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# **Chapter II – ABSTRACTS**

## **Investigating the Efficiency of Internal Control Systems in Accommodation Industry: A Research on Bursa Hotels**

Tuba Bora Kılınçarslan<sup>1</sup>

Kamuran Üstün<sup>2</sup>

### **Abstract**

Internal control is a dynamic process implemented by company's managers and employees, which includes identifying, evaluating and taking precautions against risks that may prevent the company's activities from being carried out effectively, economically and efficiently in line with its mission, vision, strategic goals and objectives. Companies in the accommodation industry, which has an important role in the hospitality sector, need an efficiency of internal control system based on the principles of transparency and accountability in order to be managed successfully. The aim of this study is to investigate the efficiency of the internal control systems with tourism operation certificated hotels in Bursa within the COSO Internal Control Framework. In the study, a questionnaire with 50-item on a 5-point Likert scale was used, which included the five components of internal control (control environment, risk assessment, control activities, information and communication, monitoring activities) in accordance with the COSO Framework. According to the data of Bursa Provincial Directorate of Culture and Tourism, a questionnaire was sent to the senior managers of 103 hotels with tourism operation certificated in Bursa in 2022, via e-mail and by interview. 33 hotel managers participated in the questionnaire, and the response rate was 32%. The data obtained was analysed in the SPSS 28 package program. As a result of the research, it was determined that the hotels with tourism operation certificated in Bursa have internal control systems and their efficiency level of internal control is high.

**Keywords:** Internal control, COSO framework, accommodation industry

### **Acknowledgement**

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Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

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## **The Effect of Customer Attitudes Toward Green Products on Their Adoption: A Study of Consumer Perspectives**

Lynda Bouzeroura<sup>1</sup>

### **Abstract**

The goal of this study was to determine consumer trends toward green product adoption by analyzing the opinions of a sample of individuals. The independent variable was measured using the aspects of the green product (design, performance, and packaging), while the dependent variable was consumer trends. To accomplish the study's aims, a questionnaire with 35 questions was created and given to a sample of green product users. The hypotheses were examined using the SPSS 20 software and a variety of statistical procedures, including averages, multiple regression, one-way analysis of variance, correlation matrix, and so on. The effect of green product dimensions on consumer trends has been found to be strong, a green product can be more expensive, but it can certainly be more profitable because demand for these types of products is peaking. Designing a green product must take into account sustainability throughout the entire production process, as many consumers care about the environmental aspect and maintaining sustainability, but the lack of information about the green product leads to a lack of interest in it.

**Keywords:** Green product, life cycle, consumer orientation, product adoption

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## **Toolkit for Regional Smart Specialization Strategies: Insights from Konya**

İbrahim Tuğrul Çınar<sup>1</sup>

### **Abstract**

This study explores various analytical tools that are instrumental for developing smart specialization strategies at the provincial level in Turkey, highlighting the combined benefits of these tools. Our recent research has concentrated on economic complexity, along with metrics like proximity, density, and relatedness. These metrics serve as indicators of the potential for income generation for a country or region. Although the high technological complexity of products or sectors is an important factor in deeming them strategic, it's insufficient for comprehensive analyzes needed to identify key sectors suited to the economic, social, and spatial aspects of a city or region, or for enhancing the global competitiveness of production centers based on their local productive potential. A significant aspect of our research involves calculating the economic complexity, proximity, density, and relatedness of over 1000 product groups, classified under the 4-digit SITC revision 3, using data from the Turkish Statistical Institute. Our findings reveal that Istanbul, Ankara, and Izmir rank highest in economic complexity within Turkey, while Konya has shown notable progress in its production capabilities, closely approaching Izmir and Ankara in recent years. Therefore, we focus on Konya's smart specialization strategies, examining its rapid development in productive capabilities. We assess local capacities and determine the most competitive products with the highest income potential. Our findings show that when we merge the density metric, in products where Konya hasn't achieved competitiveness yet, with the economic complexity values of these products, it emerges that the product group 7251, Machines for the manufacture of paper and cardboard, has a significant density. This points to a greater likelihood of Konya becoming competitive in this category, even though it is not currently so. The findings provide a useful toolbox for policymakers to identify higher value-added products that provinces or regions in Turkey have the necessary productive capabilities to produce and that can provide a competitive advantage in the global market, in other words, to develop smart specialization strategies.

**Keywords:** Smart specialization, competitiveness, economic complexity, density, relatedness, proximity

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# **A New Wave of Corruption in Health: Assessment of the Covid-19 and Post - Pandemic Era**

Gökçe Sinem Erbuğa<sup>1</sup>

## **Abstract**

One of the sustainable development goals (SDGs), which aims to leave our world liveable to future generations, is to ensure healthy lives for all segments of society at all ages and to ensure access to the most basic health services by promoting well-being in this direction (SDG-3). However, with the outbreak of the Covid-19 pandemic worldwide in 2020, more than 6 million people lost their lives. During the period in question, hundreds of thousands of people could not access health services or could not benefit from these services sufficiently. Therefore, the Covid-19 pandemic, which is the period when sustainability in health is most questioned, has opened the doors of a brand-new era for our world. The pandemic process, whose effects we have seen globally in every field, from business life to our daily lives, has caused the health systems of countries to be seriously shaken. The fact that a virus that has never been encountered before causes unexpected vital consequences has, to some extent, exposed national health systems to new uncertainties and risks. Health systems, which encountered new risks during the pandemic process where very serious amounts of health expenses were incurred, became more open to corruption. In addition, manipulative behaviours seen in data regarding sick people or death toll (mortality rate) have also led to an increase in corruption in the health sector. With the increase in health expenditures, more acts of corruption have been encountered. In this study, it was investigated whether there was any relationship and causality between the health expenditures made during the Covid period and the corruption committed. In this regard, the health care index, global health security index, and corruption perception indexes of EU countries were evaluated. In addition, the corruption seen in the health sector that countries encountered both during and after Covid-19 was determined within the scope of the study.

