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Το «Αρχεῖον Οικονομικῆς Ἱστορίας» δὲν φέρει οὐδεμίαν εὐθύνη γιὰ τὰ δημοσιευόμενα ἄρθρα
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THE IMPORTANCE OF INTERNAL AUDIT AND ITS ADDING VALUE TO THE BUSINESS. EMPIRICAL INVESTIGATION IN LISTED COMPANIES ON THE ATHENS STOCK EXCHANGE

N. ERIOTIS* M. MENEXIADIS** A. VLACHOU***

Abstract

In the present study, the importance of internal audit is examined and its value added, in the Greek PLCs. Internal audit contributes to the proper operations and to the efficiency of all processes. Effective internal audit contributes to the proper management of risks, to the maintenance of a proper corporate governance system and to the achievement of business objectives.

JEL Classification: M14, M41, M42, M48

Keywords: Internal audit, risk, corporate governance

1. Internal audit

Internal audit is defined as an independent, objective appraisal function and consulting activity designed to add value and improve the operations of an organization. Specifically, by adopting a systematic and professional approach to evaluating and improving the effectiveness of risk management processes, internal control systems and corporate governance, it helps the organization to achieve its objectives (IIA, 2020).

Internal audit provides an organization with two broad categories of services, evaluation services and consulting services. Within these services, internal audit can perform the following (Cox, 2016):

- Various types of audits such as compliance, financial, information technology.

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- Business audits to review efficiency, effectiveness, commonly referred to as performance audits.
- Special audits requested by management.
- Self-assessment of the control system to be effective.
- Facilitate communication between management and external auditors.

2. The need for internal audit

Internal audit professionals have a responsibility to assist the organization in effectively allocating responsibilities, to promote the establishment of cost-effective audits, to assess risks and to recommend measures to mitigate these risks. Internal auditors are an integral part of the management team and provide top management with analysis, assessments, advice and information on the activities they examine, while also monitoring the organizational ethics of the organization. Evaluating emerging technologies, analyzing opportunities, evaluating quality, economy and efficiency, as well as providing valid and timely communication are just some of the activities of internal auditors, on a daily basis. The full scope of their responsibilities provides a broad perspective for the organization and this, in turn, makes them a valuable resource for the executive management and the board to achieve the overall goals and objectives, as well as to strengthen internal control and governance (IIA, 2019).

By assessing significant risks, identifying necessary improvements and reporting them to an organization's executive management, internal audit helps executives and boards to demonstrate that they effectively manage the organization on behalf of stakeholders.

3. The role of internal audit in corporate governance

The purpose of internal audit is to prevent and deter errors in its preventive nature of operations. In this context, internal audit should be designed and operate to correct any weaknesses or inadequacies in control systems and reduce the organization's exposure to risks. In this sense, internal auditors play an important role in strengthening corporate governance. (Menexiadis et al., 2020).

The internal control system in a company includes all the procedures set by the management and the board of directors, in order to ensure the efficiency and effectiveness of the operations, the reliability of the financial information and compliance with legislation. The legislation requires listed companies to regularly review and evaluate the internal control systems they apply and to set up an audit committee (ECHR, 2013).

4. Research results

In a research by Zafeirakos and Tachynakis in 2007, the degree of integration of internal audit in the structure of Greek companies was examined, as well as the degree of cooperation of internal with external auditors. With regards to the degree of cooperation between internal and external auditors, they concluded that their relationship has room for improvement in order to achieve the best results. The research concluded that while Greek companies consider the operation of internal audit a key element of corporate governance and supervision, it had not yet been widely incorporated by companies and that there were many points that could be improved (Zafeirakou & Tachynakis, 2007).

A more recent survey in 2011 examined the effectiveness of internal control in Greek hotels for the period 2005-2009. The survey was conducted with questionnaires on business executives of eighty-five large hotels. The fields of research were based on internal control data as proposed by COSO. Regarding the control environment, it was initially found that business management recognizes the crucial role of internal control in the business environment. For the risk assessment element, the results showed that risk assessment plays an important role in the efficient operation of hotel businesses. Regarding the element of control activities, the research showed that they are largely implemented. Finally, for the monitoring element, it was found that it exists to a large extent for the evaluation of the quality of the performance of the internal control system. Overall, this empirical research has shown that elements of internal control are of great importance (Karagiorgos et al., 2011).

In a later research in 2017, it was found that there was a large degree of agreement on the importance of internal audit in the efficient operation of banks, especially with regard to the provision of reliable information and effective risk management. Although the value of internal audit was recognized as a key element in improving the operation of a bank, there was a reservation as to whether this improvement could be achieved. (Siouziou et al., 2017).

The Menexiadis & Iosifidou research in 2020, investigated the importance of internal control. Initially they found that the Greek PLCs use internal control systems and also have invested in their effectiveness. Finally, taking into account that the Board of Directors of companies is responsible for corporate governance, they have a developed culture on the subject and regardless of the results of each period, they follow good corporate governance practices (Menexiadis & Iosifidou, 2020).

5. Research questions

As the importance of internal audit is multidimensional, constantly evolving and decisive for the operation of companies, the study of the degree of adoption of internal audit procedures by Greek organizations is particularly useful. Therefore, the research questions are the following:

RQ 1: To what extent do Greek organizations adopt and promote the operation of internal audit?

RQ 2: How and to what extent does the operation of internal audit, add value to Greek organizations?

The survey involved a total of 57 senior executives of PLCs, with a staff of over 250 employees, an annual turnover of over 40 million euro and total assets worth over 20 million euro.

The survey questionnaire was based on closed and open type questions with Likert scale. For data analysis the statistical program SPSS was used.

6. Research results

In the present research, the views of senior business executives regarding the implementation and contribution of internal audit systems to PLCs were investigated. An appropriate 3-item questionnaire was used for this purpose. The first part contains information about the organization as well as the position of each respondent in it, the second part concerns the organization and operation of the internal audit service as well as the existing treatment of risk management issues and harmonization with the strategic planning of the organization and the third part of the questionnaire concerns the assessment of the added value to the organization by the internal audit.

Table 1 shows the views of the respondents as to at what level of management the internal audit reports to. 86% thinks that it reports to the Audit Committee, while 14% believe that internal audit reports to the Chairman of the Board and the Board in general.

In Table 2, 96.4% of the respondents reply that there is a procedures manual, while 3.6% reply negatively.

Table 3 lists the views of respondents as to whether the current staffing is sufficient for the needs of internal audit. It can be observed that 84.2% consider that it is sufficient, while 15.8% disagree.

Table 4 presents the views of the respondents regarding whether the annual evaluation of the audit work is done by the head of the internal audit services.

Table 5, lists the respondents' views on the importance that companies

Table 1: What level of management the internal audit reports to?

		Frequency	Valid Percent	Cumulative Percent
Valid	To the Chairman of the Board	4	7	7
	On the Board	4	7	14
	To the Audit Committee	49	86	100.0
	Total	57	100.0	

Table 2: Is there an approved Procedures Manual?

		Frequency	Valid Percent	Cumulative Percent
Valid	Yes	54	96.4	96.4
	No	2	3.6	100.0
	Total	56	100.0	
Missing	System	1		
Total		57		

Table 3: Does existing staffing meet the needs of the internal audit service?

		Frequency	Valid Percent	Cumulative Percent
Valid	Yes	48	84.2	84.2
	No	9	15.8	100.0
	Total	57	100.0	

Table 4: Is the audit work evaluated annually by the head of the internal audit services?

		Frequency	Valid Percent	Cumulative Percent
Valid	Yes	56	100.0	100.0
Missing	System	1		
Total		57		

attach to internal audit and whether they adopt ways and procedures to achieve it. The answers accept values from 1 to 5 (1-Not at all, 2-Small, 3-Moderate, 4-Large, 5-Too much) and the increase of the average is identified with the increase of the importance given by the companies in the internal control. Respondents are placed between answers “high” and “too much” voltage to the second, as to whether control function and the overall effectiveness of control procedures (4.55). Between the same scales but with a tendency towards the answer “Large”, they are placed in terms of the fact that the internal auditors have audit experience (4.48), that the whole internal control system is evaluated (4.41), that policies and procedures have been developed for each operational function (4.34), that internal auditors are trained (4.34), and that the principles of corporate governance are applied and adopted (4.31). Continuing we observe that they are placed in the answer “Big”, in terms of recognizing and delimiting the business risk (4.14), that mechanisms are applied for the identification and assessment of obstacles to the achievement of the objectives of each operation (4.11), that from the hierarchical structure the separation of duties and responsibilities of the staff becomes apparent(4.10), the existing mechanisms recognize the current needs of the company (4.07), the measures to achieve the business objectives are understood by all staff (3.97), that models of analysis are applied of business risk in order to manage it more effectively (3.90), management frequently communicates the importance of ethical values and integrity to employees (3.83) and that information is transferred to all hierarchical levels of employees and in all directions (3.79). Finally, they answer between the answers “Medium” and “Large” with a tendency towards the latter, as to whether the Management has established efficiency measures for the procedures of the company (3.69).

Table 5: Importance that organizations place in internal audit

	Mean	Standard Deviation
Business risk is recognized and delimited	4.14	0.639
Business risk analysis models are applied in order to manage it more effectively	3.90	0.724
The principles of corporate governance are applied and adopted	4.31	0.850
Management frequently communicates the importance of ethical values and integrity to employees	3.83	0.759
The separation of the duties and responsibilities of the staff becomes apparent from the hierarchical structure	4.10	0.817
Measures to achieve business objectives are understood by all staff	3.97	0.823
Mechanisms are in place to identify and assess obstacles to achieving the objectives of each operation	4.11	0.751
Policies and procedures have been developed for each business operation	4.34	0.897
The operation and the overall effectiveness of the audit procedures are checked	4.55	0.632
Existing mechanisms recognize the current needs of the business	4.07	0.799
Information is transferred to all hierarchical levels of employees and in all directions	3.79	0.774
Management has established efficiency measures for the company's processes	3.69	0.967
The whole internal control system is evaluated	4.41	0.867
Internal auditors have audit experience	4.48	0.738
The internal auditors are trained	4.34	0.936

Table 6: In which ways does internal audit add value

	Mean	Standard Deviation
Internal control helps manage business risk assessment	4.17	0.711
The cooperation of the internal audit service with the administration improves the management of audit issues	4.14	0.639
The effect of internal control on corporate governance	4.24	0.872
Internal control contributes to the most effective strategic planning	3.93	0.704
Internal control contributes to more efficient management of quality, health and safety at work	4.00	0.598
Internal control contributes to more efficient management of quality and environmental safety	4.03	0.680
Internal control plays a catalytic role in achieving business goals	4.14	0.789
Internal control is an added value for the business	4.34	0.670

With regards to the views of the respondents regarding the ways that internal audit adds value to the organization, as well as what activities it affects, the questions accept values from 1 to 5 (1-Not at all, 2-A little, 3-Moderate, 4-A lot, 5-Too much) and the increase of the average is identical with the increase of the contribution of the internal audit, according to the point of view of the respondents.

The ways with which internal audit adds value to the organization, should be evaluated. As the internal audit is an added value for the organization, they are placed between the answers “Very” and “Too much” with a tendency towards the first (4.34). They are also placed in the answer “Much” regarding the effect of internal audit on corporate governance (4.24), internal audit helps to manage the assessment of business risks (4.17), the cooperation of the internal audit service with the management improves the management of control issues (4.14), internal audit has a catalytic role in achieving business objectives (4.14), contributes to more efficient management of quality and environmental safety (4.03), to more efficient management of quality, health and safety at work (4.00) and more effective strategic planning (3.93).

Table 7: Evaluation of the activity cycles that the internal audit has added value to the organization

	Mean	Standard Deviation
Cycle of fixed assets	3.00	0.964
Stock Cycle	3.38	0.728
Purchase - Procurement Cycle	3.71	0.659
Claims - Cash - Securities	3.69	0.660
Liabilities Cycle	3.69	0.660
Expenditure Cycle	3.55	0.827
Sales Cycle	3.41	0.733
Management Cycle	3.69	0.660
Accounting - Financial Cycle	3.83	0.848
Cycles of other functions	3.69	0.761

The activity cycles that the internal audit has added value to the organization in the last three years should at last be evaluated. Regarding the Accounting-Financial Cycle, they are placed in the answer “Very” (3.83), while between the answers “Moderate” and “Very”, with a tendency towards the second, they are placed in relation to the Purchase-Procurement Cycle (3.71), the Claims – Cash – Securities Cycle (3.69), the Liabilities Cycle (3.69), the Management Cycle (3.69) and finally, the Expenditure Cycle (3.55). Regarding the Sales Cycle (3.41) and the Stock Cycle (3.38), they are placed between the answers “Moderate” and “Very”, with a tendency towards the first and moderate consider the contribution of internal audit in the Cycles of other functions(3.00).

7. Conclusions

The research examined the views of senior executives regarding the implementation and contribution of internal audit to PLCs. The majority of respondents replied that the internal audit function mainly reports to the audit committee, that there is an approved procedures manual, as well as that the existing staff

meets the needs of the internal audit service. In addition, in terms of the importance that organizations place to internal audit, respondents agree that the operation and overall effectiveness of audit procedures are controlled, while less agree that management has established efficiency measures for business processes.

Regarding the ways in which internal audit adds value to the business, respondents agree to a greater extent that internal audit is an added value activity for the organization, while the latter ranks the view that internal audit contributes to more effective strategic planning. In addition, respondents believe that internal audit over the last three years has contributed more to the financial accounting cycle and less to the asset cycle.

