knowledge and implementation of quality policies in the same sector, whereas the other studies focused on various modes of ground transport.
- In addition, this study set itself apart by using eight specific dimensions of service quality for transportation, while most studies focus on general dimensions of service quality (reliability, responsiveness, assurance, tangibility and empathy).
- Our study joined Mekhlouf (2020) in adopting the ServPerf model to measure real service performance, and using AFNOR (2002) indicators instead of the dimensions specific to the model, but in a field study of the National Rail Transport Company.

### **Aim and Objectives of The Study**

This study aims to measure the real performance of the quality of transport service provided by the National Rail Transport Company (SNTF) in Annaba, and its effect on passenger satisfaction. It relies on a set of indicators specific to public passenger transport,

issued by the French Association for Standardization (AFNOR) in collaboration with the national institute for transport and safety research (INRETS) in France. These indicators aim to help companies stay and prosper in the transport market by applying a quality approach to public transport, and by targeting customer needs and expectations (AFNOR, 2002).

The significance of this study resides in the fact that we went out into the field to assess customer satisfaction with the quality of services provided by SNTF in Annaba. Knowing what criteria passengers prioritize when assessing the quality of the transport service enables the company's management to develop its mode of service delivery in line with customer wishes, and thus achieve higher levels of satisfaction. Furthermore, the study helps to pinpoint the weak points in the quality indicators used by SNTF in Annaba, which lead to customer dissatisfaction and discontent.

The goals of the study can be formulated in accordance with the results that the researchers aim to achieve on a theoretical and practical level, as follows:

- To understand the theoretical concepts of service quality and customer satisfaction;
- To define the concept of transport service quality, associated indicators according to the French standard (NF EN 13816) and measurement models;
- To analyze the level of commitment in the application of the NF EN 13816 standard by the SNTF company in Annaba;
- To analyze the level of satisfaction with the quality of the transport service provided by SNTF in Annaba from the passengers' point of view;
- To understand and measure the impact of the quality indicators of the transport service provided by SNTF in Annaba on customer satisfaction, and to determine the most important indicators;
- To make recommendations on the basis of the results obtained from the study and the experimental model of the relationships of influence between variables, which might improve customer satisfaction.

### **The Methodology and The Area of Study**

The quantitative method is the basis of this study, since it involves measuring, analyzing and testing the research hypotheses, and obtaining significant figures to support the research problem. The field of study consists of the following:

- **Spatial coverage:** The study was carried out at the National Rail Transport Company SNTF in Annaba;
- **The time frame:** It took some time to determine the study's target sample and to distribute the questionnaire, resulting in a 3-month period of fieldwork;



- **The human dimension:** The questionnaire was distributed to a random sample of 320 passengers travelling on SNTF trains in Annaba, of whom 277 were responded to.

## **2. The theoretical framework of quality of transport service and customer satisfaction**

This includes the fundamental concepts of quality of transport service, customer satisfaction and measurement models for these two concepts.

### *2.1 Quality of transport service*

There are many definitions of service quality, particularly those relating to public passenger transport. Before discussing these definitions, we will look at the definition and characteristics of public passenger transport service.

Public passenger transport: Public passenger transport is defined by article 2 of law no. 01/13 on the orientation and organization of land transport as "all transport carried out for remuneration and on behalf of third parties by an operator who transports people from one place to another by road, rail or any appropriate vehicle with a capacity of at least 9 seats" (Executive Decree no. 01/13 on the orientation and organization of land transport, no. 44, August 7, 2001, page 85).

Public passenger transport consists of services with the following characteristics:

- It is open to anyone, whether a single passenger or a group;
- It has a defined timetable or frequency, as well as operating periods;
- It operates according to itineraries and stops at defined points;
- The areas they serve are well defined and provided on a continuous basis, in addition to their fares being known to the general public (AFNOR, 2002, p. 5).

Quality of transport service: for some, the quality of public passenger transport service is defined as "safe travel", while for others, it means punctuality and regularity. Consequently, quality of transport service is a set of qualitative standards for which the service provider (transport company) is responsible, and is linked directly to the level of satisfaction expressed by the user of the public transport service. (Lahoul & Shahli, 2015, p. 192)

The way transport service quality is defined varies according to the parties involved in the service:

- For the beneficiary/customer: The quality of the transport service is the adaptation of this service to its uses and the satisfaction of its needs;

- For service providers/employees: who have direct customer contact, it is a reflection of a list of indicators and a work procedure that must be applied;
- For the transport company: it is the compliance of the transport service with pre-established standards (Amirouche, 2019).

Quality of transport service indicators: According to AFNOR (2002), the general quality of public passenger transport consists of a large number of standards representing the customer's point of view on the service provided. Transport service quality is divided into eight indicators according to this standard. The first two indicators outline the public passenger transport offer in more general terms, indicators 3 to 7 provide a more detailed description of service performance, whereas indicator 8 describes the environmental impact on society at large.

*A summary of these indicators follows:*

1. Service delivery: the delivery of the transport service is associated with a set of elements and measures that can improve the quality level of the transport service. These elements depend on the degree of modernity of the means of transport, the number of vehicles available, the routes they cover, compliance with journey start and end times, and vehicle capacity.

2. Accessibility: for transport, the flexibility of the itinerary and its route is even more important than the speed factor. This is also shown by the importance of convenient stations and their distribution in strategic areas that enable passengers to get there easily.

3. Information availability: the provision of information on departure and arrival times, and waiting times, not only contributes to service quality, but also makes it easier for passengers to find out the various timetables for their journeys. Such information is represented by trip prices, duration and destinations.

4. Timing: the amount of time spent can be a determining factor in customers' willingness to pay more for less time. For instance, if we take the use of urban transport as an example, we see that many customers would rather travel by cab to save time than by bus. Time also influences the customer's choice of a particular mode of transport.

5. Customer care: Attention to the customer is demonstrated by the impeccable and distinctive way in which service providers dress, as well as by the way in which they are treated, since they represent the company. This is achieved through good treatment, orientation and hospitality.

6. Comfort: Good condition of the means of transport contributes significantly to the customer's comfort and well-being, as does the cleanliness and condition of the seats.

7. Safety: Assessing safety is considered to be one of the most important psychological concerns for travelers when using the various means of transport and their basic facilities. Safety is expressed through safe driving, and the availability of safety equipment and resources in the car.

8. Environmental impact: Modern public transport has a positive impact on the environment, helping to keep the environment clean and the urban landscape appealing (AFNOR, 2002).