**Keywords:** COVID-19 pandemic, corruption, sustainability, health care index, global health security index, corruption perception index

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## Employee Fraud in Remote Working Model: A Delphi Study\*

Yasemin Ertan<sup>1</sup>

Samet Gezer<sup>2</sup>

### Abstract

The concept of sustainability, which involves maintaining existence without compromising the living standards of future generations, has garnered significant attention from the global community in recent years. Achieving sustainability requires individuals, businesses, and nations to reassess and redesign their activities. Sociological, economical, and technological developments occurring worldwide swiftly influence our daily lives, necessitating adaptation by all entities aspiring to endure. The COVID-19 pandemic serves as a prominent example of this phenomenon. The pandemic, with its global impact, has brought about changes in both individuals' lives and business operations. Among these changes, the rapid surge in the implementation of remote working stands out. In the remote working model, employees carry out their tasks from locations outside the traditional office setting. This model presents both positive and negative effects for employees and businesses, resulting in alterations in operational approaches and shifts in the risks faced by organisations. One of these risks is fraud risk. Fraud, an age-old phenomenon, remains a risk that businesses must contend with, regardless of the working model employed, be it traditional or remote. Instances of fraud can inflict significant harm on a company's sustainability. The relatively novel remote working model necessitates reevaluation and a revised understanding of employee fraud. Numerous studies have sought to identify the factors contributing to fraud, and fraud theories have been developed. For instance, the fraud triangle theory posits that when pressure exists in an environment, individuals have opportunities to engage in fraudulent behaviour and can rationalise their illicit acts, thereby increasing the likelihood of fraud within that context. This study aims to determine the awareness of business managers regarding employee fraud, identify the changes that the remote working environment introduces to the elements of fraud, and outline the factors that must be taken into account to prevent employee fraud in remote working environments. The research was conducted using the Delphi technique, involving ten managers operating in the Bursa province. As a result of the Delphi technique, which was completed in three rounds, it was observed that the participants reached a consensus on 5 out of the 22 statements presented to them. This study contributes to the existing literature, which offers limited research on employee fraud in remote working environments. Additionally, guiding results have been revealed to businesses in terms of preventing fraud in remote working models.

**Keywords:** Sustainability, fraud, employee fraud, remote working model

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\* This study was produced from the Master's thesis titled "Effects of Remote Working Models on Fraud: A Delphi Study Based on Managerial Perspectives" written by Samet Gezer under the supervision of Assoc. Prof. Yasemin Ertan.

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## **Enhancement of Coffee Quality in Rwanda: A Stakeholder Analysis of Government Policies**

Glenn P. Jenkins<sup>1</sup>

Ludovic Mbakop<sup>2</sup>

Mikhail Miklyaev<sup>3</sup>

### **Abstract**

Over the past two decades, Rwanda has positioned itself as a leading producer of specialty coffee. The shift away from ordinary coffee began in the early 2000s and was buoyed by international donors, NGOs and the Government. They all supported the nascent specialty coffee industry by providing a combination of technical assistance and funding to invest in coffee washing stations. (CWS) throughout Rwanda. CWS are a pivotal piece of the coffee value chain in Rwanda since it is where cherry coffee undergoes a process that turns it into specialty coffee. The policy of shifting to specialty coffee has been significantly beneficial to Rwanda. However, there was a rush to build a large number of CWS throughout the country which has resulted in an oversupply these plants with most of them operating below capacity and fierce competition among those for the purchase of coffee cherry from farmers. In an attempt to shore up the industry, the Government implemented a zoning policy which effectively acted as a trade barrier to artificially maintain in business weak CWSs that could not endure competition. This study uses cost benefit analysis to estimate the economic welfare loss that Rwanda has suffered as a consequence of the excess number of CWS as well as the inefficiencies created by its zoning policy. Our results show that Rwanda could save a substantial amount each year if there were an increase of competition in the market for cherry coffee brought about by a reduction of the number of CWS. If such a policy were implemented, coffee farmers could potentially receive prices that are 150% higher than the government mandated fixed prices they are currently been paid. These enhanced revenues would allow them to finance the replanting of the new coffee plants thereby tackling the issue of ageing coffee trees and maintaining the sustainability of this sector.