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Appendix: Questionnaire

Answer with ✓ for the periods known

1. At what level of Management does the internal audit report to?
To the Chairman of the Board
On the Board
To the Audit Committee
Elsewhere
2. Is there an approved Procedures Manual
Yes
No
3. Are there established standards for drafting audit documents? (Audit Report, Worksheets)
Yes
No
4. Does the existing staffing cover the needs of the internal audit service?
Yes
No
5. Is the audit work evaluated every year by the head of the service?
Yes
No

Evaluate the following sentences by ticking ✓ in the corresponding box

	Not at all	Small	Moderate	Great	Very much
6. Business risk is recognized and delimited	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Business risk analysis models are applied in order to manage it more effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The principles of corporate governance are applied and adopted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Management frequently communicates the importance of ethical values and integrity to employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. The separation of the duties and responsibilities of the staff becomes apparent from the hierarchical structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Measures to achieve business objectives are understood by all staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Mechanisms are in place to identify and assess obstacles to achieving the objectives of each operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Policies and procedures have been developed for each business operation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. The operation and the overall effectiveness of the audit procedures are checked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Existing mechanisms recognize the current needs of the business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Information is transferred to all hierarchical levels of employees and in all directions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Management has established efficiency measures for the company's processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. The whole internal control system is evaluated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Internal auditors have audit experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Internal auditors are trained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Evaluate the following sentences by ticking ✓ in the corresponding box

	Not at all	A little bit	Moderate	Very	Very much
21. Internal control helps manage business risk assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. The cooperation of the internal audit service with the administration improves the management of audit issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. The effect of internal control on corporate governance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Internal control contributes to the most effective strategic planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Internal control contributes to more efficient management of quality, health and safety at work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Internal control contributes to more efficient management of quality and environmental safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Internal control plays a catalytic role in achieving business goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Internal control is an added value for the business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Evaluate the cycles of activity that the internal audit has added value to the company in the last three years by marking ✓ in the corresponding box

	Not at all	A little bit	Moderate	Very	Very much
29. Cycle of fixed assets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Stock cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Purchase - Procurement Cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Claims - Cash - Securities Cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Liabilities Cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Expenditure cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Sales cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Management cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Accounting - finance cycle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Cycles of other functions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ENERGY SECURITY OF MEGACITIES

P. D. TASIOS* N. KONTOULIS** J. A. PARAVANTIS***

Abstract

Megacities, i.e. cities with population over 10 million, account for 5% and 10% of the global energy and electricity demand, while they also represent 10% of the global GDP in Purchasing Power Parities. The importance of securing the energy for development and prosperity of megacities is profound. There has been an absence of research on the energy security of megacities. This paper carries out a review of the dimensions that affect energy security in megacities and highlights the key drivers necessary to achieve increased availability, affordability, accessibility and acceptability of energy. Data are presented on 36 megacities; their countries; their population; their share of GDP, energy, and electricity consumption; and their national energy mix. These illustrate how megacities dominate the economy of countries and influence national energy security. Fossil fuels still constitute the majority in many countries, underscoring the need for developing renewable energy sources. Findings show a significant difference between the megacities in developed and developing countries.

JEL Classification: F52, O13, O18, Q48

Keywords: energy security, urbanization, megacities

1. Introduction

Energy has been the front runner in mobilizing the development and prosperity of urban settlements and their countries. In addition, energy is an economic, ill-distributed and expensive good, subject to price fluctuations, with repercussions in many domains of society (Paravantis et al., 2019). With intensifying urbanization, megacities (i.e. cities with population over 10 million) have emerged as the result of spontaneous processes, and are complex organisms that are extremely important for the socioeconomic development of regions and countries. They are instruments of birth rate reduction, human diversity, social and cultural centers, and they have turned to economic hotspots providing new market opportunities (Bugliarello, 2009). Megacities

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have become beacons of hope, attracting more and more people, thus increasing their demand for crucial supplies such as energy. The assurance of constant energy supply in affordable prices for everyone, i.e. the megacity's energy security, is of paramount importance.

The introduction of the energy security concept is attributed to Winston Churchill, who stated on the eve of the first World War: “*Safety and certainty in oil lie in variety and variety alone*” (Yergin, 2006). Churchill recognized that the diversification of energy sources had to be pursued. Hitherto, the concept of energy security is crucial to human security (Sovacool & Mukherjee, 2011) and multidimensional (Azzuni & Breyer, 2017). Despite the common interests of consuming and producing countries (Yergin, 2006), the energy security concept may be viewed in light of three perspectives: security of supply, security of demand, and transit security (Dooyum, Mikhaylov & Varyash, 2020; Sovacool & Mukherjee, 2011).

A connection between the functionality of urban settlements and their energy consumption exists, bringing energy security under a new prism, that of megacities. In this study, we review and discuss the concept and importance of energy security for megacities. To do so, we first consider the critical role of urbanization in the emergence of megacities and illustrate how some of their particular characteristics can explain the increasing interest in this issue. After presenting specific dimensions of energy security, we highlight some data-driven considerations. The paper concludes with a discussion and suggestions for further research.

2. Urbanization and megacities

Even though a specific definition does not exist (Folberth et al., 2015; Baklanov et al., 2016), it has been accepted (by general consensus and United Nations Population Reports) that cities that exceed a population of ten million inhabitants may be called megacities. These may be composed either by a single metropolitan area or converging areas (Folberth et al., 2015).

Megacities are urban conurbations with significant contributions to the economic status of their country and in need of constant provision of supplies, especially energy. Fossil fuels still provide much of the energy in megacities, especially in developing countries.

The Industrial Revolution, with its swift change to machinery along with the influx of population in urban industrialized settlements, has been the turning point at which energy consumption with its related components became a vital concern globally. Thereafter, energy has been the driving factor of

development and economic prosperity (Matsumoto, Doumpos & Andriosopoulos, 2018). From 1950 until 1980, the world experienced the most intense industrialization and urbanization phase. Many cities were rebuilt, and new cities were established, enabling growing industrial production (Balbim, 2016). The urban population increased dramatically from 30% of the total population in 1950 to over 50% around 2007 and 55% presently (UN, 2019). This upward trend is estimated to continue, reaching 68.4% by 2050 (i.e. 6.7 out of an estimated 9.8 billion).

Two types of urbanization are proposed by Oke et al. (2017) in their book on urban environments: one taking place periodically, giving time for proper urban development and sprawl; and another, describing settlements developing spontaneously and located in developing or undeveloped areas. With 80% of the global Gross Domestic Product (GDP) being generated in urban areas (Grubler & Fisk, 2012), consuming around 70% of the global final energy consumption and producing 70% of GHG (Güneralp et al., 2017), urban areas play a vital role in the development and prosperity of their countries and are in the epicenter of development. However, along with development came climate change, (urban) air pollution, and other environmental impacts (e.g. UHI, sea-level rise, desertification), that affect urban areas, directly and indirectly, raising concerns about energy use.

A so-called trilemma among economic development, social prosperity, and environmental sustainability has been a riddling subject for scholars and researchers of all fields and is of paramount importance for megacities. A connection between the functionality of urban settlements and their energy consumption exists, bringing energy security under a new prism, that of megacities. This study aims to provide an initial impetus towards addressing the literature dearth on the energy security of megacities, a subject of great geopolitical importance.

Their immense size and complexity have led megacities to concentrate both negative and positive aspects of urbanization. Especially in developing countries, megacities have become the dominant model of future urbanization, representing a sustainability struggle both from the viewpoint of energy and resource consumption as well as climate change adaptation and mitigation (Facchini et al., 2017).

In 1950, there were only two megacities worldwide: New York (12.3 million) and Tokyo (11.2 million). After 1980, the emergence of new megacities became more vigorous. In 2018, over 520 million people, which accounted for 7% of the global population, lived in 36 megacities worldwide, with Tokyo being the most populated megacity, housing more than 37 million people,

followed by Chongqing (China) with almost 30 million. Today, of the 36 megacities, 22 are located in Asia, with China (6 megacities) and India (5 megacities) having the largest numbers of both megacities and population. Asia's megacities concentrate 334 million inhabitants, accounting for almost two thirds (64%) of the total megacity population, and 5% of the global population, as shown in Figure 1.

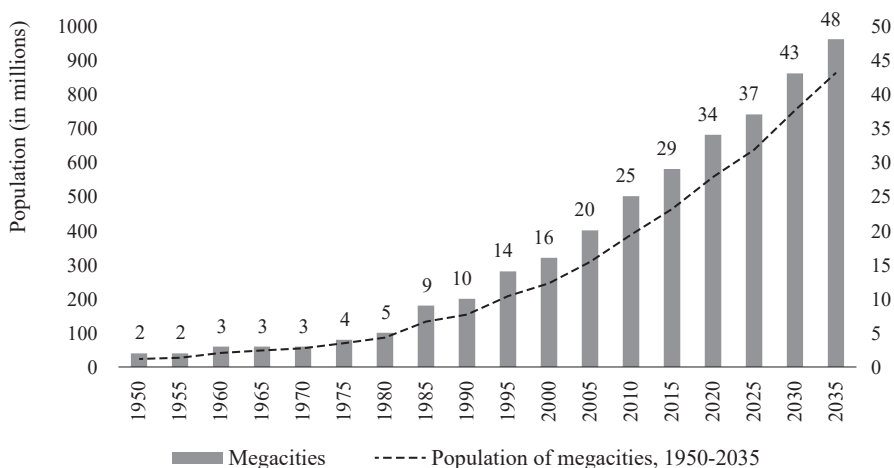
According to the UN Population Division (UN, 2019), it is estimated that there will be 48 megacities globally by 2035, in which almost one billion people will reside. This increase, both in numbers and population, can only add more stress to the urban environment demanding more resources, like water and energy, and producing more air pollutants and waste.

Megacities have higher population growth rates compared to their nations, e.g. Beijing's and Bangkok's growth rate is seven and nine times bigger than the corresponding growth rate of their countries (UN, 2019). This population increase in megacities stresses the energy demand and consumption even more.

Out of the 36 megacities, half are national capitals. In terms of economic power, according to Brookings Global Metro Monitor Reports for 2014 and 2016 (Parilla et al., 2015; Bouchet et al., 2018), Tokyo was the city with the highest GDP in Purchasing Power Parities (PPP) for both years, with 1.6 and 1.7 trillion US\$ respectively, with a significant share towards Japan's economy (32% and 33% of Japan's GDP). Even though the cities of North America (New York, Los Angeles) had the second and third highest GDP in PPP, they had a far smaller contribution to the US GDP. Lima (48%), Buenos Aires (38%), and Bogota (26%) were the cities that had the highest shares of the GDP of Peru, Brazil and Colombia correspondingly. The city with the lowest GDP in PPP was Bangalore (India), with just 45 and 59 billion US\$ in 2014 and 2016 correspondingly.

In 2014 and 2016, megacities accounted for 11% and 10% of the global GDP in PPP. Out of the 29 megacities with available data, three megacities (Tokyo, New York, Los Angeles) accounted for 3.6% of the global GDP for both 2014 and 2016. In a report by the Chicago Council on Global Affairs (Toly & Tabory, 2016), 21 megacities were included in the list of the the top 100 economies, underscoring their significance as hubs of economic development and energy consumption.

The work of Kennedy et al. (2015) was among the first to analyze megacities and their energy metabolism. Those authors examined 27 megacities, with New York having the highest 2011 energy consumption (2,600 PJ) and Kolkata (India) the lowest (78 PJ). The total energy consumption of megacities was reported to account for 6.7% of global energy and 10% of global electricity

Figure 1: Number and population of megacities (UN, 2019)

consumption. New York had a higher overall energy consumption than Tokyo, which was the most populated city, mainly because it consumed about twice as more energy per capita on transportation and heating, compared to Tokyo. On the other hand, in terms of electricity consumption, Tokyo recorded the highest electricity consumption (241,000 GWhr), followed by Los Angeles (153,000 GWhr) and New York (149,000 GWhr).

3. Energy security

Energy has been crucial throughout human history since it is essential for economic development and national security (Månsson et al., 2014). The energy crisis of 1973 made the concept of energy security synonymous with the security of supply (Loschel, Moslener & Rubbelke, 2010). Despite the common interests of consuming and producing countries (Yergin, 2006), energy security nowadays can be approached from three perspectives: security of supply, security of demand, and transit security (Dooyum, Mikhaylov & Varyash, 2020). The meaning of energy security varies across energy systems (Chester, 2010; Sovacool, 2012; Sovacool and Saunders, 2014) and is influenced by each country's unique social environment (Knox-Hayes, et al., 2013). Luft and Korin (2009) highlighted that the different natural resources, political systems, economic welfare, ideologies, geographical locations, and

international relations give alternate meanings to energy security with priorities varying accordingly among countries.

The definition of energy security varies from country to country and many authors and institutions have proposed various definitions (Augutis et al., 2020). Sovacool (2011) reported 45 different definitions of energy security that shared many similarities and lead to difficulties with the functionality of the concept (Paravantis et al., 2019). As mentioned by Paravantis (2019), Ang, Choong and Ng (2015) identified 83 energy security definitions in the literature, while Matsumoto, Doumpos and Andriosopoulos (2018) confirmed that there are no uniform definitions or evaluation methods for assessing energy security. The research literature lacks a commonly accepted definition (Azzuni and Breyer, 2018). Winzer (2012) argued that energy security has become an umbrella term for many different policy goals.