## *2.2 Customer satisfaction*

Defining customer satisfaction: The literature demonstrates that customer satisfaction is an essential factor in long-term business success. Kotler defines it as "the customer's judgment of the consumption or use experience resulting from product expectations and perceived performance" (Maadani, 2010, p. 5).

Reed & Haal define it as "the customer's degree of awareness of the company's effectiveness in providing products that meet their needs and desires" (Al-Ta'i & Al-Abbadi, 2009, p. 220). According to Bouanane, "the customer values the service on the basis of his previous experience, and if this experience is lacking, he relies mainly on his expectations during the pre-purchase phase. His future expectations of the service are an indication of a current performance evaluation process, which means that the customer's orientation or attitude towards the service adapts to his expectations." (Bouanane, 2007, p. 77)

## *2.3 The relationship between quality of service and customer satisfaction*

Opinions differ as to the interpretation of the connection between quality of service and customer satisfaction. Although a clear and certain relationship exists between the two, researchers are still unclear about the nature of this relationship and how service quality and customer satisfaction are connected.

Bateson made a distinction between quality of service and customer satisfaction, considering quality as an attitude that the customer forms in evaluating the service provided, whereas satisfaction represents the final decision as to his assessment of the exchange process in progress. Researchers argue that the difference between service quality and customer satisfaction revolves around the definition of expectations. Their research argues that the significance of expectation for satisfaction arises from the comparison of expected service performance with the perceived performance of the same service.

Customer satisfaction can be viewed through two lenses. The first concept focuses on specific transactions or a specific service, while the second concept is based on cumulative transactions, i.e. all the customer's purchasing or consumption experiences over

a given period of time. These transactions are seen as an indicator of actual performance in the past, present and future.

**The stages to achieve satisfaction:** Achieving customer satisfaction involves a series of phases to reach either satisfaction or dissatisfaction. It is vital for the service provider to stay connected to its customers in order to determine their needs and satisfy them at the right time and in the right place. Customer satisfaction crystallizes through three main stages:

1. Customer needs understanding: One of the most important steps in achieving and evaluating customer satisfaction. It involves monitoring the characteristics and elements that influence satisfaction, in order to avoid discrepancies between the expected and perceived quality of the services provided. Researchers have identified four elements that influence customer satisfaction: basic service elements expected of competitors, support services making service more efficient, systematic problem solving, exceptional services solving diverse problems for several customers.

2. Customer feedback: Here, the methods and techniques used by marketers to monitor customer opinions come into play, in order to find out how well their organizations are fulfilling their customers' expectations. This can be done through the response;

3. Continuous measurement: The final step in achieving satisfaction, consisting of the organization implementing a specific program to measure consumer satisfaction, such as a customer satisfaction matrix (CSM) system, in order to continuously monitor customer satisfaction (Meziane & Ben Salem, 2020).

#### *2.4 Quality of service measurement models*

**Models for measuring service quality from the customer's point of view:** A variety of models have been proposed for measuring service quality with the aim of improving the level of service provided to customers, including public services, based on the perception of consumer satisfaction (Msalleh, 2012). The Service Performance Model (ServPerf) is one of the most common and widely used models, as it measures service quality from the customer's point of view.

Also known as the trend model, it was developed by Steven Taylor & Joseph Cronin in 1992 following criticism of the service quality model. They both agreed that it was inappropriate to measure service quality based on the difference between customer perceptions and expectations, prompting them to propose an alternative model measuring actual service performance as a form of trending (Djebili, 2010). It can be expressed as follows:

$$\text{Quality of service} = \text{Actual service performance}$$

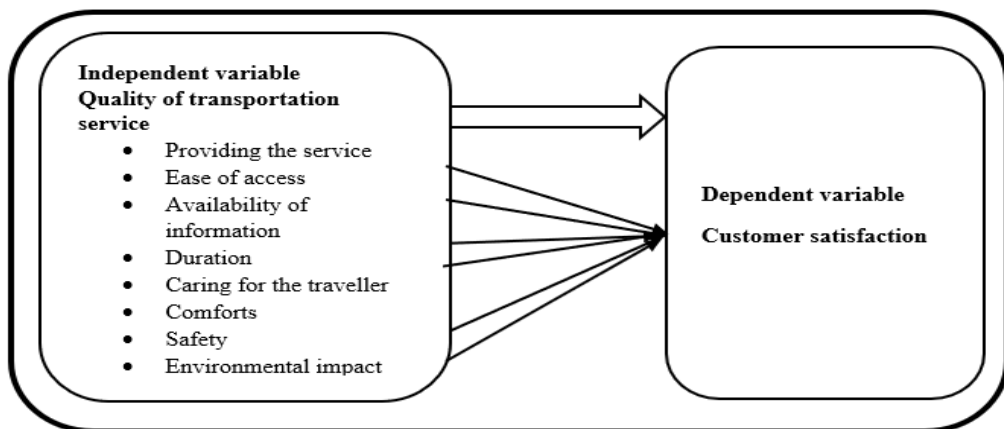
The trend model evaluates actual service performance and discards the idea of deviation when the customer assesses the quality of service. It concentrates solely on customer perceptions, as service quality is expressed as a form of trend. Under this model, satisfaction represents an intermediate factor between previous perceptions of service quality and current performance. In this context, researchers believe that the first orientation towards service is a function of the customer's earlier expectations, and that his future expectations of service are a function of his assessment of its current performance (Chirouf, 2010).

Field study model: Before explaining this model, we should note that theoretical references presume that satisfaction is a reaction of a customer consuming a product in line with his expectations, and its evaluation requires the measurement of multiple dimensions of service quality in order to give us a clear picture of overall customer satisfaction, which is crucial for the different parties involved.

Relying on previous studies, to measure the independent variable (transport service quality) and the dependent variable (customer satisfaction), we have adopted the same principles as the ServPerf trend model. However, we will not be using its specific service quality dimensions, but we will instead be using the indicators of standard NF EN 13816, which specializes in the quality of public transport services for passengers, as it is more exhaustive in defining the study's indicators.

In line with the above points, **Figure 1** illustrates the study model, highlighting the dependent variable and its indicators, along with the independent variable, as well as the relationships between them that will be tested.