**Keywords:** Coffee value chain, coffee washing station, specialty coffee, coffee zoning policy

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## Double Dividend and Green Tax Reform in Slovenia

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### Abstract

Despite the fact that many countries have introduced green taxes to some extent, only a few can be said to have implemented a comprehensive green tax reform. The main goal of every Green tax reform (GTR) is to tax bad things (pollution) instead of good ones (income, capital) in order to ensure fiscal neutrality and to improve the situation in an environmental and economic sense (double dividend). The first (environmental) dividend is linked to the reduction of emissions and the second (economic) to the reduction of social contributions or/and income tax which leads to lower costs and greater competitiveness.

The assessment of the effects of the green tax reform cannot be determined to a certain extent, since green taxes are often introduced together with other measures (regulation, labelling). Nevertheless, the experience of many European countries (e.g. Ireland, Netherlands, Sweden) shows that the effects of the green tax reform were positive in most countries. In professional literature, dilemmas regarding social injustice (regressiveness), inappropriate use of collected funds, direct costs for industry and the existence of a double dividend appear most often.

The experiences from certain European countries show the key to success in GTR introduction lies in the combination of public and private funds, gradualist measures, transparency and strong public support, purposeful spending of collected funds and recycling, effective resolution of regressiveness and loss of competitiveness and coordination and supervision of the green policy measures.

In the article two scenarios will be presented for Slovenia. Baseline scenario where the green tax is not introduced and a projection that assumes the introduction of the specific green tax with evaluation of impacts on the Slovenian economy (GDP, unemployment, consumption). The comparison between the two projections will show a relatively small impact of the chosen green tax on the chosen variables. As a rule, green taxes represent a relatively small share in the tax structure of state revenues, which means that to compensate for the loss of income tax, they would need a drastic increase. Without the latter, there is relatively little room for significant environmental (emissions reduction, greater energy efficiency) and economic benefits (higher growth).

**Keywords:** Green taxes, green tax reform, double dividend, SDGs

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# Requirements of Environmentally-Aware Consumers on the Implementation and Communication of Sustainability Measures in the Beverage Industry: A Qualitative Kano-Model Approach

Christopher Maász<sup>1</sup>

Luisa Kroll<sup>2</sup>

Michael Lingenfelder<sup>3</sup>

## Abstract

Consumers attach great importance to ecological product attributes in the beverage industry. Although the importance of sustainability aspects for consumers around the globe rises, environmentally friendly attitudes often do not result in an actual sustainable buying behavior. This may be due to the fact that the implemented sustainability measures of beverage manufacturers do not offer any added value from the consumer's point of view or because of ineffective communication strategies by the producers. Within three focus groups, which participants consisted of a young and highly educated target group that is profusely involved with environmental issues, this article discusses beverage and food choice motives and categorizes consumer requirements on sustainability measures using a qualitative Kano-model approach, taking the beverage industry as a day-to-day relevant example. Furthermore, participants expectations regarding the communication of sustainability-linked information are highlighted.

The findings reveal that healthy and balanced diets in specific are considered when purchasing groceries. Participants thereby try to habitualize their shopping behavior by buying well-known brands and products. In addition, the target group minds organic certifications, regionality and seasonality, and packaging. However, the participants pay particular attention to offers and discounts on food and beverage purchases. Highlighting the role of environmental sustainability in the beverage industry, the stated responses suggest that the reduction of water usage and emissions as well as the recyclability of labels, lids, and crown caps can be primarily classified as must-be requirements, whereas a climate-neutral production, an integration of all bottles into a deposit system, and the support of environmental projects or third-party organizations are highly valued and can be classified as attractive quality attributes. Participants further expect a more honest and transparent communication of sustainability-related information on products, e.g. provided through QR codes, and additional communication channels, especially websites and social media.

With these findings in line, the present study provides practical implications for strategic directions and effective communication approaches for beverage manufacturers. To gain further insights into the research field, future research should consider a comparison of consumers' willingness to pay for the depicted attractive quality attributes within the beverage industry.

**Keywords:** Beverage industry, communication, consumer requirements, Kano-model, sustainability measures

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## Assessing Transport Sustainability in the European Union Countries

Danguolė Oželiene<sup>1</sup>

Aušra Katiniene<sup>2</sup>

### Abstract

The transport sector accounts for 5% of the European Union's GDP, employs around 10 million people and is an important part of the European Union economy. However, the transport sector is one of the biggest environmental polluters. Greenhouse gas emissions from the transport sector account for 25% of the European Union's total emissions. The concept of sustainable transport is closely linked to the development of sustainable transport modes, infrastructure and activities. Sustainable transport involves meeting society's mobility needs while minimizing environmental impact. A key objective of sustainable development is to prevent the increase in pollution and negative economic effects associated with the growth of the transport sector. Moreover, European Union has set an ambitious goal of becoming a climate neutral continent by 2050.

The research aims to assess the sustainability of the European Union transport sector and provide recommendations to policymakers. The research data were obtained from the Eurostat and Statista databases and were analyzed using several research methods, including the Cumulative Proportionality Assessment method (COPRAS) and the Hierarchical Clustering approach proposed by the SPSS statistical program.

The research results show the ranking of European Union countries. Additionally, the cluster aggregation dendrogram has facilitated the merging of different countries into common clusters based on the similarity of identified indicators for each country. Research findings offers a roadmap for policymakers and decision-makers to navigate the complex landscape of sustainable transportation.

**Keywords:** Sustainable development, transport sector, environmental pollution, assessment of the sustainable development, Green Deal.