Many definitions add different dimensions to energy security, aiming to make it more flexible and able to be used generally (Coutinho, Vianna & Dias, 2020). In the late 1980s, Yergin (1988) visualized energy security as the assurance of “*adequate, reliable supplies of energy at reasonable prices*”, adding a geopolitical component by qualifying that this assurance must be provided “*in ways that do not jeopardize national values or objectives*”.

The most commonly used definitions of energy security are presented by the International Energy Agency (IEA, 2011), the Asia Pacific Energy Research Centre (APEREC) (2007), and the European Commission (EC, 2000). The IEA, a pioneer institution in energy security and the most important multinational energy platform (Paravantis & Kontoulis, 2020), defines energy security as “*the uninterrupted availability of energy sources at an affordable price*”. APEREC defines it as “*the ability of an economy to guarantee the availability of energy resource supply in a sustainable and timely manner with the energy price being at a level that will not adversely affect the economic performance of the economy*”. Finally, the European Commission defines it as “*the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development*”. In recent research, Gasser (2020) highlighted that the above-mentioned definitions focus on the elements of physical availability and affordability, with potential inclusion of environmental sustainability.

3.1. Dimensions of energy security

The bulk of the literature on energy security seeks to organize the aspects

of energy security into dimensions (Kruyt et al., 2009). The IEA has adopted long-term and short-term energy security aspects. The first deal with timely investments to supply energy in line with economic developments and environmental needs, while the latter focuses on the energy system's ability to react promptly to sudden changes in the supply-demand balance.

Brown et al. (2014) explained how the coverage of energy security differed among 91 peer-reviewed academic articles covering the dimensions of energy security. Availability was covered in 82%, affordability in 51%, energy and economic efficiency in 34%, and environmental stewardship in 26% of the examined articles.

The four As of energy security (APEREC, 2007) are a frequent starting point of contemporary energy security studies (Cherp & Jewell, 2014). Availability is considered the bedrock of energy security (Kruyt et al., 2009; Luft & Korin, 2009; IEA, 2007; Narula & Reddy, 2015). Ang, Choong and Ng (2015) confirmed its importance, as this is taken into account in 99% of related studies. Availability is also used to imply stable and uninterrupted supply of energy (EC, 2000; Yergin, 2006). According to Ren and Sovacool (2014), availability may be measured by the following metrics: security of supply, a ratio equal to the total production energy divided by the total consumer energy; self-sufficiency, a ratio equal to the imported energy divided by the total consumer energy; diversification, measured by a diversity index such as the Shannon-Wiener; renewable energy, assessed by a ratio equal to the renewable energy divided by total consumer energy; and technological maturity, a qualitative metric.

The interruption of energy supplies can cause major financial losses and create havoc in economic centers, especially megacities. Sovacool and Brown (2010) confirmed that more than 50% of the literature suggested affordability as an important principle, which Chester (2010) approached as reasonableness of prices. Kruyt et al. (2009) interpreted affordability as low energy prices for consumers. Ren and Sovacool (2014) proposed that affordability may be measured by: price stability, equal to the deviations of price about a global mean value; dependency, equal to the total transported energy divided by population; market liquidity, a qualitative metric; decentralization, equal to the total energy by distributed and small scale generation divided by total energy production; electrification, equal to the percentage of the population with reliable access to grid; and equity, equal to the percentage of households depending on wood, straw, etc. for cooking and heating.

Goldthau and Sovacool (2012) recognized three key energy challenges: energy security, energy justice, and a low carbon transition. Thus, they

highlighted the need to consider energy security as a democracy issue, and equity as an important aspect of accessibility. Traditionally, accessibility concerns the ability to access energy resources (APEREC, 2007) and it has been at the center of energy security debates and policy approaches into the 21st century (Kopp, 2014). Energy poverty, an aspect of accessibility, is defined by Day, Walker and Simcock (2016) as the lack of access to sufficient, affordable and high-quality energy to meet survival and development. As for developed countries, energy poverty is characterized by high energy costs (Dobbins et al., 2019) and lack of access to modern energy in developing countries (Lin & Wang, 2020). Data on energy poverty are of varying quality and are built with different parameters and methodologies. This renders accurate comparisons and benchmarking among megacities difficult. Accessibility may be measured by the following metrics: import stability, trade, political stability, military power, and safety and reliability, all qualitative metrics (Ren & Sovacool, 2014).

Acceptability considers environmental concerns related to the energy industry, focusing mainly on fuel resources (APEREC, 2007; Cherp & Jewell, 2014). Acceptability measures safety and accounts for the impacts of energy on the environment and society (Tongsopit et al., 2016). It may be measured by the following metrics (mostly qualitative): environment, a composite of several “*micro aspects*” that are “*measured individually*”; social satisfaction; national and international governance; transparency; and investment and employment (Ren & Sovacool, 2014).

4. Megacities and energy security

Du et al. (2020) examined 30 countries and developed a dynamic method for measuring their energy security in 2012. Of the total of 36 megacities, 25 are included in the examined countries. The dimensions that connect the 16 used indicators included environmental factors, energy production, and energy consumption. The study revealed that the energy security level of each country is closely related to its resource endowment, energy technology and national policy. Cluster analysis classified the countries, into: low energy security; consumption-oriented energy security; security based on high and very high energy production; and high and diversified energy security. China and India, two developing countries with 11 megacities, were at the bottom of the list, while out of the 13 countries that host megacities, Nigeria (Lagos) had the highest energy security performance.

Edomah & Nwaubani (2014) were the first to demonstrate how national

energy security has direct impacts on the security of Lagos (a megacity in Nigeria) by presenting a historical review of the development of Nigeria's energy resources and their connection to the energy security challenge of Lagos. It was concluded that one of the most defining concerns in relation with energy is the adequate protection of vital energy systems from disruption. Such disruptions can occur either from short term shocks (e.g. technical failures, natural events, deliberate sabotage) or more permanent threats like unsustainable demand growth, and resource scarcity. Disruptions may affect other broader security issues ranging from the viability of national economies and the stability of political systems to armed conflict (Martišauskas, Augutis & Krikštolaitis, 2018).

Similar threats and possible outcomes theoretically apply to all megacities, but especially those in energy importing countries. Such a dependence on the constant supply of energy, makes the evaluation of the interactions between national energy security affects and megacities, a task of great importance.

4.1. Components of megacity energy security

To evaluate the energy security performance of megacities, the 4A energy security dimensions of APERC (2007) is considered by this study. The first three dimensions (availability, affordability, and acceptability) according to Brown et al. (2014) are mentioned by the majority of published literature sources. These were complemented by the fourth dimension of accessibility.

To get a sense about the energy security of megacities, the participation of megacities in their countries' population, economy (Parilla et al., 2015; Bouchet et al., 2018), electricity and total energy consumption (Kennedy et al. 2015), is presented in Table 1. The table also shows the energy mix of each megacity country as reported by the International Renewable Energy Agency (IRENA, 2020).

Of the 23 countries that host megacities, 13 were importers. Japan imported almost 90% of its final energy consumption, followed by Turkey (71%) and France (46%). Brazil had the lowest share of imported energy (World Bank data available at <https://data.worldbank.org/indicator/EG.IMP.CON.S.ZS>). The megacity with the highest share in electricity (72%) and energy consumption (45%) was Manilla (Philippines), which accounted for 25% of the nation's GDP in PPP. Considering that the Philippines imported 41% of its net consumption, it may be concluded that much of it is imported to sustain Manilla's demand. This dependence on imports is the reason Brahim (2014) insisted that the energy future of the Philippines is renewable energy.

Table 1: Countries and megacities (negative energy imports denote exports)

Country	Megacity	Population (millions)	Megacity share (%)		
			Population	GDP	Electricity
Argentina	Buenos Aires	15	30	38	29
Bangladesh	Dhaka	19.6	12	9	22
Brazil	Sao Paulo	21.6	10	13	11
	Rio de Janeiro	13.3	6	6	7
China	Shanghai	25.6	2	3	3
	Chongqing	29.9	2	1	2
	Beijing	19.6	1	3	2
	Tianjin	13.2	1	2	2
	Shenzhen	11.9	1	2	2
	Guangzhou	12.6	1	2	2
Colombia	Bogota	10.6	21	26	24
Congo (DR)	Kinshasa	13.2	15	–	–
Egypt	Cairo	20.1	20	13	22
France	Paris	10.9	17	24	16
India	New Delhi	28.5	2	15	3
	Mumbai	20	1	2	2
	Kolkata	14.7	1	3	2
	Bengaluru	11.4	1	1	0
	Chennai	10.5	1	3	0
Indonesia	Jakarta	10.5	4	8	22
Iran	Tehran	9	11	–	13
Japan	Tokyo	37.5	30	33	24
	Osaka	18.7	15	13	14
Mexico	Mexico City	12.3	10	18	6
Nigeria	Lagos	13.5	7	–	7
Pakistan	Karachi	15.4	7	–	13
	Lahore	11.7	5	–	–
Peru	Lima	10.5	32	48	–
Philippines	Manila	13.5	12	25	72
Russia	Moscow	12.4	9	15	6
South Korea	Seoul	10	19	37	10
Thailand	Bangkok	10.2	15	23	34
Turkey	Istanbul	14.8	18	18	21
UK	London	10	14	28	12
USA	New York	18.9	6	8	4
	Los Angeles	12.8	4	5	4

Energy	Country energy imports & mix (%)					
	Imports	Oil	Gas	Coal	RES	Nuclear
21	3	35	52	2	9	2
41	17	14	51	4	31	0
5	8	41	10	6	42	1
3						
2	12	19	7	64	8	2
0						
1						
0						
0						
1						
–	–285	40	25	10	25	0
–	–2.1	24	18	0	59	0
11	–10	43	49	0	7	0
7	46	29	16	3	10	42
1	29	26	5	45	23	1
0						
0						
0						
0						
–	–107	34	15	20	30	0
12	–66	31	66	0	1	1
13	–89	41	23	28	6	2
6						
6	–18	47	34	7	10	2
–	–104	16	9	0	75	0
12	23	36	31	11	21	2
–						
–	–23	47	27	3	23	0
45	41	36	6	28	30	0
6	–80	22	52	16	3	7
7	82	39	15	31	2	14
N/A	42	41	26	13	20	0
10	72	30	30	27	13	0
8	31	34	38	7	10	10
3	19	37	30	16	8	10
1						

Significant shares were also found for the megacities of Tokyo, Osaka (Japan) and Istanbul (Turkey). Tokyo and Osaka cumulatively represented almost half of Japan's GDP in PPP, 40% of its electricity consumption, and 30% of the total energy. The Fukushima accident made Japan aware of the importance of energy security (Vivoda, 2010). Since Japan imports 89% of its final consumption, it became clear that the development and prosperity of its two megacities is in constant dependence on imported energy (Yamanishi, Takahashi & Unesaki, 2017). Matusmoto and Shiraki (2018) underlined that the dependency on imported fossil fuels may be decreased by introducing renewable energy in the country's energy mix and reducing energy demand.

Turkey is a geopolitically important transition country that hosts transit pipelines for international markets in the West. Turkey is also one of the most important customers for the oil and natural gas producers in the Caspian region, Central Asia and the Middle East (Esen, 2016). Istanbul produces 20% of the national GDP, consuming 20% and 10% of the national electricity and energy, when Turkey imports 72% of its energy consumption.

Another important energy security indicator is access to electricity. People in urban areas have easier access to electricity, which is expected as urban areas are generally characterized by higher dependence on electricity. However, the socioeconomic gap that exists in many megacities translates to the emersion of both areas with proper housing and electricity facilities as well as slums lacking even basic necessities to sustain a healthy and safe livelihood. Urban slums are mainly found in developing countries such as Nigeria (Lagos), Bangladesh (Dhaka) and Pakistan (Karachi and Lahore). These countries have the highest percentage of people who live in slums in urban areas, which in the case of Lagos is up to 60% (Lawanson, 2020).

Table 1 also illustrates the dependence of almost all countries (and consequently megacities) on fossil fuels. India and China share the highest coal consumption, while oil was a major component of the energy mix of almost all countries. This dependence has impacted the local and global environment. Locally, the Urban Heat Island (UHI) effect combined with severe heat waves, poses significant health threats and causes economic impacts especially in countries that depend on outdoor labor such as India (Woetzel et al., 2020). Moreover, air pollutants connected with fossil fuels can deteriorate living conditions and cause health problems (Hajat et al., 2019). Globally, the global average temperature has been increasing especially after the Industrial Revolution, with an upward trend of 0.19°C per decade (Papalexioiu et al., 2018). The impacts of this increase have become more conspicuous lately, in the form of extreme climatic events (forest fires, heat waves, floods, droughts, etc.), that

according to Mami Mizutori (Special Representative of the UN Secretary-General for Disaster Risk Reduction, 2019) occur weekly (Harvey, 2019).

5. Discussion and conclusions

This research presented herein was a first attempt at approaching the energy security of megacities and how it relates to national energy security. The literature and data available on the energy security of countries does not cover megacities (and cities in general). Urban settlements and megacities are the locomotives of development and prosperity. Urban areas account for 80% of global GDP, consuming around 70% of the global final energy consumption, and producing 70% of greenhouse gas emissions.