*Figure no. 1 Field study model*



Source: Developed by the researchers based on a study by Lahoual and Chehli (2015) & Mekhlouf (2020)

### 3. The framework of the field study.

The methodological procedures of the study involve observation and data analysis methods. Observation of the study community: The survey targets train passengers travelling in and out of the city of Annaba, where the average daily number of passengers according to the institution's statistics is 1,934, distributed over three lines as follows:

- The line linking the city of Annaba to the municipality of Sidi Amar, designed for students;
- The line linking Annaba to the municipality of Chehana, extending to Tébessa via Souk Ahras;
- The line linking the city of Annaba to the municipality of Berrahal, reaching El Aga station in the city of Algiers.

Using Steven Thompson's equation (Thompson, 2012, p. 59), consistent with likely observations given that the objective of the study is to generalize, our sample size becomes 320 passengers according to the following formula:

The questionnaires were distributed in the stations and inside the train carriages. A

$$t = \frac{N \times p(1 - p)}{(N - 1)(a^2/z^2) + p(1 - p)}$$

random sampling methodology was used, taken from the entire population, where the number of questionnaires collected amounted to 277 complete questionnaires.

**Methods of data analysis:** The SPSS statistical software was used to meet the study objective. The following statistical methods were employed:

- Cronbach's alpha coefficient: To assess the reliability of the questionnaire, Cronbach's alpha coefficient was calculated. This coefficient is one of the best estimates of internal consistency and is widely used by researchers.
- Kolmogorov-Smirnov, Skewness and Kurtosis test: This was performed to check the distribution of the data used.
- Frequencies, means and standard deviations: This provides a complete description of the characteristics of the sample studied and its degree of agreement.
- One-sample T-test: This was performed to test significance.
- Simple and multiple linear regression, using a stepwise method to analyze the relationship and impact between variables, test hypotheses and select the optimal model for the study.

### Testing the reliability and suitability of the survey tool.

Appearance validity: The questionnaire was submitted to a panel of evaluators from the University of Souk Ahras and Oum El Bouaghi, specialized in the fields of Quality and Marketing. In addition, it was presented to a number of employees of the National Railway Company to assess the accuracy of the questions and their appropriateness to the objectives of the study. Some of the questionnaire questions were reviewed in the light of changes recommended by the evaluators.

Statistical reliability: To measure the accuracy of the questionnaire, Cronbach's Alpha equation was used to assess the consistency and correlation between questionnaire questions. This coefficient must exceed the statistically acceptable threshold, which is generally 70%. The following table shows the final results of the overall reliability coefficient for each study variable.

*Table No. 1 - Testing the reliability of the questionnaire items for each variable using the Cronbach's alpha reliability coefficient*

Statement	Number of paragraphs	Cronbach's alpha coefficient
<b>Quality indicators for combined transport services</b>	42	0.852
<b>After satisfaction</b>	6	0.828
<b>Global questionnaire reliability coefficient</b>	48	0.882

*Source:* Prepared by researchers based on SPSS outputs

From the table above, it can be seen that the alpha coefficient for questionnaire items exceeds (80%) for both dependent and independent variable items. This indicates correlation and consistency between questionnaire items. As the statistically acceptable threshold is (70%), this confirms the stability of the tool used in our study. Normal distribution test: It is necessary to check whether the data are normally distributed or close to a normal distribution, using the skewness and kurtosis indices.

Skewness is present when values fall outside the defined interval [1-, 1+], and the same applies to kurtosis when values fall outside the interval [1.5-, 1.5+]. The distribution is considered normal or close to normal if the values lie within the same intervals. The following table shows the degree to which the data match the normal distribution.

Table no. 2 - Results of the normal distribution test for the data using the skewness and kurtosis factors.

Respondents' data to questionnaire topics	Skewness coefficient		Kurtosis coefficient	
	Statistical value	Std. Error standard error of the coefficient	Statistical value	Std. Error standard error of the coefficient
Service provision	-0,062	0,146	-0,162	0,292
Ease of access	-0,062	0,146	0,059	0,292
Availability of information	0,224	0,146	-0,421	0,292
Timing	-0,628	0,146	-0,080	0,292
Customer care	0,140	0,146	0,431	0,292
Confort	-0,069	0,146	-0,490	0,292
Safety	-0,357	0,146	0,105	0,292
Environmental impact	-0,115	0,146	-0,169	0,292
The care for the customer	-0,778	0,146	1,094	0,292

Source: Prepared by researchers based on SPSS outputs

Based on the above table, we note that all statistical values fall within the defined intervals. Consequently, it seems that respondents' data on the questionnaire dimensions follow a normal distribution. This allows us to use parametric statistical tools to test and analyze the study hypotheses.

#### 4. Presenting and analyzing the results of the study

**Descriptive statistics regarding personal data:** Appendix 1 shows that the majority of individuals in this sample are male, aged between 18 and 35, have a university education and work as employees or are students attending university. Their income peaks at 18,000 DA. They live mainly in the downtown area, travel by train daily or twice a week. In addition, they do not own a private car, meaning that the main means of public transport for them is the train. In particular, this situation illustrates employees' and students'



commitment to their jobs and studies, as well as the proximity between their work/study locations and the three rail lines.

*Table no 3 Descriptive statistics for transportation service quality indicators*

<b>Indicators</b>	<b>Arithmetic mean</b>	<b>standard deviation</b>	<b>Coefficient of variation CV</b>	<b>Degree of approval</b>
<b>Service provision</b>	3,3068	0,5623	17	Medium
<b>Ease of access</b>	3,5640	0,5806	16,29	Strong
<b>Availability of information</b>	2,9593	0,6758	22,88	Medium
<b>Timing</b>	3,4205	0,7937	23,20	Strong
<b>Customer care</b>	3,5972	0,5200	14,45	Strong
<b>Confort</b>	3,2657	0,5335	16,33	Medium
<b>Safety</b>	3,6093	0,5527	15,31	Strong
<b>Environmental impact</b>	3,0156	0,6013	19,94	Medium
<b>Quality of transport services</b>	3,3423	0,6025	17	Medium

*Source:* Prepared by researchers based on SPSS outputs

The table above reveals that the majority of travelers' responses lean towards a strong or moderate degree of agreement, with strong levels of approval for safety, customer care, ease of access and duration, with averages ranging from (3.6093) to (3.4205). There is moderate agreement for service, confort, environmental impact and information availability, with means of (3.3068), (3.2657), (3.0156) and (2.9593) respectively.

As for standard deviations and coefficients of variation, no significant differences were recorded in travelers' responses, indicating a homogeneity of responses in terms of agreement. This is a strong point of the SNTF (National Rail Transport Company), which guarantees the presence of security agents on all its routes, as well as a special car for national gendarmerie agents on regional and long-distance trains. Police officers are also present in stations. The driving style and the presence of brakes also help to avoid traffic accidents.