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## Is Distance Learning Sustainable for Training Workers in the Occupational Safety Field?

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### Abstract

The acute and severe respiratory syndrome of coronavirus 2 (SARS-CoV-2, or Covid-19, or more simply Covid) has spread throughout the planet, infecting tens of millions of people and killing a significant percentage of them. The pandemic led many states to implement increasingly severe restrictions, culminating in the establishment of states of emergency that lasted several months in various countries that had, and will continue to have, truly dramatic socio-economic consequences in the near future.

Although the idea of digitizing educational systems had already been debated for a long time, the acceleration of this initiative under the reign of the Covid pandemic was truly impressive. All educational levels, from kindergartens to the university system, have been severely affected by the new coronavirus, and most institutions have either been closed completely or have been operating at a much reduced capacity for several months. After the initial shock, millions of teachers, professors and members of administrative and technical bodies in education systems around the world reacted in a truly extraordinary way, trying to transfer all teaching activity online and, in just a few weeks, to familiarize themselves with the operation of digital platforms such as Zoom, Google Meets and Microsoft Teams which, in most cases, they had not even been aware of before this crisis.

The COVID-19 pandemic, perhaps for the first time in the history of education, has made distance learning the new standard teaching method for almost an entire academic year.

This also applies to the field of occupational health and safety distance training.

In this paper we evaluate the sustainability of distance learning in occupational safety field by meaning of a comprehensive literature review conducted in the main scientific data bases (Scopus Elsevier, Web of Science, Google Scholar) and by taking into account the three major aspects of sustainability: economic sustainability, social sustainability and ecological sustainability. To conduct a systematic literature review on sustainability of distance learning in the field of occupational safety it was used The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA).

In our paper we approach economic sustainability as that the online training system must be financially viable in the long term, that is, it must be affordable and provide real value to users. We also considered that social sustainability implies that the training system is accessible and useful for a wide range of users, including those who do not have access to other forms of training or who do not have sufficient financial resources to participate in traditional courses. Finally, we considered that social sustainability implies that the training system is accessible and useful for a wide range of users, including those who do not have access to other forms of training or who do not have sufficient financial resources to participate in traditional courses.

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This study aims to fill this gap in current knowledge by providing a comprehensive analysis of the existing literature on e-trainings in occupational safety and health and also to provide up-to-date details on sustainability of online occupational safety training interventions and in the end, to help increase awareness and compliance with health and safety rules and regulations in the workplace.

**Keywords:** Occupational safety, distance learning, e-training

## **Sustainable Public Health Infrastructure Development Through Private Finance: Turkish PPP Experience**

H. Semih Yildirim<sup>1</sup>

### **Abstract**

Investment in sustainable health infrastructure is fundamental to the development of any country. Over the past decade, a number of large-scale hospital projects have been procured, built and become operational under Turkey’s ambitious Healthcare Transformation Program (HTP). Responding to ever-growing infrastructure finance needs, Turkey has taken an approach towards involving private-sector through a public-private partnership (PPP) model. While the availability of alternative methods of infrastructure development and service delivery can enhance opportunities to increase socio-economic welfare, involving a private sector partner in design, finance, construction and operation under complex contracts can produce a host of new challenges to address. The purpose of this paper is to provide an analysis of the Turkish healthcare PPP experience to contribute to the discussion of whether PPPs are a viable option for health infrastructure projects in developing and emerging economies and make recommendations to improve current and future healthcare partnerships.

**Keywords:** Public private partnership, healthcare infrastructure finance, private finance

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# **Chapter II – FULL PAPERS**

## **Evaluating the Operationalization of the Agency Theory Using Economic Value-Added Metric: Evidence from Firms Listed on the Ghana Stock Exchange**