Megacities produce 10% of the global GDP and are important for the economies of their countries, acting as beacons of development and prosperity. To sustain and expand their development, megacities are in continuous need of energy. An impressive 6.7% of global energy consumption and 10% of global electricity consumption originates in megacities. In many cases (like Manila, Tokyo and Osaka), this energy consumption is associated with heavy import dependence.

Any disruption in the energy supply, especially of megacities with important economic and energy shares, can have significant impacts on their economies, and can cause a cascading effect that can influence national economic prosperity and sustainability. Moreover, since specific megacities have an important share in their country's GDP, any impact on the GDP can cause energy security issues by increasing the share of energy imports over GDP.

Interconnections between energy crises and megacities (e.g. Gulf war, Fukushima accident, Russia/Ukraine dispute) highlight how energy security issues of a national scale can influence the functionality of megacities. Future research should provide more insight into the role of megacities in national energy security. The formulation of a megacity energy security index will have to overcome the unavailability of indicator data at a city level, since most pertinent metrics and the literature that accompanies them are geared towards countries.

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THE EFFICIENCY OF THE HEALTHCARE SYSTEM IN GREECE BEFORE AND DURING THE CRISIS: DATA ENVELOPMENT ANALYSIS AND MALMQUIST APPROACHE

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Abstract

This paper aims to evaluate the static and dynamic efficiency of the public health care system in Greece, compared to the corresponding experience from European systems. Data Envelopment Analysis and Malmquist Index used as two nonparametric methods. Efficiency and productivity scores were calculated by bootstrapping statistical data for 23 European countries from 2000 to 2016. We had selected one input variable and nine output variables. Financing the health care system is the main input variable and life expectancy variables are the outputs. Findings reveal that since the beginning of crisis (2010) Greece is more efficient in using its inputs in the healthcare system. However, financial, managerial and structural reforms suggest to be done, in order to further improve efficiency (mainly the technical one), without forgetting public health issues, concerning mortality (and morbidity), which need further considerations.

JEL Classification: I13, H51

Keywords: Efficiency, Productivity, DEA, Malmquist Index, Greece, Europe, Health care.

1. Introduction

Most of the developed countries devote an increasing share of resources to healthcare (Barros et al., 2007). Healthcare costs have been, to current levels, over 10% of GDP in the developed countries globally (Martin, A. B, 2014).

To explain this trend, many studies have tried to diagnose the underlying. Efficiency and productivity of the systems, as well as technological change

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(TC) and effectively change (EC) in healthcare, have been claimed to have a significant impact on healthcare costs (OECD, 2013).

To assess the efficiency of healthcare, It is a complicated process, which often encounters methodological problems. For countries of low or medium human development index to increase the efficiency of healthcare services becomes highly important and necessary. On the other hand, for countries with a high development index, it is necessary to assure a high level of efficiency and quality of their health services (Bekaroglu, 2015).

The efficiency of financial resources involved in the health sectors becomes a relevant topic both for scientists and for health policymakers.

This paper aims to describe the efficiency of public healthcare systems in Greece before and during the recent crisis. Data Envelopment Analysis, a non-parametric method, is applying, and a Malmquist index approaches a dynamic evaluation. This paper presents the relevant results in the literature in section 2, followed by a brief description of the method and detains the following two sections. Section 5 discussed the results, while the last section concludes the paper.

2. Literature Review

Data Envelopment Analysis (DEA) is linear programming, nonparametric approach, which evaluate relative efficiencies of a set of DMUs (decision-making units), constructing a theoretical best-practice frontier from the observed DMUs. DMUs can be factories, sections of factories, countries, universities, supply chains and hospitals. The DEA method introduced by Charnes, Cooper, and Rhodes (Charnes, Cooper and Rhodes, 1978) and further formalised by (Banker, Charnes and Cooper, 1984) based on Farrell's (Farrell, 1959) simple measure of firm efficiency that accounted for multiple inputs. The methods of DEA change over time, according to DEA literature, are Malmquist index (MI) and window analysis (Sánchez, 2018).

The Malmquist Index (MI), also called the Malmquist Productivity Index (MPI), is an index that compares the production technology of two economies (Caves D, 1982). It is named after Professor Sten Malmquist. MI estimates the productivity change of a DMU between two periods. It has been defined as the product of two terms: the effective change (EC) or catch-up and technical change (TC) or frontier-shift. The EC study the effect of growth, and the TC (or innovation) verify the change in the efficient frontiers between the two time periods (Sánchez, 2018). Ozcan (2014), presented a complete framework for DEA modeling.

The first published work applying DEA whereas to healthcare was “Measuring routine nursing efficiency” (Nunamaker and Lewin, 1983) and Sherman (1984) was the first author to use DEA to evaluate overall hospital efficiency. Nowadays a very extensive DEA literature has given emphasis on national differences in hospital efficiency research, in health facilities efficiency (Stefko, 2018, Ozcan, 2008) and health care delivery (Hollingsworth, 2008), public policies efficiency (Coppola et al., 2003). The research works of Kohl et al. (2019), Hollingsworth (2003), O’Neill et al. (2008) present detailed reviews of the literature about DEA models in hospital efficiency research. Zakowska I. (2020), perform a systematic literature review of the use of data envelopment analysis in estimating the relative technical efficiency of primary health care centres, and to identify the inputs, outputs and models used. DEA and Malmquist Index have been used to assess different aspects of the healthcare field like hospital efficiency and productivity in Greece during the crisis (Polyzos, 2012, Xenos et al., 2017).

Comparing countries’ healthcare systems is a way to determine if a healthcare system is achieving the desired results, and today, datasets allowing the comparison of the performance and efficiency levels of healthcare systems of different countries can be easily accessed.

Asandului et al. (2014) analyse the efficiency of public healthcare systems for 30 European states for 2010. DEA input oriented models were used, with three output variables, life expectancy at birth, health adjusted life expectancy and infant mortality rate and three input variables, number of doctors, number of hospital beds and public health expenditures as a percentage of GDP.

The technical efficiency and the change in the efficiency of the healthcare systems in 23 European Union (EU) countries were analyzed by Kocisiva K. et al. (2020), using Dynamic Network Data Envelopment Analysis (DNDEA). The efficiency of the medical care system (provided to individual patients) and the public health system (population-based services), together with overall healthcare system efficiency was the primary research achieve. The analysis was based on the data published by OECD between 2008 and 2016. The inputs include lifestyle habits that make a significant contribution to individual health outcomes, and also medical technology per million inhabitants and total employment in the healthcare sector. Outputs include information about inpatient discharges and outpatient consultation.

Top M et al. (2019) measure the healthcare system efficiency of 36 African countries and compare efficiency levels between countries, using an input-oriented two-stage model. The input variables used for DEA in the study consisted of the proportion of total health expenditures in the GDP, the number of

physicians, nurses, and hospital beds per 1000 population, the unemployment rate, and the Gini coefficient. The output variables were life expectancy at birth and 1/(infant mortality rate).

3. Method

Data Envelopment Analysis (DEA) is one of the most widely used methods in assessing the efficiency of a set of Decision-Making Units (DMUs).

We assume that we have K DMUs (indexed $\kappa=1\dots K$), with each uses m inputs to produce n outputs. The inputs and the outputs of DMU k can be denoted as m -vector and n -vector respectively

$$x^k = (x_1^k, x_2^k, \dots, x_m^k) \in R_+^m$$

$$y^k = (y_1^k, y_2^k, \dots, y_n^k) \in R_+^n.$$

The pair of input and output vectors $(x^k, y^k) \in R_+^m \times R_+^n$, is called production plan for DMU k . The technology set defined as:

$$T = \{(x, y) \in R_+^m \times R_+^n \mid x \text{ can produce } y\}.M$$

In DEA, the estimate of the technology T , the empirical reference technology T^* space constructed according to the minimal extrapolation principle, T^* is the smallest subset of $R_+^m \times R_+^n$ that contains the data (x^k, y^k) , $k = 1, \dots, K$ and satisfies certain technological assumptions.

The most critical assumptions are:

Free disposability, means that we can produce less with more:

$$\text{if } (x, y) \in T \text{ and } x' \geq x \text{ and } y' \leq y \text{ then } (x', y') \in T$$

Convexity, means that any weighted average of feasible production plans is feasible as well:

$$\text{if } (x, y) \text{ and } (x', y') \in T \text{ and } w \in [0,1] \text{ then } w \cdot (x, y) + (1 - w) \cdot (x', y') \in T$$

γ - returns to scale, means that production can be scaled with a given set of factors:

$$(x, y) \text{ and } \kappa \in \Gamma(\gamma) \text{ then } \kappa \cdot (x, y) \in T.$$

where $\gamma = crs, drs, irs, \text{ or } vrs$ where the set of possible scaling factors $\Gamma(\gamma)$ are given by $\Gamma(crs) = [0, \infty), \Gamma(drs) = [0, 1], \Gamma(irs) = [1, \infty), \Gamma(vrs) = \{1\}$.

Additivity, means that the sum of any two feasible production plans is a feasible production plan:

$$\text{if } (x, y) \text{ and } (x', y') \in T \text{ then } (x, y) + (x', y') \in T$$

All DEA models share the idea of estimating the technology using a minimal extrapolation approach, and only differ in the assumptions that they invoke (Bogetoft and Otto, 2011). The six classical models are the constant return to scale (CRS) model, decreasing (DRS) – increasing (IRS) – varying (VRS) return to scale models, the free disposability (FDH) model and free replicability (FRH) model. Table 1 summarizes the assumptions invoked in six models.

On the input side, Farrell (Farrell, 1957) proposed a measure, known as input Farrell efficiency, defined as:

$$E = \min \{ E > 0 \mid (Ex, y) \in T \}.$$

Table 1: DEA models assumptions

Model	Assumptions			
	A1	A2	A3	A4
	Free disp	Convexity	γ -return	Additivity
FDH	X		$\kappa=1$	
VRS	X	X	$\kappa=1$	
DRS	X	X	$\kappa \leq 1$	
IRS	X	X	$\kappa \geq 1$	
CRS	X	X	$\kappa \geq 0$	
FRH	X		$\kappa=1$	X

Hence, the DEA approach to efficiency measurements leads to a mathematical optimisation problem:

$$\min_{E, \lambda^1, \lambda^2, \dots, \lambda^k} E$$

$$\text{s.t. } E \cdot x^0 \geq \sum_{k=1}^K \lambda^k \cdot x^k$$

$$y^0 \leq \sum_{k=1}^K \lambda^k \cdot y^k$$

$$\lambda \in \Lambda^K(\gamma)$$

$$\text{where } \Lambda^K(fdh) = \{\lambda \in N_+^K \mid \sum_{k=1}^K \lambda^k = 1\}$$

$$\Lambda^K(vrs) = \{\lambda \in R_+^K \mid \sum_{k=1}^K \lambda^k = 1\}$$

$$\Lambda^K(drs) = \{\lambda \in R_+^K \mid \sum_{k=1}^K \lambda^k \leq 1\}$$

$$\Lambda^K(irs) = \{\lambda \in R_+^K \mid \sum_{k=1}^K \lambda^k \geq 1\}$$

$$\Lambda^K(crs) = \{\lambda \in R_+^K\}$$

$$\Lambda^K(frh) = \{\lambda \in N_+^K\}.$$

It is easy to see that $FDH \subseteq FRH \subseteq CRS$, $FDH \subseteq VRS \subseteq DRS \subseteq CRS$ and, $FDH \subseteq VRS \subseteq IRS \subseteq CRS$. The relationships between the technologies sets are interesting because they explain systematic differences between the outcomes of benchmarking, the DMUs look less efficient in the larger models. With regards to the definition of the DEA model (constant or variable scale), literature suggests performing the Kolmogorov-Smirnov test (K-S), since the choice of technology is a key issue and if decided arbitrarily it can produce biased results (Perico et al., 2016). The choice of assumptions shall be carefully argued and possibly tested, using nonparametric tests, like Kolmogorov-Smirnov (Bogetoft and Otto, 2011).

If the distribution of the efficiency scores for the k DMUs under two technology assumptions T_1 and T_2 are g_1 and g_2 respectively, the hypothesis $H_0: g_1 = g_2$ against $H_1: g_1 \neq g_2$ can be tested, using the nonparametric test K-S test $T_{KS} = \max_{i=1,2,\dots,K} \{|G_1(F^k) - G_2(F^k)|\}$. Large values for T_{KS} indicate that H_0 must be rejected.

According to Simar and Wilson (2000), the two-state approach results are inconsistent and biased, unless a bootstrapping procedure corrects the DEA efficiency scores.

The first contribution to DEA change over time is the Malmquist Index (MI) [23]. MI measures how much a firm has improved from one period s to the next period t . Value of the index larger than 1 indicates that the DMU has improved over the time, on the other hand, a value smaller than 1 indicates that the DMU was less efficient in period t than period s . MI can be calculated as:

$$M(s, t) = \sqrt{\frac{E^i(t,s)}{E^i(t,t)} \cdot \frac{E^i(s,s)}{E^i(s,t)}} \cdot \frac{E^i(t,t)}{E^i(s,s)}$$

where: $\sqrt{\frac{E^i(t,s)}{E^i(t,t)} \cdot \frac{E^i(s,s)}{E^i(s,t)}}$ is the technical change (TC) effect and $\frac{E^i(t,t)}{E^i(s,s)}$ is the efficiency change (EC) effect.