The high degree of agreement for the customer care index reflects the importance the company attaches to its customers. It ensures this by training and upgrading employee skills, offering quality services, dealing with suggestions and complaints, offering competitive fares and attractive offers, as well as providing appropriate uniforms for employees to help guide passengers when needed.

The strong confirmation of ease of access and duration reflects the excellent infrastructure put in place by the relevant organization, covering most of the routes in the areas concerned. This also facilitates ticketing and wagon loading/unloading. What's more, the flexibility and organization of the timetable are taken care of by the company's customer service, as is the regular maintenance provided for wagons and tracks.

In contrast, moderate agreement on the other indicators shows a divergence of opinion among some passengers regarding the services offered. For example, the absence of late journeys, the lack of Wi-Fi connection in the station, the absence of toilets in the Sidi Amar trains. Although these services are available on other trains, the distance between departure and arrival determines their availability. And, finally, there is no clear communication policy at stations and on trains, enabling passengers to obtain information on timetables, waiting times at the station and on-board trains, as well as delays or trip cancellations.

*Table no. 4 - Descriptive statistics for the customer satisfaction variable items*

<b>The expressions</b>	<b>Arithmetic mean</b>	<b>Standard deviation</b>	<b>Coefficient of variation Cv</b>	<b>Degree of approval</b>
<b>The National Rail Transport Company of Annaba meets our needs</b>	3,4440	1,0221	29,67	Strong
<b>A reliable rail travel experience</b>	3,9927	0,7565	18,94	Strong
<b>As a customer of the National Rail Transport Company of Annaba, we are known for our loyalty.</b>	3,7942	0,9465		Strong
<b>The service provided by SNTF Annaba meets our expectations.</b>	3,2924	1,0654	24,94	Medium
<b>Generally speaking, I'm satisfied with the</b>	3,7472	0,9674		Strong

<b>services provided by SNTF Annaba.</b>				
<b>I prefer to travel by train instead of other means of transport.</b>	4,2274	1,2224	32,36	very strong
<b>Orientation towards customer satisfaction</b>	3,7496	0,6815		Strong

*Source:* Prepared by researchers based on SPSS outputs

The table above illustrates that the majority of travelers are satisfied with the quality of transport services provided by Annaba's SNTF (National Rail Transport Company), as evidenced by the high overall average score of 3.7496, indicating a high degree of agreement for phrases expressing customer satisfaction. Passengers prefer train travel to other means of transport, with an average of 4.2274, expressing an extremely high level of satisfaction.

Furthermore, the averages of the first five sentences indicate a high degree of agreement, reflecting passengers' acceptance of the following elements: the satisfaction of their needs by SNTF d'Annaba, the reliability of their train travel experience, their loyalty to SNTF d'Annaba, the conformity of the services provided with their expectations, and finally, their overall satisfaction with the services provided by SNTF d'Annaba.

These findings indicate a high level of customer satisfaction with service quality, with most indicators at a high or at least moderate level of satisfaction. With regard to coefficients of variation and standard deviations, no values indicate significant differences or dispersion in responses.

**Hypothesis testing and study design:** In this section, we will attempt to test the previously stated hypotheses in order to validate or refute them, as well as proposing the best study design using a stepwise test.

**Testing the main hypothesis:** Using simple linear regression analysis, the main hypothesis will be tested to determine the impact of transport service quality indicators as an independent variable on the dependent variable, i.e., customer satisfaction.

Main hypothesis H1: There is a positive impact of the quality of transport service provided by the National Railway Transport Company (SNTF) of Annaba on customer satisfaction.

The following table shows the most important results of the simple linear regression analysis between the independent variable “quality of transportation service” and the dependent variable “customer satisfaction” with the services provided by SNTF Annaba:

*Table no. 5 - Analysis of variance of the effect of transportation service quality on customer satisfaction.*

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
<b>Between groups</b>	48,959	1	48,959	169,905	0,000
<b>Within groups</b>	79,243	275	0,288	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,618)	R <sup>2</sup> = (0,382)

*Source: Prepared by researchers based on SPSS outputs*

Further to the linear regression analysis as indicated in table number 5 above, we find that the results of the analysis of variance are as follows: the calculated value of F is (169.905) with degrees of freedom of (1 and 275), and a significance level (Sig) of (0.00), below (0.05), the threshold of significance retained in the study. This requires rejection of the null hypothesis and acceptance of the alternative hypothesis, which asserts the existence of a positive impact of transport service quality on customer satisfaction at the company studied.

Moreover, the coefficient of determination R<sup>2</sup> is (0.382), which means that 38.2% of the variations observed in customer satisfaction (the dependent variable) are due to variations in transport service quality (the independent variable).

### **Testing the sub-hypotheses**

First sub-hypothesis: There is a positive impact of the "Service delivery" indicator from SNTF Annaba on customer satisfaction.

*Table no. 6 - One-way analysis of variance (ANOVA) of the sample members' answers between the service delivery index and customer satisfaction*

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
<b>Between groups</b>	16,383	1	16,383	40,292	0,000
<b>Within groups</b>	111,817	275	0,406	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,357)	R <sup>2</sup> = (0,127)

*Source: Prepared by researchers based on SPSS outputs*

Table 6 shows that the calculated F value is (40.292) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, which suggests the existence of a weak relationship between service provision and customer satisfaction. The weak relationship is confirmed by the estimated correlation coefficient of (0.357) and the coefficient of determination of (0.127), indicating that only (12.7%) of the effect on the dependent variable is attributable to the independent variable "Service provision".

Second hypothesis: There is a positive impact of the indicator "Ease of access" to services provided by SNTF Annaba on customer satisfaction.

*Table no. 7 - One-way analysis of variance (ANOVA) of the sample members' answers between the ease of access index and customer satisfaction.*

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
<b>Between groups</b>	824,78	1	824,78	65,917	0,000
<b>Within groups</b>	103,413	275	0,376	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,440)	R <sup>2</sup> = (0,193)

*Source:* Prepared by researchers based on SPSS outputs

Table 7 above reveals that the calculated F value is (65.917) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This entails rejection of the null hypothesis and acceptance of the alternative hypothesis, which suggests the existence of an average relationship between ease of access and customer satisfaction. This relationship is confirmed by the estimated correlation coefficient of (0.440) and the coefficient of determination of (0.193), indicating that only (19.3%) of the variations observed in the dependent variable are attributable to the independent variable "Ease of access".