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### **Abstract**

The objective of this paper was to examine the operationalization of the agency theory by managers and analyze the nexus between agency costs and value creation leading to sustainability of firms' operation. Continuous value creation leads to continuous survival, but agency costs is a threat to sustainability. This study employed two metrics to measure agency costs – expense ratio used as proxy for agency cost1 and asset turnover used as proxy for agency cost2. Additional three metrics were used to measure financial performance – economic value added (EVA), market value added (MVA) and current ratio (liquidity). The study period covered a ten-year period, from 2011 to 2020. Sources of data were predominantly from the financial statements from annual reports of firms listed on the Ghana Stock Exchange (GSE). Data analysis was purely quantitative, using statistical computations and multivariate regression analysis. The results showed that on average, listed firms on the GSE generated negative EVA (-3.891 units). This implies that on average, listed firms on the GSE did not create value for its shareholders, but rather dissipated value. Another implication was that, although these firms may look profitable when their performance is measured with the conventional accounting performance measures, they actually generated negative returns when measured with EVA. Although, these firms recorded positive mean of ROE (19.3%), positive mean of ROA (3.5%) and a positive mean of EPS (GHS 1.59). The positive 19.3% of ROE, 3.5% of ROA and GHS 1.59 EPS showed that these firms appear profitable but generated minimum negative ROE of -1,117.9%, minimum negative ROA of -91.6% and a minimum negative EPS of -170.9 cedis. The average MVA was rather found to be positive (6.891 units). On the issue of agency costs, the GSE-listed firms recorded average agency cost1 (expense ratio) of 1.619, which indicated that the average total expenses incurred by GES listed firms represented 162% of sales. This implies that there was a high presence of agency cost1 among GSE-listed firms during the period of study. This means agency cost1 is a real corporate governance problem in Ghana which needs attention from board of directors, shareholders, and regulators. The average agency cost2 (asset turnover) recorded by GSE-listed firms, on the other hand, was 0.866, indicating that the average asset turnover produced by GSE listed firms was 0.87 cedis (87 pesewas). This implies that for every 1 cedi invested in the assets, a GSE-listed firm produced 87 pesewas of sales, which was less than what was invested, therefore, not an efficient use of asset. The regression result showed a 1% significant positive relationship between liquidity and EVA and liquidity and MVA, indicating that positive EVA firms tend to be generally liquid firms, and positive MVA firms also tend to be liquid firms. However, contrary to expected sign, the results further showed that an increase in EVA was caused by a 51% increase in agency cost1 (expense ratio). This implies that to increase EVA, managers had to increase expense ratio (agency cost1). The implication is that these expenses could be in the form of incentives or productive administrative expenses. Agency cost1 is, therefore, a two-edged sword, such that high expenses may be an investment in productive administrative issues which increase EVA, or an indication of good incentives to employees which in turn motivate managers to work harder and generate positive EVA. In addition, when these expenses are channelled into productive use, they will generate positive EVA, positive MVA and positive ROE but will produce negative results, otherwise. Similar to the results on agency cost1, agency cost2 had a negative relationship with EVA. This indicates that an increase in asset turnover (lower agency cost) leads to a decrease in EVA. It implies that higher agency cost2 leads to an increase in EVA. Consistent with expected result, liquidity had a negative nexus with agency cost1, implying that an increase in expense ratio leads to a decrease in firms' liquidity. Finally, liquidity had a positive nexus with agency cost2, implying that an increase in asset turn over (higher agency cost) leads to an increase in liquidity. Conclusion is that high agency costs dissipate liquidity and can increase value or dissipate value depending on what is used for.

**Keywords:** Agency theory, agency costs, economic value-added, market value, liquidity

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## 1. Introduction

The primary objective of corporate finance is to maximize firms' value. Therefore, value creation for investors, both shareholders and debtholders, is generally the topmost priority of almost all board of directors who represent the interest of shareholders in regulating management (Gupta & Sikarwar, 2016 and Wahba, 2014). Shareholders, generally, are unable to control what the managers do, except indirectly through the board of directors, as elected representatives of the shareholders, therefore, directors are obligated to ensure that managers work to create value for shareholder and debtholders (Brealey, Myers & Allen, 2017, p.12; Damodaran, 2015, p.15) by managing the firm in a way that is consistent with the value-oriented theory by creating value for their shareholders. This tripartite relationship between shareholders, board of directors and the managers represent the agency relationship, where the shareholders represent the principals and the managers represent the agents. In this agency relationship, the agents are required to work to increase the principals' wealth. Lev (2018, p.465), however, contends that reported earnings of most firms no longer reflect the firm's performance.

Theoretically, it is the agency theory that moderates the relationship between the managers (agents) of a firm and the shareholders (principals) and debtholders (Brealey, Myers & Allen, 2017, p.302; Drake & Fabozzi, 2010, p.99; Jensen, 1986, p.323; Jensen & Meckling, 1976, p.7). The agency theory is basically a generic description of human behaviour (Rowe, 1982, p.364). Prior studies have established that the principal-agency employment contract is rife with problems of adverse selections or wrong choices due to undisclosed information, and moral hazards, inappropriate attitude as a result of hidden agendas; these factors compound the risk to investors. When the agents work to maximize shareholders' wealth then the spirit of the theory has been operationalized, otherwise, they create an agency problem.

The purpose of this study, therefore, is to apply two value-based performance metrics; economic value added (EVA) and market value added (MVA) to evaluate the real performance of the work of the agents (managers) and to evaluate whether managers of these firms operationalised the agency theory. This will then contribute to the theory of value-oriented management, also known as Value Based Management (VBM) by advancing knowledge on value-oriented financial performance management and reporting in accounting and finance. The objective of this paper is to examine the operationalization of the agency theory by managers and to analyse the nexus between agency costs and value creation leading to sustainability of firms' operation. This is imperative because continuous value creation leads to continuous survival, but agency costs is a threat to sustainability.

## 2. Literature Review

VBM is a management philosophy which contends that managers must focus on the creation, management, and measurement of corporate value. Thus, the three pillars of VBM are - creating value for investors, managing for value and measuring value. The Economic Value Added (EVA) metric of VBM has outstanding capabilities of realising these for managers and investors. In a study of South African firms, Hall (2017, p.442) found that value-based performance measures, such as EVA, is capable of explaining shareholder value creation better than the conventional accounting-based performance indicators such as ROA, NOPAT, ROE, and EPS. EVA is theoretically grounded such that to create value for investors, the returns on investments must be greater than the cost of capital, which eventually enhances a firm's value, as there is a clear correlation between cost of capital and firm performance. In order for managers' decisions to add value, the present value of the benefits resulting from their decisions must be greater than the associated costs. These costs, however, must comprise the weighted average cost of capital, which is, the average rate of return demanded by investors in the firm's