4. Data and variables

For the analysis, statistical data for Greece and 22 other European states for 2000 to 2016 have been used, extracted from the Eurostat, Mortality.org, World Bank, OECD and WHO online databases. The countries to the sample follow three criteria: the country must be in Europe, must have a population over to 1.000.000 people, and final the country database includes data from 2000 to 2016.

The model has one input variable: total health expenditures as a percent of GDP and three output variables: life expectancy for males and females at birth and infant mortality rate.

Following the Eurostat definition, *life expectancy at a certain age* is the mean additional number of years that a person of that age can expect to live if subjected throughout the rest of his or her life to the current mortality conditions (age-specific probabilities of dying, i.e. the death rates observed for the current period). Life expectancy is often used in international studies as an output variable, which confirms its capacity to assess the efficiency of the healthcare system (Tudorel et al., 2009).

Infant mortality rate defines as the ratio of the number of deaths of children under one year of age to the number of live births in the reference year; the value is expressed per 1000 live births.

The input variable, *Total Health Expenditures*, refers to the percentage of GDP allotted to healthcare. The percentage of the GDP allocated to health consists of capital spending from government budgets, social (or compulsory) health insurance funds and private expenditures.

5. Results and discussions

The DEA model applied in this paper is an input orientation model. Firstly we create three DEA models following VRS, CRS and FDH assumptions. Examining the differences of the efficiency scores between the three models, using Kolmogorov – Smirnov test, for the period from 2000 to 2016, the p-values indicates that CRS vs VRS and CRS vs FDH the differences are statistically significant, but the differences between VRS and FDH aren't statistically significant. The assumption VRS, must be taken. In the next step, for greater accuracy in efficiency scores before calculation, we implemented bootstrapping techniques (1000 repetitions-samples), under the VRS assumption.

According to the results of 2000, UK presents the highest efficiency score (score: 0,84, 95% CI: 0,81 – 0,91) while the lowest Germany with a score of 0,52 (95%CI: 0,50 -0,55). The average is 0.68, and the median score is 0.69. The efficiency in Greece is close to the average of the countries with 0,69 (95% ΔE: 0,66 – 0,75). The peer countries for Greece are the UK and Poland.

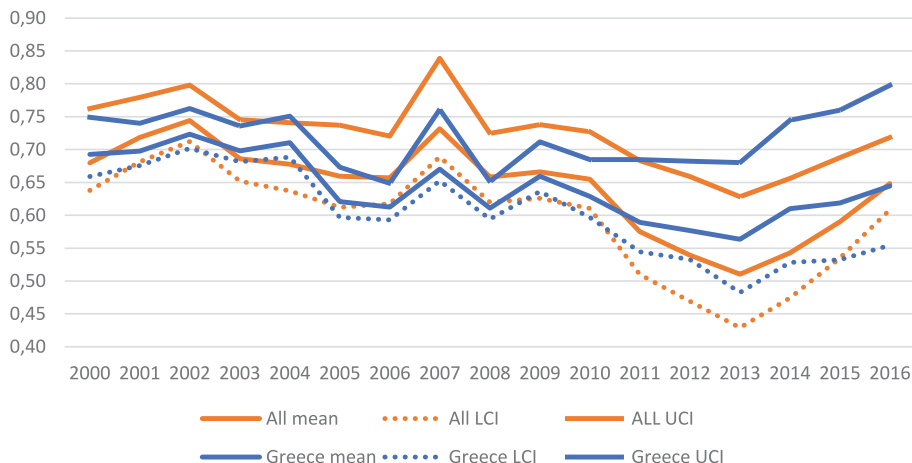
In 2001 the highest efficiency was presented by Czech Republic (score: 0,89, 95% CI: 0,87 – 0,95), while the lowest in Germany (score: 0,56, 95% CI: 0,55 – 0,59). The average efficiency score was at 0,72 (95% CI: 0,68 – 0,78) with median score 0.71. Greece score was (score: 0,70, 95% CI: 0,68 - 0,74) lowest to average. The peer country for Greece was UK.

The average efficiency for 2002 was 0,74 (95% CI: 0,71 – 0,80) and average value 0.73. The highest efficiency were presented by Czech Republic (score: 0,90, 95% CI: 0,88 – 0,95), and UK (score: 0,90, 95% CI: 0,87 – 0,95). Germany (score: 0,59 , 95% CI: 0,58 - 0,61 and France (score 0,59, 95% CI: 0,57 - 0,62) had the lowest efficiency scores. Greece is slightly below the average with a score of 0,72 (95% CI: 0,70 -0,76) and the peer country was Poland (score: 0,84).

In 2003, UK had the highest efficiency score (score: 0,82, 95% CI: 0,78 – 0,87), German presented the lowest (score: 0,55, 95% CI: 0,53 – 0,58). Mean, and average efficiency scores had the same value 0.69. Greece had a score of 0,70 (95% CI: 0,68 - 0,74) above average. Greece is featured (peer countries) in Spain and UK.

In 2004 the average efficiency was 0.68 (95% CI: 0.64 - 0.74) with median score 0.69. The highest score appeared in Czech Republic (score: 0.83, 95% CI: 0.80 - 0.88) and the lowest score in France (score: 0.55 with 95% CI: 0.53-0.59). Greece presented a score of 0.71 (95% CI: 0.69 - 0.75), above the mean and the median values. The peer country was Spain. It should be noticed that

Graph 1: Greece and All Countries average and 95% C.I. efficiency scores (2000-2016)



2004 was pre- and post- elections year, with a change of government (from social democrats to Christian democrats).

Taking into account the 2005 results, Czech Republic continued to had the highest score, (0.83, 95% CI: 0.79-0.90). France presented the lowest efficiency score (0.54, 95% CI: 0.52 - 0.59). The average efficiency score was 0.66 (95% CI: 0.61 - 0.74), and the median score was 0.68. Greece has presented a score of 0.62 (95% CI: 0.60 -0.67), lowest than the average and median scores. Peer country was Spain (score: 0.82).

For the year 2006, the highest efficiency scores appeared in Czech Republic (0.84, 95% CI: 0.81 – 0.89) and Poland (score: 0.76, 95% CI: 0.63 - 0.94) with larger standard error. France had the lowest efficiency score (score: 0.53, 95% CI: 0.51 - 0.56), followed by German (score: 0.54, 95% CI: 0.53 - 0.58). The average score was 0.66 (95% CI: 0.62 - 0.72) and the median 0.67. Greece has presented a significant lower score than the average and median, 0.61 (95% CI: 0.59 - 0.65), with Spain as peer country.

For 2007, the VRS - DEA model gave an average efficiency score of 0.73 (95% CI: 0.69 - 0.84), and the median score of 0.76. The highest score appeared in (score: 0.96, 95% CI: 0.93 – 1.00), followed by Polland (score: 0.86, 95% CI: 0.73 – 1.00), the latter had a much larger standard error. France (score: 0.59, 95% CI: 0.57 – 0.67) appeared the lowest score, followed by Germany (score: 0.61, 95% CI: 0.59 – 0.69). The score for Greece was 0.67

(95% CI: 0,65 – 0,76) significant below the median and the average efficiency score. Greece's peer countries were Czech Republic and Spain.

According to the 2008 results, the average efficiency score was 0,66 (95% CI: 0,62 – 0,72) and the median was 0.67. The highest score appeared, again, in the Czech Republic (score: 0,85, 95% CI: 0,82 – 0,92) followed by Poland (score: 0,74, 95% CI: 0,63 – 0,91) and Norway (score:0,73, 95% CI: 0,71 – 0,78). France (score: 0,54, 95% CI: 0,52 – 0,58) and Germany (score: 0,56, 95% CI: 0,54 – 0,60) had the lowest. The results for Greece was 0,61 (95% CI: 0,59 – 0,65) below the median price and the average efficiency. Greece peer countries were Czech Republic and Spain.

The countries with the highest efficiency scores in 2009 were Czech Republic (score: 0,82, 95% CI: 0,79 – 0,88) and Poland (score: 0,79, 95% CI: 0,69 – 0,94) but the standard errors of the estimation was quite large. The lowest scores remained in France (score: 0,55, 95% CI: 0,52 – 0,60) and Germany (score: 0,56, 95% CI: 0,54 – 0,61). The average efficiency score was 0,67 (95% CI: 0,63 – 0,74) with an average score of 0.67. Greece presented a score of 0,66 (95% CI: 0,64 - 0,71) close to average score. Czech Republic and Spain were the peer country. Again 2009 was pre- and post- elections year, with a change of government (from Christian democrats to social democrats).

Taking in account 2010 results, the highest efficiency scores presented to Czech Republic (score: 0,84, 95% CI: 0,80 – 0,90) and to Poland (score: 0,77, 95% CI: 0,63 – 0,95). France (score: 0,54, 95% CI: 0,51 – 0,58) and Germany (score: 0,55, 95% CI: 0,53 – 0,60) had the lowest scores. The average score was 0,65 (95% CI: 0,61 – 0,73) and median 0,68. For Greece the score was 0,63 (95% CI: 0,77 – 0,81), value equal to average and median. Spain was the peer country (score: 0.88).

The scores of 2011 were among the smallest that appeared in the research. The average score was 0,58 (95% CI: 0,51 – 0,68), and the median score 0.56. Czech Republic had the highest efficiency score (score:0,74, 95% CI: 0,51 – 0,68). France (score:0,48, 95% CI: 0,44 -0,56) and Germany (score:0,50, 95% CI: 0,46-0,58) showed the worst performance. Greece had a score of 0,59 (95% CI: 0,54 – 0,68) above the average and median efficiency scores; the peer country was UK with a score of 0.62.

The results for 2012 gave an average efficiency of 0,54 (95% CI: 0,47 – 0,66) with a median value of 0,53. The countries with the highest scores were again Czech Republic (score: 0,70, 95% CI: 0,64 – 0,83) and Poland (score: 0,65 και 95% ΔΕ: 0,48 – 0,82). The lowest scores concern France (score: 0,44, 95% CI: 0,40 - 0,53) and Germany (score: 0,47, 95% CI: 0,43 - 0,56).

For Greece, the efficiency score was 0,58 (95% CI: 0,53 – 0,68) and UK the peer country.

The year with the lowest average efficiency score 0,51 (95% CI: 0,43 – 0,63) in the study period, was 2013. The median score was 0,52. The highest scores occur in Czech Republic (score: 0,60, 95%CI: 0,54 – 0,72). Greece had one of the highest scores, 0,56 (95% CI: 0,48 - 0,68). It should be noted that the stronger austerity measures in Greece have been appeared during 2010-12, including the health care system and its financing, then stabilizing the measures from a coalition government (2013-14) of the previously referred parties.

In 2014, Greece had the third highest efficiency score 0,61 (95% CI: 0,53 – 0,74). The average score was 0,54 (95% CI: 0,47 – 0,66) with the same value for the median. Letonia (score: 0,66, 95% CI: 0,46 – 0,89) and Poland (score: 0,66, 95% CI: 0,46 – 0,89) present high scores but with large standard error, followed by Czech Republic (score: 0,64, 95% CI: 0,59 – 0,75). The lowest prices were in France (score: 0,43, 95% CI: 0,38 – 0,52), Denmark (score: 0,45, 95% CI: 0,36 – 0,57) and Germany (score: 0,46, 95% CI: 0,42 – 0,55).

Characteristic of the results of 2015 was the significant increase in the efficiency score of Ireland, which presented the highest score 0,74, (95% CI: 0,69 – 0,84), the same with Czech Republic (score: 0,74, 95% CI: 0,69 – 0,83). The average score was 0,59 (95% CI: 0,53 – 0,69) and the median at 0,57. The distribution of scores was slight asymmetry. The peer counties countries for Greece (score: 0,62, 95% CI: 0,53 - 0,76) was Ireland. It should be noted that 2015 was also pre- and post- elections year, with a change of government (mainly a left large party in coalition with a small right one), even though health policies, at least in financing, did not change essentially.

According to the results of 2016, the average efficiency score was 0,65 (95% 0,61 – 0,72) and the median at 0,64. Ireland (score: 0,83, 95% CI: 0,80 – 0,89) had the highest scores, following by Czech Republic (score: 0,81, 95% CI: 0,77 – 0,87). Greece and Spain had the same scores 0,80, Spain had a smaller standard error. The countries with the lowest scores were France (score: 0,51, 95% CI: 0,47 – 0,57) and Germany (score: 0,53, 95% CI: 0,51 – 0,58). The peer countries of Greece were Ireland and Poland.