Third hypothesis: There is a positive impact of the indicator "Availability of information" on the services provided by SNTF Annaba on customer satisfaction.

*Table no. 8 - One-way analysis of variance (ANOVA) of the sample members' answers between the information availability index and customer satisfaction.*

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
<b>Between groups</b>	14,423	1	14,423	34,86	0,000
<b>Within groups</b>	113,778	275	0,413	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,335)	R <sup>2</sup> = (0,113)

Source: Prepared by researchers based on SPSS outputs

Table 8 above shows that the calculated F-value is (34.86) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between information availability and customer satisfaction. The weakness of this relationship is confirmed by the estimated correlation coefficient of (0.335) and the coefficient of determination of (0.113), indicating that only (11.3%) of the impact on customer satisfaction is attributable to the independent variable "Information availability".

Fourth hypothesis: The "Duration" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.

*Table no. 9 - One-way analysis of variance (ANOVA) of the sample members' answers between the duration index and customer satisfaction.*

Statement	Sum of squares	Degree of freedom	Mean squares	(F) arithmetic value	P-Value Sig
<b>Between groups</b>	24,107	1	24,107	63,687	0,000
<b>Within groups</b>	104,094	275	0,378	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,433)	R <sup>2</sup> = (0,188)

Source: Prepared by researchers based on SPSS outputs

The table above illustrates that the calculated F value is (63.687) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of an average relationship between the

duration indicator and customer satisfaction. This moderate relationship is confirmed by the estimated correlation coefficient of (0.433) and the coefficient of determination of (0.188), indicating that only (18.8%) of the impact on customer satisfaction is attributable to the independent variable "Duration".

Fifth hypothesis: The "Customer care" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.

*Table no. 10 - One-way analysis of variance (ANOVA) of the sample members' answers between the customer interest index and customer satisfaction.*

<i>Statement</i>	<i>Sum of squares</i>	<i>Degree of freedom</i>	<i>Mean squares</i>	<i>(F) arithmetic value</i>	<i>P-Value Sig</i>
<b>Between groups</b>	34,821	1	34,821	102,547	0,000
<b>Within groups</b>	93,380	275	0,34	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,521)	R <sup>2</sup> = (0,272)

*Source:* Prepared by researchers based on SPSS outputs.

In the table above, the calculated F value is (102.547) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of an intermediate relationship between the customer care indicator and customer satisfaction. Confirming this moderate relationship is the estimated correlation coefficient of (0.521) and the coefficient of determination of (20.27%), indicating that only (20.27%) of the impact on customer satisfaction is attributable to the independent variable "Customer care".

Sixth hypothesis: The "Comfort" indicator of SNTF Annaba services has a positive impact on customer satisfaction.

*Table no. 11 One-way analysis of variance (ANOVA) of the sample members' answers between the comfort index and customer satisfaction.*

<b>Statement</b>	<b>Sum of squares</b>	<b>Degree of freedom</b>	<b>Mean squares</b>	<b>(F) arithmetic value</b>	<b>P-Value Sig</b>
<b>Between groups</b>	14,632	1	14,632	35,432	
<b>Within groups</b>	113,568	275	0,412	At the significance level: Alpha = 0.05	
<b>Total contrast</b>	128,201	276		R= (0,338)	R <sup>2</sup> = (0,114)

*Source:* Prepared by researchers based on SPSS outputs.

According to the table above, the calculated F value is (35.432) with degrees of freedom of (1 and 275) and a level of significance (Sig) of (0.000), below (0.05), the threshold chosen for this study. This leads to the rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between the comfort indicator and customer satisfaction. This weak relationship is confirmed by the estimated correlation coefficient of (0.338) and the coefficient of determination of (0.114), indicating that only (4.11%) of the impact on customer satisfaction is attributable to the independent variable "Comfort".

Seventh hypothesis: there is a positive impact of the "Safety" indicator of the services provided by SNTF Annaba on customer satisfaction.

*Table no. 12 - One-way analysis of variance of the sample members' answers between the security index and customer satisfaction*

<b>Statement</b>	<b>Sum of squares</b>	<b>Degree of freedom</b>	<b>Mean squares</b>	<b>(F) arithmetic value</b>	<b>P-Value Sig</b>
<b><i>Between groups</i></b>	12,538	1	12,538	29,81	0,000
<b><i>Within groups</i></b>	115,664	275	0,421	At the significance level: Alpha = 0.05	
<b><i>Total contrast</i></b>	128,201	276		R= (0,312)	R <sup>2</sup> = (0,098)

*Source:* Prepared by researchers based on SPSS outputs.

From the table above, we can see that the calculated F-value is (29.81), with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the threshold chosen for this study. This implies rejection of the null hypothesis and acceptance of the alternative hypothesis, pointing to a weak relationship between the safety indicator and customer satisfaction. This low relationship is confirmed by the estimated correlation coefficient of (0.312) and the coefficient of determination of (0.098), indicating that only (8.9%) of the impact on customer satisfaction is attributable to the independent variable "Safety".

Eighth hypothesis: The "Environmental impact" indicator of services provided by SNTF Annaba has a positive impact on customer satisfaction.



*Table no. 13 - One-way analysis of variance (ANOVA) of the sample members' answers between the environmental impact index and customer satisfaction.*

<b>Statement</b>	<b>Sum of squares</b>	<b>Degree of freedom</b>	<b>Mean squares</b>	<b>(F) arithmetic value</b>	<b>P-Value Sig</b>
<b><i>Between groups</i></b>	6,472	1	6,472	14,622	0,000
<b><i>Within groups</i></b>	121,729	275	0,44	At the significance level: Alpha = 0.05	
<b><i>Total contrast</i></b>	128,201	276		R= (0,225)	R <sup>2</sup> = (0,050)

*Source:* Prepared by researchers based on SPSS outputs.

The table above reveals that the calculated F value is (14.622) with degrees of freedom of (1 and 275) and a significance level (Sig) of (0.000), below (0.05), the chosen threshold for this study. This implies rejection of the null hypothesis and acceptance of the alternative hypothesis, suggesting the existence of a weak relationship between the environmental impact indicator and customer satisfaction. This weak relationship is confirmed by the estimated correlation coefficient of (0.225) and the coefficient of determination of (0.050), indicating that only (5%) of the impact on customer satisfaction is attributable to the independent variable "Environmental impact".