debt and equity financing (Brealey, Myers & Allen, 2017, p.221; Drake & Fabozzi, 2010, p.99). Nevertheless, when accounting for the cost of capital, the general practice is that, managers usually account for cost of debt only. This is due to the fact that lenders have first claim on the firm’s cash flow because they are promised definite cash payments for interest and principal repayment, whereas the shareholders, regarded as residual claimants, receive whatever cash left over, if any, after the creditors have been paid (Brealey et al., 2017, p.355). This practice is legally acceptable, although, financially it puts equity investors at a disadvantage; EVA can, therefore, be used to address this challenge. Value Based Management (VBM) theory opines that managers should focus on managing for value, therefore, be value-oriented. When these basics are implemented properly, a firm derives the benefits of maximizing value creation, steadily. This will, also increase transparency in the firm, thereby, helping the firm satisfy its global investors. The technique will also - align the interests of managers with those of shareholders and debtholders, facilitate communication with the firm’s investors and analysts, encourage value-creating investments as well as improve efficient allocation of resources. Forker and Powell (2008, p.494) found that compared to the residual income valuation model, conventional accounting financial performance practice is limited by their non-recognition of cost of equity capital ( $K_e$ ).

The EVA theoretical framework is depicted in Figure 1 below:



**Figure 1:** EVA theoretical framework

**Source:** Authors’ own

Contrary to the preceding divergent views of measuring financial performance, Chen and Dodd (1997, p.318) asserted that improving EVA performance is associated with a higher stock return and executives from firms that employ EVA, such as AT&T and Coca-Cola, have stated how very satisfied they are with EVA. Majority of subsequent studies on EVA confirmed its outstanding superiority over other conventional financial performance metrics (Zafiris & Bayldon, 1999; Worthington & West, 2001; Fountaine, Jordan & Phillips, 2008; Forker & Powell, 2008; Poll et. al., 2011; Sahoo & Pramanik, 2016; Gupta & Sikarwar, 2016; Hall, 2017; Agrawal, Mohanty & Totala, 2019; Tripathi, Kashiramka & Jain, 2019; Zhang & Aboud, 2019).

The proponents of EVA, Stern Stewart & Co. (1991), maintain that EVA is almost 50% better than its closest competitors, such as EPS, ROE and ROA, in measuring changes in shareholder wealth and value addition and therefore it is superior (Gupta & Sikarwar, 2016 and Worthington & West, 2001). In their study of listed firms in India, Agrawal, Mohanty and Totala (2019, p.127) found that EVA had a more significant impact on the annual stock returns compared to ROA and ROE for both OLS and mixed-effect models. In a similar study of South African firms, Hall (2017) found that economic-based value drivers were more significant than the traditional accounting-based value drivers in explaining shareholder value creation. The findings of Gupta and Sikarwar (2016, p.438) also indicated that EVA has more relevant and incremental information content than the conventional accounting measures for analysing shareholder value creation. Their results confirmed EVA is a better performance measure than the traditional accounting measures which then supports the position of Stern Stewart and Co. (1991).

### 3. Method

This study employed two metrics to measure agency costs; expense ratio used as proxy for agency cost1 and asset turnover used as proxy for agency cost2. Additional three metrics were used to measure financial performance, economic value added (EVA), market value added (MVA) and current ratio (liquidity).

#### 3.1 Data

The study period covered a ten-year period, from 2011 to 2020. Sources of data were predominantly from the financial statements from annual reports of firms listed on the Ghana Stock Exchange (GSE). Data analysis was purely quantitative, using statistical computations and multivariate regression analysis. The data were obtained from the financial statements of 27 firms listed on the GSE. Apart from data obtained from Bank of Ghana and Ghana Revenue Authority, extra data were obtained mainly from the statement of financial position (balance sheet) and the statement of financial performance (income statement) of these listed firms. The average commercial banks’ lending rates obtained from the Bank of Ghana were used as a proxy for cost of debt. Total number of shares outstanding and share prices were obtained from the GSE.

#### 3.2 Model Specification

This section provides the models used to analyse the data from JSE and GSE-listed firms. The objective was to run generalized least-square regressions with all N T observations, such that the regression parameters take values common to all cross-sectional units, for all time periods (Hsiao, 2003, p.14). The purpose was to test the operationalization of the agency theory (agencyCosts) by listed firms and to measure its effect on financial performance (EVA).

Similar to Wooldridge (2013, p.4), two empirical models have been constructed as follows:

$$EVA_{it} = \beta_0 + \beta_1 MVA_{it} + \beta_2 iSpread_{it} + \beta_3 ROE_{it} + \beta_4 ROA_{it} + \beta_5 BIG4_{it} + \beta_6 EPS_{it} + \beta_7 LEV_{it} + \beta_8 ROCE_{it} + \beta_9 Liquid_{it} + \beta_{10} AgenCost1_{it} + \beta_{11} AgenCost2_{it} + \beta_{12} FinDistress_{it} + \beta_{13} BoDSize_{it} + \sum_{i=14}^{15} \phi controls_{it} + \lambda_t + \mu_i + \varepsilon_{it} \dots \dots \dots \text{model 1}$$