Summarizing the results of the DEA study for Greece, we can talk about three different periods, the first from 2000 to 2004, where the efficiency scores were close to European average. The second period, form 2004 to 2011, where the efficiency scored were low, below the European average, maybe due to non relevant increases of outputs (life expectancy etc) compared to inputs (financing). From 2011 to 2013 the efficiency decreased but the scores were above the European average, and after the 2013 efficiency increases, as we have high

Graph 2: Average Malmquist Index score for Greece and the European States (2000 – 2016)

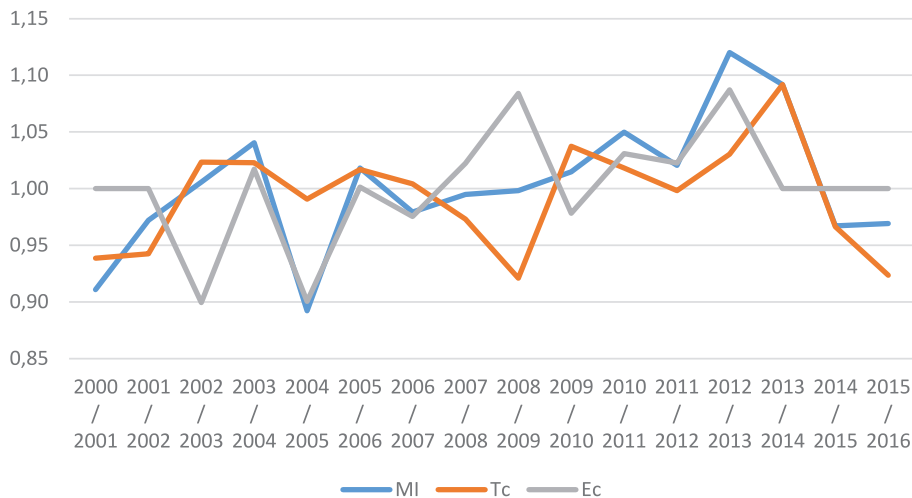


results with reduced funding due to the financial crisis. In recent years Greece has efficiency score close to average, but shows less improvement than EU countries Europe. The question is what needs to be done to remain in these positions (or even improved) in the future. To answer this question, we also examine the dynamics of this time series with the Malmquist Index.

The Malmquist index was used for the dynamic productivity study. Examining the evolution of the index in Greece (Graph 2), the Malmquist index (MI) was higher than 1 for ten years. During the 2000 to 2006 period, the MI took values less than 1, with an exemption the years before the Olympic Games period (2003-2004). Greece Malmquist Index was followed by a pattern close to the European average (Graph 3). The financial crisis and the recession led to spending cuts and control policies. The first years of this period (2010 - 2014), Greece Malmquist productivity Index showed a significant increase, and values approached 1.15, upper the average European score. In the last two years, 2015 - 2016, productivity has been declining and approaching the European average again, with values less than 1. For us, apart from financing, life expectancy (and other similar indices') stabilization should occupy health policy makers.

Technical change index is calculated to measure technological change, and values above 1 represent technological progress in the sense that more can be produced using fewer resources. Efficiency change index (EC) measures the catch –up relative to the present technology. If the DMU moved closer to the frontier, EC is larger than 1. TC and EC present the same pattern as the key

Graph 3: Malmquist Index, Technical Change Index (TC) and Efficiency Change Index (EC) for Greece 2000 – 2016



index. Until 2010 there are large discrepancies, within each indicator but also between the indicators. From 2010 to 2016 these deviations are reduced. TC and EC receive prices above the unit continuously from 2010 to 2015, then show signs of stagnation.

6. Conclusions

This paper attempts to analyze efficiency and productivity growth using bootstrap methods to estimate DEA efficiency scores and Malmquist Productivity Indicator for Greece and a sample of 18 other European states.

The main findings of the paper reflect that, since 2010, Greece is efficient in using its inputs in the healthcare system, and the last years proved to be on the efficiency frontier. To the dynamic approach, the Malmquist Index indicate productivity growth, from 2009 until 2015. Since 2009 until 2012, almost all the productivity increase was due to efficiency change, and only a minor part was due to technical change. Taking into account, only the last two years, MI was TC was less than 1, and EC close to 1. As TC is linking to investments, the increase of financing to the system and the managerial and organizational reform, it is necessary for a continuing positive impact in the future.

These conclusions raised the need for continuing the research. The results will increase the healthcare policy relevance for Greece that needs to find out

more efficiency ways. And that is a challenge of the new government (New Democracy, 2019) to select all regulations done previously in a reform plan setting managerial and structural changes in NHS (ESY) and the (2012) established unified social insurance sickness fund (EOPYY), taking into account 2020 evolutions in public health and the demographic decrease since 2018.

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THE PROGRESS OF VESSEL SALE AND PURCHASE PROCESSES IN THE IONIAN ISLANDS OF GREECE FROM THE LATE 18th CENTURY - EARLY 19th CENTURY UNTIL THE PRESENT DAY

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Abstract

The article embarks on a comparison of the processes of vessel sale and purchase in the Ionian islands of Greece of the late 18th century-early 19th century, with the respective processes followed today, not only in Greece but all over the world. For this purpose, four vessel sale and purchase contracts, that took place in the period of interest in the Ionian Islands, were examined and presented. These contracts were notarial acts where the vessel was treated as a simple asset without any peculiarity, no different from any other form of property. At the same time, the current process of selling and purchasing a vessel, as well as the required documents associated with it, were presented. The comparison of the two procedures indicates that the process of vessel sale and purchase of that time has nothing to do with the current one, since the process of the past was simple, private and local contrary to the current one which is complex, standardized, international and heavily mediated.

JEL Classification: K12, N70

Keywords: history, Ionian Islands, ship sale and purchase, contracts

1. Introduction

This article embarks on a comparison of the processes of vessel sale and purchase in the Ionian Islands of Greece of the late 18th century to early 19th century, with the respective ones carried out today, not only in Greece but all over the world. For this purpose, after research of relevant sources, four sale and purchase contracts have been found and listed below. All of them were acknowledged by a notary public. In other words, these are notarial acts where the vessel –or, to be more specific, the boat– is treated as a simple asset, no different than any other form of property.

All four agreements were signed at a notary office on the island of Paxi –which belongs to the geographical region of Corfu– and are quite different

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from each other. It is certain that other agreements have also been saved, but they are mainly to be found in private collections (Vlassopoulos, 1995). The above mentioned notarial acts, however, provide sufficient material for this specific study.

The structure of the study is the following: First, an allusion is made to the history of the Ionian Islands –mainly during the period of interest–, followed by a brief listing of the four Paxi agreements of that time along with commentary. Then the current vessel sale and purchase processes are addressed and finally, the relevant comparisons are made in the conclusion. The final inference to be drawn is that the process of purchasing and selling a vessel at that time has nothing to do with that of modern times, since, back then, the name of the vessel was sometimes not even mentioned in the contracts. It was a simple, private process, unlike the modern process which is complex and heavily mediated.

2. The history of the Ionian Islands of Greece - a Summary

1. The Ionian Islands or the Islands of the Ionian Sea are located on the west coast of Greece, facing Italy and consist of the islands of Corfu, Cephalonia, Zante, Lefkas, Ithaca, Cythera and Paxi. Among these, Cythera stands out because it is located in a different region from the other islands, in the south of Greece, instead of the west. Historically, from a maritime perspective, Cephalonia was the most prevalent in terms of vessels and seamen.

In pre-Christian times, the Ionian Islands used to be under Macedonian rule. Then, they were dominated by the Romans, only to be ruled by the Byzantine Empire afterwards; from 1238 to 1797 they were under the rule of the Serenissima Repubblica di Venezia (in Italian). Cythera was first conquered by the Venetians in 1238. The Venetians went on to conquer the rest of the Ionian Islands, with Lefkas being the last to fall in 1718. The Venetian Republic, an independent state since 697, used to be a dominant trading power in the Mediterranean and was overthrown in 1797 when Napoleon the Great invaded the north of Italy. That was the year when the Ionian Islands came under French control (Campo Formio Treaty) and were considered to be French prefectures until 1799. In 1799, after the Russian and Turkish attacks on the French, which were supported by England, who did not agree with Napoleon's expansionist aspirations, the Ionian Islands ended up under Russian and Turkish (Ottoman) occupation. Thus, the French were evicted from the Ionian Islands and the so-called First French Rule (1797-1799) came to an end. In 1800, the Septinsular Republic (Repubblica Settinsulare in Italian), also known as the Republic

of the Seven United Islands, which was under Russian-Ottoman rule, was founded. This state is considered to be the first Greek independent territory, despite being under Russian-Ottoman protection, because at that time, Greece was under Ottoman occupation. This semi-autonomous state lasted until 1807, when, following several victories of Napoleonic France, the Ionian Islands were annexed to France (Tilsit Treaty) and thus began the Second French Rule (1807-1814). Nevertheless, the British had embarked on a campaign to gradually conquer the islands since 1809; this expedition was completed with the conquest of Corfu in 1814. In 1815 the autonomous United States of the Ionian Islands (Stati Uniti delle Isole Ionie in Italian) which eventually became known as the Ionian State, were founded under the protection of Great Britain, and were essentially an English protectorate. In 1864, following a decision of the United Kingdom and the consent of other countries such as Russia, France and Austria (Treaty of London), the Ionian Islands were ceded to Greece and became its prefectures.

2. Owing to their numerous conquerors, the Ionian Islands present many different weights and measures with regard to goods and vessels and their counting. What is more, different monetary units, languages and flags of ships were also present. It is remarkable that the use of the above did not only change over time but many of them were simultaneously used in transactions. For example, during the reign of the Venetian Republic (697-1797), Venetian, Italian and Latin were the predominant languages in the Ionian Islands and the currency was the Venetian ducat. During the period of the Septinsular Republic (1800-1807), the languages that prevailed were Greek and Italian and the currency was the gazetta of the Republic. On the contrary, during the period of the Ionian State (1815-1864) the prevalent languages were mainly Greek and Italian and the currency was the Ionian obol.

Counting goods by weight was a difficult task in shipping, because the weight unit utilized was the prevalent weight unit of the port of shipment and not the one of the port of destination. In general, each island had its own measures and weights. If we also take into account the plethora of currencies accepted in trade, we realize that what was happening during these times could be described as a real state of anarchy.

The sector of shipping had been advantageously treated by the State ever since 1800, an era characterized as “glorious” since various laws on shipping were issued, the most significant one being the “Regulation and Structure of Shipping” of 1803.

3. Vessel sales and purchases and contracts in the Ionian Islands: late 18th century - early 19th century

a. The first sale and purchase contract was signed at a notary office in the end of the Venetian occupation and specifically on 01-09-1779. It concerned the sale of half a sloop, referred to as “caique galdido” (in Greek). There is no information concerning the type of boat or its size, but it is assumed that it was rather small (as implied by the use of the word “caique”) and that it had a loading capacity of less than 30 tons, probably around 15 tons. The seller stated that he had received the money in his hands and asserted that he was the only one, apart from the notary public, to sign the contract. There were also two witnesses present who were named but did not sign the contract. The selling price was 5.36 gold zecchini. Reading the notarial act (Vlassopoulos, 1995, Volume B', p. 189), it is easy to deduce that the seller did not own the entire boat but 50% of it and had simply sold his share. Also, the only data mentioned are the names of the seller, the buyer and the witnesses and absolutely no information about the vessel, such as its name, tonnage, rigging, flag, etc. It should be noted that the vessels of the time were all sailboats with masts.

To illustrate the value of the 5.36 gold zecchini at the time, it would be worthwhile at this point to make a brief reference to the complex monetary issue of the time. During the Venetian occupation, the most prevalent currency was the ducat, which by the end of this period was called “zecchino”. It was a coin made of almost pure gold, of 997/1000 title, weighing 3.494 grams and bearing the image of the Doge of Venice (Houmanidis, 1990). The silver ducat and the silver tallero were also prevalent. It is estimated that the silver tallero had a transaction value of about 45% of that of the gold zecchino and that it also had about 4 times the transaction value of the silver ducat. This estimation is subjective, based on relevant data of exchange rates of various currencies of the time mentioned by Professors L. Houmanidis (1990), D. Ithakisios (1988) and A. Andreadis (1914). In 1805, the silver talaro was equal to 3 grossi and 18 para (the era of the Septinsular Republic, under the Russian-Ottoman occupation), i.e almost 3.5 grossi, since the grosso had 40 para. However, the coins in circulation were numerous such as the Paris lira, the bronze denari, the gazetta, the bronze bezzo, the solidus, the akçe, the English sterling, the Spanish talaro (two-columns), the Austrian Regina, the Venetian tallero of St Marcus, the Turkish grosso with its subdivisions and many more, while from 1834 onwards Ionian coins were also issued. What is more, the exchange rates between currencies varied from place to place and from time to time, yet, the zecchino seemed to be the most stable over time.

At the same time, though, the prices of the various products (oil, wine, wheat, etc.) differed and fluctuated, so, apart from the fact that there are not enough data on this matter, it would be risky to correlate the prices of the products with the value of the 5.36 gold zecchini. Regarding the value of the ducat, it should be noted that, thanks to the Constitution that was passed in the Ionian Islands in 1803, the status of the aristocracy was determined by their income. Those who had an income of 1800 ducats in Corfu, 1300 ducats in Zante, 670 ducats in Cephalonia, 540 ducats in Lefkas and Paxi, 315 ducats in Ithaca and 225 ducats in Cythera belonged to the “Active Nobility” (*nobiltà attiva*) (Sideris, 1960 and Houmanidis, 1990).

b. The second sale and purchase contract was signed before a notary public as well, also at the end of the Venetian occupation and specifically on 07-07-1788. Once again, the boat is a sloop type boat referred to as “caique galdido”. This type of boat is one with a relatively small loading capacity. In this case too, the seller sold his share, which was 50% of the boat. This notarial document also mentions the co-owner of the boat, namely the person who owned the remaining 50% of the boat and who kept his share without selling it. The boat was sold with complete rigging. In other words, it was sold along with all the supplies and equipment it had (sails, ropes, etc.). It was also stated that the seller took the money in his hands and counted it. The two witnesses who participated were named and it seems that they had co-signed this notarial act, in contrast to the previous agreement discussed above, which was signed only by the seller and not by the witnesses, despite their names being mentioned. The selling price of this particular boat was 28 Venetian talleri, and as in the previous sale agreement, no identifying characteristic of the boat such as name, tonnage, flag, rigging etc is mentioned. If the estimation that the “Venetian talleri” and the “silver talleri”, which, by the way, had about 45% of the transaction value of the gold zecchino, are the same currency, then these 28 talleri were equivalent to approximately 16 zecchini. Therefore, this boat was sold at a much higher price than the previous one –approximately three times its price– despite being of the same type. Nonetheless, there is no report on the condition of the vessel, its age and other characteristics it may have had, factors which affect the price. Thus, no comparison can really be made. Actually, in the present day, this is also the case. In other words, there are purchases and sales of vessels of the same type and tonnage at completely different prices due to their age, but also depending on the prevailing conditions of the freight market.