In order to build the best model representing the impact of transport quality on customer satisfaction: multiple regression analysis uses a statistical test to identify which independent variables have the greatest influence on the dependent variable. Various methods are available to assess this influence.

Regarding the linear regression equation between the dependent variable (customer satisfaction) and the independent variable (quality of transport service), this equation explains which sub-indicators or specific variables of transport service quality (service provision, accessibility, availability of information, duration, customer care, comfort, safety and environmental impact) have the greatest impact on customer satisfaction.

We conducted a stepwise test, considered one of the best compared to the conservative method (Enter). Each of the independent variables linked to transport service quality is introduced sequentially, and its contribution to the dependent variable is assessed. If it makes a significant contribution to the model, it is retained; otherwise, if it makes no significant contribution, it is deleted. This method results in the smallest selection of variables with a contribution to the model.

Table no. 14 - Results of the multiple regression analysis of the impact of transport service quality indicators on customer satisfaction

The model		Unstandardized coefficients		Standard coefficients	T	P-value	F	P-value
		B	Std. Error	BETA				
1	(Constant)	1,293	0,245		5,273	0,000	102,547	0,000
	X5	0,683	0,067	0,521	10,127	0,000		
2	(Constant)	0,832	0,261		3,184	0,002	63,591	0,000
	X5	0,528	0,075	0,403	7,044	0,000		
	X2	0,286	0,067	0,244	4,268	0,000		
3	(Constant)	0,318	0,294		1,084	0,279	48,428	0,000
	X5	0,524	0,073	0,399	7,137	0,000		
	X2	0,266	0,066	0,227	4,041	0,000		
	X8	0,198	0,056	0,175	3,561	0,000		
4	(Constant)	-0,128	0,312		-0,410	0,682	41,394	0,000
	X5	0,449	0,075	0,343	6,024	0,000		
	X2	0,236	0,065	0,201	3,639	0,000		
	X8	0,217	0,055	0,192	3,969	0,000		
	X1	0,231	0,063	0,191	3,686	0,000		
5	(Constant)	-0,120	0,307		-0,392	0,696	35,874	0,000
	X5	0,364	0,079	0,278	4,629	0,000		
	X2	0,197	0,065	0,168	3,006	0,003		
	X8	0,209	0,054	0,184	3,865	0,000		
	X1	0,223	0,062	0,184	3,604	0,000		
	X4	0,144	0,048	0,167	2,992	0,003		
6	(Constant)	-0,412	0,329		-1,251	0,212	31,296	0,000
	X5	0,343	0,079	0,261	4,356	0,000		
	X2	0,157	0,067	0,134	2,339	0,020		
	X8	0,215	0,054	0,190	4,014	0,000		
	X1	0,209	0,062	0,173	3,393	0,001		
	X4	0,145	0,048	0,169	3,055	0,002		
	X7	0,147	0,063	0,119	2,336	0,020		

Source: Prepared by researchers based on SPSS outputs.

In Table 14, there are six (6) significant models, as indicated by the F-test with a significance (sig=0.000) below the study's significance threshold (0.05). It is also observed that the value of the constant is not statistically significant in the last four models, as it is above the study significance threshold. Furthermore, the values of (t) for all impact coefficients are acceptable, as reflected by (sig), being below the study's significance threshold, making them statistically significant. Here are some details on these models:

**First model:**

The first model explains that if the independent variable (care for the customer) changes by one unit, then the dependent variable (customer satisfaction) changes by (0.683).

$$Y = 1,293 + 0,683.X5$$

*The second model:*

The stepwise test adds, in the second step, the second independent variable based on the degree of correlation, which is ease of access, in addition to the stability of the first independent variable (customer interest).

The second model explains that if the first independent variable (customer interest) changes by one, the dependent variable (customer satisfaction) changes by (0.528), and if

$$Y = 0,832 + 0,528.X5 + 0,286.X2$$

the second independent variable (ease of access) changes by one, the dependent variable changes by (0.286).

**The sixth model:**

The stepwise test will continue to add independent variables according to the degree of correlation until it reaches the optimal model, neglecting variables with low or insignificant correlation. The optimal model in our study was obtained after the gradual addition of four further variables in the following order: (environmental impact, service provision, duration and safety), represented by the following regression equation:

$$Y = -0,412 + 0,343.X5 + 0,157.X2 + 0,215.X8 \\ + 0,209.X1 + 0,145.X4 + 0,174.X7$$

The optimality of this model can be confirmed by comparing the intensity of the correlation as follows:

**Table no. 14 - Correlation coefficients for the different multiple regression models of the study.**

The model	Correlation coefficient. R	R Square	Adjusted R Square	Std. Error of the Estimate
<b>First model</b>	0,521 <sup>a</sup>	0,272	0,269	0,5827
<b>The second model</b>	0,563 <sup>b</sup>	0,317	0,312	0,5653
<b>Third model</b>	0,589 <sup>c</sup>	0,347	0,340	0,5536
<b>Fourth model</b>	0,615 <sup>d</sup>	0,378	0,369	0,5412
<b>Fifth model</b>	0,631 <sup>e</sup>	0,398	0,387	0,5335

*Source:* Prepared by researchers based on SPSS outputs

According to table number 14, we can confirm that the sixth model is the best model due to the strength of the correlation estimated at (64%), indicating that the model is of high quality, and the coefficient of determination explains (41%) of the total variations of the multiple linear regression model. It can also be seen that the (Stepwise) model automatically suppressed models seven and eight linked respectively to variables three and six (information provision and comfort) due to their statistical non-significance.

## **5. The discussion**

According to the findings, the customer interest index is the most influential element in customer satisfaction. The reason for this can be attributed to the nature of the individuals in the sample, who are particularly focused on details, notably those related to prices and appropriate offers for the service: 900 DZD / \$6.63 for the Algiers train (627 km), 480 DZD / \$3.54 for the Tébessa train (231 km) ..., which is less expensive than other means of transport. The same applies to service providers' handling of customer complaints.

The accessibility index comes second in terms of its influence on customer satisfaction. In fact, the more routes are adapted to passengers' movements, and the easier it is for them to buy tickets, the greater their satisfaction with services.

In terms of influence on customer satisfaction, the environmental impact index ranks third. Travellers place importance on the speed of their journeys, and complain about traffic jams and high noise levels, both of which affect their satisfaction.

Ranking fourth is the service delivery index. The availability of transport throughout the day with an adequate number of journeys enables passengers to travel comfortably in modern, uncongested carriages.