$$Liquidity_{it} = \beta_0 + \beta_1 EVA_{it} + \beta_2 MVA_{it} + \beta_3 Spread_{it} + \beta_4 ROE_{it} + \beta_5 ROA_{it} + \beta_6 BIG4_{it} + \beta_7 EPS_{it} + \beta_8 Lev_{it} + \beta_9 ROCE_{it} + \beta_{10} AgenCost1_{it} + \beta_{11} AgenCost2_{it} + \beta_{12} FinDistress_{it} + \beta_{13} BoDSize_{it} + \sum_{i=14}^{15} \phi controls_{it} + \lambda_t + \mu_i + \varepsilon_{it} \dots \dots \dots \text{model 2}$$

$$EVA = \text{Income Earned} - \text{Total Capital Invested} \times \text{Cost of Capital}$$

$$EVA = \text{NOPAT} - [\text{TCI} \times \text{WACC}]$$

NOPAT denote net operating profit after tax

$$\text{NOPAT} = \text{PAT} + (\text{Interest Charge} \times (1 - T_c))$$

Similar to Makhija and Trivedi (2020) and ACCA (2019), WACC is estimated as;

$$\text{WACC} = \left[ \left( K_e \times \frac{E}{V} \right) \right] + \left[ \left( K_d (1 - T_c) \times \frac{D}{V} \right) \right]$$

where:

$K_e$  = required rate of return on equity finance (cost of equity)

$K_d(1-T_c)$  = after tax rate of return on *debt* finance (Drake and Fabozzi, 2015, p.470)



$K_d$  is proxied by average commercial banks’ lending rate obtained from Bank of Ghana

$D = \text{total debt capital}$

$T_c = \text{corporate tax rate.}$

$E = \text{total equity capital.}$

$V = D + E$

The cost of equity in this study was computed using the Capital Asset Pricing Model (CAPM), similar to Brealey, Myers and Allen (2017, p.166).

$K_e = R_f + \beta(R_m - R_f)$

$K_e = \text{cost of equity for each firm (expected stock return)}$

$R_f = \text{risk free rate, which is proxied by the one-year Treasury Bill rate}$

$R_m = \text{expected market rate of return}$

$R_m = R_f + \text{normal risk premium}$

**Table 1:** Dataset

| Variables                            | Symbol     | Source                                    |
|--------------------------------------|------------|---|
| Economic Value Added                 | EVA        | Self-calculated from financial statements |
| Market Value Added                   | MVA        | Self-calculated from financial statements |
| Investment Spread                    | Spread     | Self-calculated from financial statements |
| Return on Equity                     | ROE        | Self-calculated from financial statements |
| Return on Asset                      | ROA        | Self-calculated from financial statements |
| Global Biggest four Accounting Firms | BIG4       | Obtained from financial statements        |
| Earnings Per Share                   | EPS        | Self-calculated from financial statements |
| Leverage                             | LEV        | Self-calculated from financial statements |
| Return on Capital Employed           | ROCE       | Self-calculated from financial statements |
| Liquidity (Current Ratio)            | Liquid     | Self-calculated from financial statements |
| Agency Cost1 (Expense Ratio)         | AgenCost1  | Self-calculated from financial statements |
| Agency Cost2 (Asset Turnover)        | AgenCost2  | Self-calculated from financial statements |
| Financial Distress (Z-Score)         | FinDistres | Self-calculated from financial statements |
| Size of Board of Directors           | BoDsIZE    | Obtained from financial statements        |
| Size of total asset of firm          | FirmSize   | Self-calculated from financial statements |

Source: Authors’ own

#### 4. Empirical Results

To be certain of the validity of the results, diagnostic checks were performed to ensure that the assumptions of multiple regression analysis were not violated. The diagnostic test results include - linearity in parameters, multicollinearity among the predictor variables, homoscedasticity or constant variance of residuals, and endogeneity or no covariance between the error term and the independent variables and issues of outliers were also checked. EVA is an absolute indicator, hence, it reflects the size of the firm as a whole. This means the absolute figure would produce a larger EVA value which will be prone to heteroscedasticity. It was therefore appropriate to normalize the absolute EVA figure by using the economic value-added rate of return, which divides the EVA by the TCI (Zhang and Aboud, 2019, p.604). To reduce the heteroscedasticity in the data, all the EVA figures were deflated, by converting the absolute values into ratios (Makhija & Trivedi, 2020).

#### 4.1 Descriptive Statistics

The descriptive statistics results showed that the minimum EVA was -5.946 units, maximum was 7.728 units and on average, listed firms on the Ghana stock Exchange (GSE) generated a negative EVA (-3.891 units). This implied that on average, listed firms on the GSE did not create value to its shareholders, but rather destroyed value; meaning, return on capital employed has been lower than the cost of capital employed by these firms. The implication is that although these firms may look profitable when measured with the conventional accounting performance measures, they actually generated negative returns when measured with EVA. These findings are consistent with Wilson (2008) and Durant (1999) and this was confirmed by - the positive mean of ROE (19.3%), positive mean of ROA (3.5%) and positive mean of EPS (1.59 cedis). The positive 19.3% of ROE, 3.5% of ROA and the positive mean of 1.59 cedis EPS actually showed that these firms are profitable. However, Durant (1999) particularly argued that under the generally-accepted accounting principles, most firms appear to be profitable, yet, many actually destroy shareholder wealth because they earn less than the full costs of capital employed but EVA overcomes this problem by explicitly recognizing that when capital is employed it must be paid in full. To confirm this further, a careful look at the GSE firms minimum results showed that they all actually generated negative minimum returns. For instance, the firms generated minimum negative ROE of -1,117.9%, minimum negative ROA of -91.6% and a minimum negative EPS of -170.9 GHS.