In conclusion, there are several similarities between the first two notarial

acts addressed above as well as the respective vessel sale and purchase contracts. On the contrary, in the following two purchase and sale contracts several peculiarities are noticed; peculiarities which are definitely not encountered nowadays. At the same time, the concept of commercial cooperation between co-owners with profits and losses is introduced, as well as the concept of payment of the purchase value of the vessel in kind.

c. The third sale and purchase agreement that took place in a notary office, was drafted and signed during the period of the Septinsular Republic, namely during the Russian-Ottoman rule and specifically on 16-09-1804. This time, contrary to the two agreements discussed above, the document mentions both the name and the tonnage of the vessel. Moreover, the seller, who is also named, is the sole owner of the vessel and not the owner of only half of it, but he does not sell the whole vessel but only a part of it. It is noteworthy that in the case of the two transactions discussed above, the seller transferred the entire part of the vessel he owned, namely 50% of it. This sale and purchase concerns a medium-sized boat, probably twice as large as those involved in the two previous notarial acts. This vessel was a *bracera* (*brazzera* in Italian), with a loading capacity of about 30 tons. The *braceras* were two-masted –perhaps three-masted– sailboats, with a tonnage usually under fifty tons. Its tonnage in this transaction is listed in “*koila*”; to be more specific, it is approximately 60,000 Venetian “*koila*”, in other words, 30 tons (Vlassopoulos, 1995). The seller sold only $\frac{2}{6}$ of his boat along with its rigging, having agreed that after each voyage it would be accounted and the profits or losses based on the $\frac{2}{6}$ and $\frac{4}{6}$ ratios would be respectively distributed. To put it in another way, this would be done on the basis of the $\frac{2}{6}$ and $\frac{4}{6}$ ownership of the boat that had been configured for the two co-owners while, this rule would also apply for any expenses that would occur in the future. This contract was signed only by the two witnesses and not by the seller, who stated in the document that he had received the money corresponding to the value of $\frac{2}{6}$ of the boat in his hands and expressed his satisfaction. The price of $\frac{2}{6}$ of the boat was 400 Turkish *grossi* (a silver coin, of 650/1000, title which was rarely used for transactions in the Ionian Islands, but in this case it was probably chosen because of the Russo-Ottoman rule of the time). According to Raptarchis (1934), in 1775, one *zecchino* was equivalent to 7.5 *grossi* and in 1821 one *zecchino* was equivalent to 12 *grossi*, while according to Kremmidas (1972), in 1774 one *zecchino* was equal to 4-5 *grossi* (Houmanidis, 1990). Since there is no data available for 1804 –the year of this sale and purchase– but also because there have been frequent and significant fluctuations in the exchange rates of the currencies,

it is impossible to make an objective estimation of the actual value of the 400 grossi. Based on a subjective estimation, it could be stated that this boat was sold expensively, because although it was not sold in its entirety –as only at 2/6 of it was sold– it reached a price that is considered to be high compared to the purchases and sales mentioned previously, even though they involved smaller boats. Last but not least, the quality condition of the boats was not mentioned at all.

d. The fourth and final sale and purchase contract, which was also drafted and signed at a notary office, took place during the Second French Rule and more specifically on 28-11-1808. One of the two co-owners of the boat sold his share, i.e. 50% of the boat. It was a sloop –it is referred to as “caique sakoleva” in Greek– and it must have been quite small, because this sloop was a type of boat that usually had a single sail. It was sold as it was and the price was calculated in oil, a common product of Paxi. Moreover, no other identifying characteristics of the boat were indicated in the agreement, neither its name, nor tonnage or registration flag. Witnesses did not participate in this agreement and it was signed only by the seller, who stated in writing that he had been paid and was satisfied. The purchase of 50% of the boat was made after the buyer paid 19 “xesto oil lampante”. According to Vlassopoulos (1995), the word “lampante” has two possible explanations; either that the oil was of very high quality or that it was lighting oil. The most logical assumption is that the word “lampante” was used to talk about lighting oil (which was necessary back then). Besides, nowadays, when the word “lampante” is used to refer to oil, it indicates oil of poor quality and of high acidity that cannot be consumed without being previously processed. As for the “xesto”, this used to be a unit of measurement used for liquids. One xesto was equivalent to 2 ionic meters or 13 okas (okka in Turkish) or 16.5 kg. Also, four xestos were equivalent to 1 barile (in Italian). One oka was equivalent to 1.2829 kgs (Pantazis Kontomichis, 2001). Based on the above, it can be assumed that 19 xestos were more or less equivalent to 315 kg, but this assumption may not be correct because there were various measurements and equivalents for oil, wine, water and other liquids. Also, the price of oil per kilo is not known at that time, therefore, it is difficult to estimate the monetary value of the 19 xestos and determine if the 50% of this boat was bought cheaply or expensively. In other words, it is difficult to make a relatively safe estimation of the value of the boat when half of it was sold.

4. The sale and purchase process of a vessel today

Nowadays the process of selling and purchasing a vessel is reflected in the following briefly described stages. The initiative of starting the process is taken sometimes by the respective buyer and sometimes by the respective seller, through the mediation of the ship brokers with whom each of them cooperates. For example, a potential buyer gives the broker the specific requirements that a vessel must meet in order for them to purchase it along with an order to find it on their behalf. Such specifications are the size of the vessel, its type based on the cargoes they intend to load, its age, the money they intend to disburse for it, etc. The ship broker, in turn, being aware of the vessels available on the market at that time, reaches out for other brokers who are acting on behalf of ship owners. When a vessel that fulfils the requirements of the prospective buyer is found, an initial negotiation takes place between the shipbrokers and, if there is an agreement in principle, the buyer –through specialized persons– inspects the vessel for sale, both physically and typically –by checking its documents (records) that is– in order to determine on the one hand the current condition of the vessel and on the other hand its previous life. If the inspection determines that the vessel is suitable for purchase, the final negotiations follow, culminating in the signing of a Memorandum Of Agreement (MOA) between the buyer and the seller, namely a standard vessel sale and purchase contract and the buyer agrees to pay the seller a deposit of 10% of the total agreed price. A MOA includes various terms and conditions and if one is not observed or breached afterwards, especially in cases of wilful misconduct, the sale and purchase process can be brought to arbitration or it may even be challenged in the –preliminarily agreed as competent– courts, usually in England. As a result, the agreement is either ratified or cancelled, along with an obligation of the perpetrator or overdue party to pay compensation or be imposed a penalty clause (depending on the terms of the MOA). If the procedure is completed smoothly, following the MOA, the “bill of sale”, namely the sales contract is signed, the rest of the price is deposited by the buyer to the account opened for this purpose in a Bank –where the 10% advance payment has already been deposited– and the ship passes into their ownership.

It is worth noting that the above procedure is the most common one and here it is outlined extremely briefly, without its admittedly numerous variations and versions, many of which stem from the different types of the MOA, the most significant document in this whole process, that exist in the shipping market (Norwegian Saleform 1993, Singapore Saleform, Nippon Saleform 1999 etc.). In fact, the process of selling an purchasing a vessel is neither so

simple nor so brief, as a multitude of additional documents are required in order to complete the process and transfer the ownership of the vessel to the respective buyer. One of the documents included is the “purchase inquiry”, a document announcing the wish to purchase a vessel that is sent to ship brokers who have vessels available. Another document is the “offer”, namely the offer of the prospective buyer to the seller of each vessel. Another one is the “recap”, which is the pre-agreement document informing about the terms of the MOA, which the parties will sign at a later time. Moreover, there is the “notice of readiness”, which a certificate is showcasing the readiness of the vessel, mainly regarding the settlement and fulfilment of any outstanding issues and the notification of the buyer’s intention to pay the full price. Last but not least, there is the “protocol of delivery”, namely the protocol concerning the matters of delivery and acceptance of a vessel on an exact date. Also, it is remarkable that throughout the sale and purchase process, apart from the ship brokers, the Bank (or the Banking group) and obviously the contracting seller and buyer, other persons and entities are involved, such as the classification society, the vessel’s engineers-inspectors and the registration (flag) of choice of the new owner (Papoulidou, 2020).

5. Comparisons - Conclusion

Actually, no comparison can be made between the vessel sale and purchase process of the period under study and of the one carried out nowadays. As mentioned above, the first was a simplified procedure that took place before a notary public, involving just a few people and sometimes even a single one, while the second is a much more complex process mediated by various entities and mainly a bank. Back then, the price of the vessel was paid by the buyer before the notary public and counted by the seller, who expressed his complete satisfaction in the contract. Nevertheless, there was always a possibility that he had already received the payment in advance or had received another price in another place, other than the notary office. The contract could be described as general and vague, while it often lacked any identifying characteristics of the vessel being sold, such as its name, flag, tonnage and dimensions, rigging and general condition. Regarding the document, there was no standardization of its form, while it was sometimes signed by the seller and other times by the two witnesses. Nevertheless, it seems that –despite being considered inadequate compared to the modern shipping processes– this practice was quite common, with regard to all kinds of shipping-related contracts, since –as it can be observed– the charter agreements of that time in the Ionian Islands, usually

did not mention much about the ship and especially its tonnage. However, the name of the ship and its flag were usually mentioned. The charter parties of this period involved an even simpler process than the vessel purchase and sale process, because they were not even signed before a notary public; they were private agreements between a charterer and a ship owner, who signed and received a copy of the contract (Zois, 1996).

On the contrary, nowadays, ship sale documents are not only standardized, as is the whole procedure, but also their validity (and therefore their breach) goes beyond the borders of the country, where they are signed. This is due to the fact that the MOAs –but also the other documents required for the completion of a ship sale process– are now internationally recognized as standardized forms, since they have been established by competent and globally recognized and accepted entities, and their breach or interpretation is conducted by the authorities of countries other than the ones where they have been signed, usually in arbitrators or courts in England or in the case of the signing of the Nippon Sale form in Japan. In the Ionian Islands of the period under study, there is another problem, regarding the measures and weights and the transaction currency. These differed from island to island, and changed frequently due to the many foreign conquerors. Especially in the case of money, as mentioned above, dozens of different currencies were simultaneously used and accepted in transactions. Consequently, a contract conducted in the Ionian Islands could be legally challenged for many different reasons, as there was breeding ground for various interpretations, unclear issues or even matters that were not mentioned or regulated at all in these vessel sale and purchase agreements. On the contrary, in modern times the standardization of terms allows the MOA to be challenged before the courts or any dispute to be resolved by arbitration only with respect to a specific term, which regulates a very specific issue, and does not leave room for generalization or misinterpretation or ad hoc wrongful application between the parties involved.

However, it must be noted that there also used to be contracts –with a simple text, similar to those mentioned above– concerning the sale and purchase of vessels in the Ionian Islands of the late 18th and early 19th century, which were signed or at least ratified before public authorities, such as consulates –of various countries but mostly England– because the involved parties, namely the seller and the buyer of the vessel in question, wanted to formalize the agreement between them. As a final remark, it is worth pointing out that during the period under study (but not only then), vessels were treated as a simple property asset, a simple object, which was being transferred, while today the sale and purchase of a vessel –and mainly of a ship– is a peculiar and

complex transaction, which requires standardization of contracts, organization and internationally accepted but also established practices.

In other words, the transition from the simple, private and local to the complex, standardized and international was nothing but the progress of “hic” to “hic et ubique”.

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EXPLORING PATTERNS OF CONSUMER BEHAVIOUR AND TOURISM DISTRIBUTION CHANNELS IN A RELIGIOUS TOURISM DESTINATION

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Abstract

ICT is a deliberately broad term to encompass any technology that helps to gather, store, analyze, communicate and disseminate information. Having accurate and up-to-date information has always been the basis of good decision-making in any business, and almost all sectors of economic activity, including tourism. An up-to-date tourism destination promotional strategy is necessary to incorporate all those elements related to the cultural and national identity of the place, such as religion and religious monuments. This paper explores patterns of consumer behavior of religious tourists in a tourism destination and recommends useful practices regarding tourism development with emphasis put on the use of Information and Communication Technologies (ICTs).

JEL Classification: Z33, Z12, Z32, Z39

Keywords: Religious tourism, ICTs, Tourism Destination, Tourism Distribution Channels.

1. Conceptual Approach to Religious Tourism and its marketing management policy in a destination

The controversy of the dominant model of mass tourism, the policy of international organizations including E.U., and also the environmental impacts of tourism development, are some of the reasons that forced the tourism industry to orient in new standards of tourism development (Tsartas et al., 2010). In addition, changes in consumer motivations have led to the emergence of special and alternative forms of tourism (Andriotis, 2003).