Then the duration index confirms that the more the duration is adapted and respected, the greater passengers' appreciation of the transport service, whether in terms of the advertised journey time or even the waiting time at the station.

Last but not least, the safety index comes sixth in terms of its impact on satisfaction. Passengers prefer to travel with a company that guarantees them protection against assaults and theft, thus guaranteeing their safety compared to other institutions where no safety is guaranteed.

As for information availability and comfort indices, they did have a positive impact on customer satisfaction in the National Rail Transport Company (SNTF) in Annaba, but this was not statistically significant, making them unable to predict customer satisfaction.

All in all, these findings revealed a positive impact of quality of transport service indexes on customer satisfaction. Nevertheless, differences from previous studies regarding these results can be synthesized as follows:

A strong commitment to most of the quality-of-service indicators was observed at Annaba's National Rail Transport Company (SNTF), whereas this commitment was weaker in the city of Annaba's public urban and semi-urban transport company, as Mekhlouf's (2020) study reported.

The Getachew (2019) study results indicated that stations were not safeguarded against criminal activity, which was particularly dissatisfying to passengers at night, unlike our results where security was at its highest, along with satisfaction.

The study results also confirmed that Annaba has a defined quality policy, reflected by the presence of a team dedicated to its application. This completely differs from the study by Amirouch (2019), which concluded that SNTF Constantine did not have a clear, defined quality policy, which all staff understood and applied.

Regarding the cumulative impact of transport service quality indicators on customer satisfaction, the results of Mekhlouf's (2020) study confirmed the acceptance of the main hypothesis concerning indicators such as accessibility, duration, customer interest, comfort and safety. These factors do indeed have a positive impact on the dependent variable. By contrast, the study rejected this hypothesis for cues such as service provision, information availability and environmental impact, showing a positive but statistically insignificant impact, thereby confirming our results. Yet the difference lies in the statistically significant positive impact of the service provision index and environmental impact, while the comfort index had no statistically significant impact.

### **Conclusion and Recommendations**

In recent years, the SNTF (National Rail Transport Company) has undertaken a restructuring process to improve the quality of the services provided, in line with the needs

and desires of its customers. To this end, we conducted this study of customer satisfaction in Annaba with the quality of services provided by SNTF. The aim was also to identify the indicators influencing this satisfaction, in order to assist the company's management in improving service delivery to meet customer expectations, and to highlight areas of dissatisfaction and dissatisfaction. Here are the main results obtained:

*1. Findings concerning SNTF Annaba's commitment to applying the AFNOR NF EN 13816 standard:*

- The safety index was ranked first in terms of commitment to its application, setting the company aside from other means of land transport.

- The company's commitment to customer care, with the exception of the possibility of electronic payment for ticket purchases, was rated low due to its lack of service.

- The majority of passengers agreed on the ease of access to services, demonstrating a strong commitment to applying them.

- Overall agreement was high on the commitment to apply the duration index.

- Conversely, the service provision, comfort, environmental impact and information availability indicators showed the least commitment to applying them, in particular due to the lack of night flights, the absence of Wi-Fi in stations, train noise and the lack of an information policy.

- SNTF Annaba's commitment to applying the AFNOR NF EN 13816 quality of transport service standard is considered to be relatively high compared with previous years. This was reflected in the overall degree of approval on the independent variable represented by all the indicators, which tended towards strong approval.

*2. The results of an analysis of the level of satisfaction with the quality of SNTF's transport service in Annaba:*

- The majority of survey respondents' answers tended towards strong approval on all statements reflecting their satisfaction with the services provided to them. This indicates that satisfaction with the quality of the transport service is at its highest level.

- Most of our study participants prefer to travel by train rather than by other modes of transportation.

*3. Results of testing the study hypotheses*

The results were as follows:

- There is a positive impact of the quality of the transport service offered by SNTF Annaba on customer satisfaction.

- There is a positive impact of SNTF Annaba's "service delivery" index on customer satisfaction.

- There is a positive impact of the "ease of access" to SNTF Annaba services index on customer satisfaction.
- The "availability of information" index for SNTF Annaba services has a positive impact on customer satisfaction.
- The "duration" index of SNTF Annaba services has a positive impact on customer satisfaction.
- There is a positive impact of the "customer consideration" index of SNTF Annaba services on customer satisfaction.
- The "comfort" index of SNTF Annaba services has a positive impact on customer satisfaction.
- The "safety" index of SNTF Annaba services has a positive impact on customer satisfaction.
- The "environmental impact" index of SNTF Annaba services has a positive impact on customer satisfaction.

Regarding acceptance of the overall model, it emerged that the impact of comfort and information availability on customer satisfaction was not significant, which led to rejection of the model for these two indexes and acceptance for the others. This is explained by the fact that, despite the absence of an information policy and the unavailability of certain points concerning comfort, respondents were satisfied with the services provided, such as the absence of Wi-Fi in stations, toilets on trains and, finally, the absence of luggage areas.

### **Recommendations:**

Building on the results of this field study, several recommendations can be made to enhance the quality of services provided by the company in question, maximizing customer satisfaction. These recommendations cover:

- The necessity of renewing tracks that do not allow trains to run at high speed, thus affecting set timetables, in addition to the use of modern trains used in other regions.
- The need to provide evening late flights, particularly for suburban trains and short-distance regional trains.
- The need to ensure early morning flights to Algiers, rather than just one train per day.
- The requirement to provide a clear information policy to communicate day-to-day details to passengers, such as train destinations, waiting times at terminals, delays or cancellations, and to provide this information via their online platforms.

- The urgency of offering an online ticket sales service, as the "SNTF" application offers this functionality but is not yet activated.
- Toilets need to be opened for trains equipped with toilets, but which are not available.
- Attempt to create new rail links between Annaba downtown and its suburbs, in particular the densely populated new town of "Zarâa Errich", as well as the commune of "El Kalaitoussa", not far from the commune of Berrahal, to attract new customers.
- To maintain the "Sidi Amar" suburban trains, which only operate during the academic year and cease to operate during the vacations and on public holidays.
- Reinforce the safety and security measures and make sure they are maintained, as they constitute the missing element in other forms of ground transport."

## REFERENCES

- AFNOR. (2002). European Standard NF EN 13816: Transport - Logistics and Services - Public Passenger Transport-Definition of Service Quality, Objectives, and Measures. France: AFNOR.
- Algerian Official Journal (2001), Executive Decree No. 01/13 on the orientation and organization of road transport, number 44, dated August 7, 2001.
- Al-Ta'i, Y.H.S., & Al-Abbadi, H.F.D. (2009), Customer Relationship Management (1st ed), Oman: Al Waraq Publishing & Distribution.
- Amirouche, N. (2019), Achievement of Railway Transport Service Quality in the Development of the Transport Sector in Algeria for the Period (2000-2015), *Review of Financial, Accounting, and Administrative Studies*, 5(1), 447-499.
- Amponsah, C. T. (2016). Service Quality and Customer Satisfaction in Public Transport Operations. *International Journal of Service and Operations Management*, 25(4), 531-549.
- Bouanane, N. E. (2007). Service Quality and its Impact on Customer Satisfaction: A Field Study at the Port Company of Skikda, unpublished master's thesis, *Faculty of Economic Sciences, Management Sciences, and Commercial Sciences, Mohamed Boudiaf University, M'sila, Algeria.*
- Chirouf, F. (2010). The Impact of E-Marketing on Banking Services Quality: Case Study of Some Banks in Algeria, unpublished master's thesis, *Faculty of Economic Sciences and Management Sciences, Mentouri University, Constantine, Algeria.*



- Djebili, H. (2010). Measurement of Banking Services Quality: Case Study of Banque Al Baraka Algeria, unpublished master's thesis, *Faculty of Economic Sciences and Management Sciences*, Mentouri University, Constantine, Algeria.
- Getachew, G. (2019). Impact of Transport Service Quality on Customer Satisfaction: Evidence from the Amhara Region, Ethiopia. *International Journal of Health Economics and Policy*, 4(2), 49-57.
- Kechkoush, B. (2018). Impact of Air Transport Service Quality on Customer Satisfaction: Case Study of Air Algérie in Oran. *Journal of Innovation and Marketing*, 5(1), 235-252.
- Lahoul, S., & Shahli, Y. (2015). Impact of Urban Collective Transport Service Quality on Customer Satisfaction: Case Study of the Collective Urban Transport Company ETUB. Baghdad University *Faculty of Economics Review*, 45, 187-214.
- Maadani, N. (2010). Introduction to Quality in Services Marketing and its Role in Customer Satisfaction, unpublished master's thesis, *Faculty of Economic and Management Sciences*, University of Boumerdes, Algeria.
- Mekhlouf, S. (2020). Analysis of User Satisfaction Regarding the Quality of Collective Urban Transport Services: Public Enterprise of Urban and Semi-Urban Transport in the City of Annaba, unpublished thesis, *Faculty of Economic, Commercial, and Management Sciences*, Haji Lakhdar University, Batna, Algeria.
- Meziane, H., & Ben Salem, N. (2020). Importance of Customer Satisfaction in Building Loyalty: Field Study with a Sample of Mobilis Clients. *Journal of Economic Perspectives*, 6(1), 662-642.
- Msalleh, A. (2012). Measurement of Service Quality from the Perspective of Staff and Patients in Hospitals in the City of Qalqilya. Al-Quds Open *University Journal of Research in Humanities and Social Sciences*, 2(27), 11-48.
- Shen, W., Wang, X., & Xiao, W. (2016). Passenger Satisfaction Evaluation Model for Urban Rail Transit: A Partial Least Squares Structural Equation Modeling. *Transport Policy*, 46, 20-31.
- Tzvetkova, S. (2020). Transport Crisis Management and Media Contact. *Economics and Management*, 17(1), 84-95.
- Tzvetkova, S. (2021). The Eu's Policy for the Development of Railway Transport "2021 – The European Year of Rail". *Entrepreneurship*, 9(1), 36-44. <https://doi.org/10.37708/ep.swu.v9i1.3>
- Thompson, S. K. (2012). Sampling (3rd ed). United States: Wiley-Blackwell.
- Wang, Y., Zhang, Z., Zhu, M., & Wang, H. (2020). Impact of Service Quality and Customer Satisfaction on Reuse Intention in Urban Rail Transport in Tianjin, China. *Sage Open*, 10(1): 1-10.

## APPENDICES

### Appendix 01: Personal Data Tables

#### *Statistics*

		Sex	Age	Education level	Employment	Monthly income	Residency	How often do you use the train ?	Private car availability
No.	<b>Valid</b>	277	277	277	277	277	277	277	277
	<b>Missing</b>	0	0	0	0	0	0	0	0

#### *Sex*

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<i>Male</i>	163	58,8	58,8	58,8
	<i>Female</i>	114	41,2	41,2	100,0
	<b>Total</b>	277	100,0	100,0	

#### *Age*

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>From 18 to 35</b>	170	61,4	61,4	61,4
	<b>From 36 to 53</b>	64	23,1	23,1	84,5
	<b>Older than 53</b>	43	15,5	15,5	100,0
	<b>Total</b>	277	100,0	100,0	

#### *Education level*

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	<b>Middle school</b>	18	6,5	6,5	6,5
	<b>Highschool</b>	48	17,3	17,3	23,8
	<b>University</b>	178	64,3	64,3	88,1
	<b>Postgraduate</b>	33	11,9	11,9	100,0
	<b>Total</b>	277	100,0	100,0	

#### *Employment*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	University student	107	38,6	38,6	38,6
	Employee	110	39,7	39,7	78,3
	Retired	15	5,4	5,4	83,8
	Freelancer	21	7,6	7,6	91,3
	Unemployed	24	8,7	8,7	100,0
	Total	277	100,0	100,0	

*Monthly income*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 18,000 DZD	138	49,8	49,8	49,8
	From 18,000 DZD to 36,000 DZD	29	10,5	10,5	60,3
	From 36,000 DZD to 54,000 DZD	63	22,7	22,7	83,0
	From 54,000 DZD to 72,000 DZD	23	8,3	8,3	91,3
	Greater than 72,000 DZD	24	8,7	8,7	100,0
	Total	277	100,0	100,0	

*Residency*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Downtown	128	46,2	46,2	46,2
	Suburbs	100	36,1	36,1	82,3
	Outskirt the city	49	17,7	17,7	100,0
	Total	277	100,0	100,0	

*How often do you use the train?*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Everyday	79	28,5	28,5	28,5
	At least twice a week	88	31,8	31,8	60,3
	Once a week	39	14,1	14,1	74,4
	Less than that	71	25,6	25,6	100,0
	Total	277	100,0	100,0	

*Private car availability*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, I have my own car	68	24,5	24,5	24,5
	I don't have a private car	209	75,5	75,5	100,0
	Total	277	100,0	100,0	

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