Since ancient times the sacred places have been places of destination for travelers. These sites include temples, monasteries, places of appearance or burial of Saints or religious feasts. Religious tourism is defined as “a special form of tourism that expresses the individual’s desire to move from the place of his permanent residence to another place he considers sacred in order to

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fulfill a vow, to express his gratitude, or to communicate with the Divine” (Lopez, 2013). This movement is connected with the pilgrimage that is the basic expression of religious tourism (Lagos & Christogiannis, 2006).

Marketers who want to attract potential religious travelers must take into account parameters such as attitudes, behaviors, motivations, socio-demographic characteristics, age, etc. Understanding these parameters, would provide useful information on how to foster intergenerational interactions among different groups. For example, seniors see the educational purposes and feelings of national identity related to sacred sites as important while these are less motivating for the young (Irimias et al., 2016). According to Kocyigit (2016), the most important motivations of religious tourists are the mental and spiritual relaxation, to get away from stress and the discovery of new cultures and different religions. The balancing of the needs and the satisfaction of different market segments, must be the goal of marketing managers. This will be achieved by introducing new experiences and innovative elements that will allow the attraction of younger and more dynamic visitors (Fernandes et al., 2016).

Creating a picture of a destination that combines intangible properties (e.g. religion, tradition, etc.) and tangible elements (e.g. sights, monuments, churches, etc.) creates a sense of intimacy and proximity to the mind of the traveler and a cultural familiarity with the destination (Kavoura and Katsoni, 2014). For example, the historical significance of a religious monument and its role in creating the national identity could be explained by an interactive way. Better understanding of the historical and cultural importance of a religious site would raise its appreciation among young people and this is key for an age-related visitor widening (Irimias et al., 2016). Significant in this direction is the fact that new technologies are not only used by those directly involved in tourism but also by organizations representing the Church and the Monasteries. ICT seems to be gradually adopted by holy places with strict monastic traditions around the world, such as Mount Athos in Greece (Tanasyuk and Avgerou, 2009).

This paper explores the role of the tourism distribution channels in the development of religious tourism in the Prefecture of Messinia, in the south-western part of the Peloponnese region, in Greece.

2. The Role of Tourism Distribution Channels and ICTs in Tourism Development

Distribution or marketing channels are defined as “sets of interdependent

organizations involved in the process of making a product or service available for use or consumption” (Buhalis, 2000a). Their purpose is twofold: to provide information for prospective tourists and intermediaries as well as to establish a mechanism which would enable consumers to make, confirm and pay for reservations (Buhalis, 2000b). Additionally, greater understanding is needed to the extent of which visitors use particular channels for different types of travel activity and of the factors that influence their selection and use (Pearce & Schott, 2005).

Web 2.0 applications have been enabling consumers to communicate with each other more easily (Middleton et al., 2009). Strategic benefits of using ICTs are mainly caused because of the flexible pricing and reduced communication and distribution costs, better specialized and differentiated services, close relationships with customers, smart enterprise networks, established entry barriers, and knowledge acquisition (Kavoura and Katsoni, 2014).

The use of Information and Communication Technology (ICT) has radically changed the structure of intermediaries and the conditions of world trade, allowing the emergence of new electronic distribution channels, as advances in electronic-based ICTs are rapidly transforming social and economic conditions across the globe. The availability of information on the Internet and the emergence of electronic intermediaries revolutionize distribution (Buhalis, 2000a). As the cost of ICTs continues to fall and their capabilities increase, their applications are becoming even more vital to all sectors of the economy and society, including the tourism sector (Katsoni, 2011b).

According to Katsoni (2011b), ICT-skilled tourism enterprises and DMOs have huge opportunities to apply ICTs for communicating their offering, enhancing their visibility on the market and strengthening their competitiveness. Incorporation of ICTs and the adoption of e-commerce in a marketing tourism destination strategy may strengthen networks and alliances between the public-private sector for the implementation of a successful tourism development (Kavoura and Katsoni, 2014). In this case, the DMO as the network management organization can be both the agent of the community and the principal of the network participants and make efforts to attract and retain individual tourism businesses as members in the marketing networks (Wang, 2011). The most important shareholders that may be involved in a DMO are: Hotels, government (at different levels), tourist attractions, DMO’s board of directors, residents, restaurants, universities, traders and sponsors (Katsoni, 2011a). It is imperative, therefore, for DMOs to use legislative and management tools during planning and management of destinations in order to ensure that the benefits of tourism activity are shared fairly between all stakeholders

and that sustainable practices safeguard the regeneration of resources utilized for the production of tourism (Buhalis, 2000a).

3. Research into Consumer behavior and Tourism Distribution Channels Use in the Prefecture of Messinia, Greece

The paper examines the ability of contribution of Information and Communication Technologies (ICTs) and the role of distribution channels in promoting Messinia as a tourist destination of religious interest. This paper presents the visitors' questionnaire, in Greek and in English and answered by 173 travelers in a period of 6 months in 2017. In order to complete the questionnaires, a large number of hotel managers of each category was interviewed. Regarding the characteristics of travelers, the research proved that 54.9% of them are women. Ages 35-55 account for about 45% of travelers. The difference in

Table 1: Trip characteristics

	Number of Travellers	Percentage Allocation (%)
Have you visited Messinia before		
Yes	78	45,1
No	94	54,3
You travel		
on your own	11	6,4
with one or more friends	58	33,5
with your family	104	60,1
You booked your accommodation		
through a travel agent	25	14,4
by yourself via telephone	58	33,5
by yourself via Internet	70	40,5
other	7	4,0

Note: Percentages do not always add up to 100 because of non-response to individual questions

Table2: Degree of interest in activities during the holiday

	Very Unlikely (1)	Unlikely (2)	Neither likely Nor unlikely (3)	Likely (4)	Very Likely (5)	Average scale (standard deviation)
Activity 1: Visiting natural attractions and enjoying the quiet nature of the region	1	44	32	81	15	3,37 (0,98)
Activity 2: Learning about local culture / history	1	34	23	100	14	3,51 (0,96)
Activity 3: Shopping	1	64	60	40	6	2,88 (0,93)
Activity 4: Night life / entertainment	1	22	51	86	12	3,28 (0,87)
Activity 5: Visiting agricultural sites	10	78	67	16	2	2,55 (0,79)
Activity 6: Visiting friends and relatives	8	45	40	64	14	3,14 (1,11)
Activity 7: Religious tourism	8	66	60	24	15	2,84 (1,02)
Activity 8: Watching sporting events	14	51	52	51	5	2,90 (1,01)
Activity 9: Mountaineering and other intense athletic activities	14	57	56	42	4	2,80 (0,98)
Activity 10: Sunbathing / swimming	0	2	4	90	77	4,39 (0,60)

Note: The number of travelers for each activity does not always add up to 173 (total population) due to non-response to individual questions.

Table 3: Visit to Religious Sites - Number of Travelers

	Number of Travelers	Percentage Allocation (%)
1. Metropolitan Church of Ypapanti - Kalamata (Litany - pilgrimage - vow)	54	31,2
2. Historical Church of Agioi Apostoloi - Kalamata	47	27,2
3. Monastery of Voulkano	15	8,7
4. Byzantine Basilica in Ancient Messini (church)	20	11,6

the level of study is significant. 63.6% of travelers are tertiary graduates and 31.8% are graduates of secondary school. As for the profession, there is also statistically significant differentiation between travelers. 24.3% of travelers are clerical workers, 22.5% are scientific, technical and related worker and freelancers, 13.9% are students and 11.0% are pensioners.

Table 1 below shows other trip characteristics. 54.3% of travelers have not visited Messinia again. Significant differentiation occurs between those traveling with their family (60.1%) and those travelling alone (6.4%) or friends (33.5%). 40.5% of Messinia's guests booked their stay on the Internet, followed via telephone (33.5%) and via travel agency (14.5%). Differences between booking options are statistically significant.

Table 2 shows the interest of travelers in various activities during their holidays in Messinia and the distribution on a scale (1) - (5) where (1) – Very Unlikely and (5) – Very Likely. The Table shows the statistical measures of the average scale as well as the standard deviation of these values. In this case, the higher the average, the greater the interest of the respondents in this activity. The first activity in the ranking is “Activity 10 - Sunbathing / swimming” followed by “Activity 2 - Learning about local culture/history”. Religious tourism is eighth in the ranking, while the “Activity 5 - Visiting agricultural sites” is the least interesting.

In total, about 1 in 4 travelers showed interest in religious tourism, 22.5% of all respondents (39 travelers). This total is clearly lower than that of travelers who visited at least one religious site, but it is remarkable for a special form of tourism.

Table 3 shows the frequencies of travelers' visits to religious sites in Messinia. For the selection of their religious sites, a list of 21 religious destinations

Table 4: Information sources used for the trip - Comparison between travelers who visited religious sites and other travelers

	Number of Travelers (%)	Number of Travelers who visited religious sites (%)	Number of other travelers (%)	χ^2 -test
Source 1: Information Brochures	40 (23,1)	21(26,0)	19 (21,0)	X -squared=0.35049, df=1, p-value=0.5538
Source 2: Hotel Listings	37 (21,4)	21 (21,0)	16 (21,9)	X -squared=5.826e-31, df=1, p-value=1
Source 3: Retailer / agency	50 (28,9)	32 (32,0)	18 (24,7)	X -squared=0.77859, df=1, p-value=0.3776
Source 4: Touristic kiosks	22 (12,7)	13 (13,0)	9 (12,3)	X -squared=3.1445e-30, df=1, p-value=1
Source 5: Advertisements and articles in newspapers / magazines	32 (18,5)	20 (20,0)	12 (16,4)	X -squared=0.15811, df=1, p-value=0.6909
Source 6: Travel guidebooks and travel magazines	34 (19,6)	21 (21,0)	13 (17,8)	X -squared=0.10762, df=1, p-value=0.7429
Source 7: Radio and TV broadcasts (documentary or news)	34 (20,2)	21 (21,0)	14 (19,2)	X -squared=0.010609, df=1, p-value=0.918
Source 8: Internet / usage tablet - smart phones	126 (72,8)	64 (64,0)	62 (84,9)	X-squared=8.3154, df=1, p-value=0.003931
Source 9: Recommendation from friends & relatives	100 (57,8)	53 (53,0)	47 (64,3)	X -squared=1.7994, df=1, p-value=0.1798
Source 10: Personal experience / Knowledge	53 (30,6)	31 (31,0)	22 (30,1)	X -squared=0, df=1, p-value=1
Source 11: Church / Pilgrim excursions	36 (20,8)	32 (32,0)	5 (6,8)	X-squared=14.415, df=1, p-value<<0,0005

Table 5: General impression of Messinia

	Yes (1)	Maybe (2)	No (3)	Average scale (standard deviation)
Question 1: Do you intend to visit Messinia again in the future;	123	45	5	1,32 (0,53)
Question 2: Would you recommend Messinia to your friends and relatives;	162	11	0	1,06 (0,24)

and events was given. 100 out of 173 travelers (57.8% of respondents) said they had visited at least one of the list's destinations.

Metropolitan Church of Ypapanti was the most visited. Nearly one in three travelers visited the Metropolitan Church of Ypapanti, while the percentage is rising (almost one in two) if we focus on the 100 who visited at least one religious site. They follow in visiting the Historical Church of Agioi Apostoloi, the Byzantine Basilica in Ancient Messini and the Monastery of Voulkano.

Table 4 describes the distribution of the population of the two groups of travelers, that is travelers who visited religious sites and other travelers, on the basis of whether they have used each of the sources of information listed in the table. For the comparisons in the use of each source between the two groups, the χ^2 -test was used. As can be seen from the results, the two groups differ in a statistically significant way (p-value <0,05) only in terms of using two sources.

The satisfaction of a traveler from the place he visited many times is related to whether he will visit it again in the future and/or whether he will recommend it to friends and relatives. In the relevant questions, the answers were particularly encouraging. The majority of respondents gave positive answers to the question whether they would visit Messinia in the future and whether they would recommend Messinia to friends and relatives (Table 5).

4. Conclusions

According to this research, the most important source of information regarding the tourism distribution channels described above, is "Source 8 - Internet / usage tablet - smart phones", for which visitors of the religious sites have statistically significantly less use (64.0%), compared with 84.9% of the visitors who did not visit religious sites.

Statistically significant findings also emerged for “Source 11 - Church/Pilgrim excursion”. Nearly 1 in 3 (32.0%) travelers who visited religious sites in Messinia had been informed about the journey from the Church. On the contrary, only 5 travelers (6.8%) from the second group were informed about the trip from this source.

The development of ICTs has also led to changes in demand and supply. The authors support the view that ICTs that include a broader use of technological systems and applications, would be extremely important for the tourism development of the area. Some of the ICTs’ applications adopted by the tourism industry include: Global Distribution Systems – GDS, Geographical Information systems (GIS) – Global Positioning Systems (GPS), Augmented Reality Applications –AR, use of Quick Response (QR) Codes, Radio Frequency Identifications – RFID, Cloud Computing and many others that appear through technological innovation. The tourism context has become a fertile ground for mobile computing (Dickinson et al, 2014). Smartphones generally support activities that are common both in everyday life and during holidays such as communication, entertainment, social networking (e.g. Facebook, Twitter, Instagram), flight search, activities and attractions, hotels, tickets and travel offers, etc. (Wang et al, 2014). As the tourism destination is amalgam of tourism products, offering an integrated experience to consumers, the intense need for a rational management with the most modern tools available is proven from this research. One limitation of this study is that it does not include specific sources of information through the internet, but the authors are already working on this aspect and they are going to present their results in the near future.

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