**Table 2:** Descriptive statistics

| Variable                   | Obs | Mean    | Std. Dev. | Min     | Max      |
|----------------------------|-----|---------|-----------|---------|----------|
| EVA                        | 265 | -3.891  | 8.857     | -5.946  | 7.728    |
| MVA                        | 270 | 6.891   | 5.559     | -1.131  | 7.692    |
| Spread                     | 256 | 0.025   | 0.19      | -0.916  | 2.12     |
| ROE                        | 256 | 0.193   | 1.735     | -11.179 | 16.283   |
| ROA                        | 265 | 0.035   | 0.173     | -0.916  | 1.229    |
| BIG4                       | 270 | 0.77    | 0.421     | 0       | 1        |
| EPS                        | 269 | 1.159   | 20.687    | -170.9  | 81       |
| Leverage                   | 267 | 0.807   | 0.575     | -0.552  | 6.171    |
| ROCE                       | 267 | 0.041   | 0.133     | -0.954  | 0.58     |
| Liquidity                  | 270 | 1.775   | 6.396     | 0.018   | 94.283   |
| AgenCost1 (Expense ratio)  | 266 | 1.619   | 26.405    | 15.222  | 430.114  |
| AgenCost2 (Asset turnover) | 266 | 0.866   | 1.178     | -0.098  | 5.813    |
| FinDistress (Z-score)      | 268 | 212.525 | 2177.504  | -4.183  | 31002.36 |
| Board Size                 | 270 | 8.963   | 2.296     | 3       | 15       |
| Firm Size                  | 269 | 20.179  | 2.401     | 13.451  | 23.979   |
| Firm Age                   | 270 | 40.456  | 25.619    | 2       | 124      |

Consistent with DeWet (2005) who found that EVA did not show the strongest correlation with MVA, the average MVA in this present study were, rather, positive (6.891 units). This is consistent with expectation because MVA represents performance at the market level and is influenced by a firm’s information, news and announcements. Positive information or news will generate positive MVA and negative information or news will generate negative MVA. Since information on ROE, ROA and EPS are readily available and they were positive and investors trade on available information, it is, therefore, understandable that the average MVA was positive just as the average ROE, ROA and EPS. The minimum MVA was -1.131 unit, the maximum was 7.692 units and the average was 6.891. This implied that, on average, GSE firms generated positive MVA.

Contrary to expectation, the firms recorded an average spread of 2.5% with a minimum spread of negative -92% and a standard deviation of 19%. The negative minimum spread was consistent with EVA and the positive average spread was consistent with MVA. The firms

recorded average 81% leverage indicating that GSE listed firms are highly levered and operate with high levels of debt-financing, exposing them to higher risks of financial distress. The firms also recorded a positive 4% return on capital employed and average liquidity (current ratio) of 1.8 times. This indicates that even though highly levered, GSE-listed firms are capable of settling their current liabilities as they fall due.

On the issue of agency costs, the GSE-listed firms recorded average agency cost1 (expense ratio) of 1.619, which indicates that the average total expenses incurred by GSE-listed firms represent 162% of sales. This implied that there is a high presence of agency cost1 among GSE-listed firms during the period of study. This means agency cost1 is a real corporate governance problem in Ghana which needs attention from board of directors, shareholders and regulators. This explains why the firms recorded negative EVA. The average agency cost2 (asset turnover) recorded by GSE listed firms, on the other hand was 0.866, indicating that the average asset turnover produced by GSE-listed firms was 0.87 cedis (87 pesewas). This implies that for every 1 cedi invested in the assets, a GSE-listed firm produces 87 pesewas of sales, which was less than what was invested, therefore, not an efficient use of asset.

On the issue of financial distress, the maximum Z-score for the GSE-listed firms was 31002.36 which was far above the threshold of 2.99, indicating that these firms listed on the GSE fall within the safe zone and are certain to succeed. The minimum Z-score, however, was -4.183, which was below the 2.99 threshold and therefore indicate that some GSE -isted firms are in financial distress, they fall within the danger zone and are likely to fail. This minimum -4.183 explains the cause of the failed Ghanaian firms between the period of 2017 and 2018 and those that are currently in financial distress. The regulators, Bank of Ghana, the Ghana Stock Exchange and the Securities and Exchange Commission should keep a watchful eye on these firms; notwithstanding this, the average Z-score of the GSE-listed firms was 212.525, which was above the 2.99 threshold. According to Altman (1968), a score between 1.81 to 2.99 cannot be classified as - certain to fail or certain to succeed - hence, it falls within a zone of ignorance. Correia, Flynn, Uliana, Wormald and Dillon (2015) classify the Z-score barriers as;  $Z > 2.60$ =Safe Zone,  $1.10 < Z < 2.60$ = Grey or Danger Zone, and  $Z < 1.10$ =Distress or Fail Zone. This result, therefore, imply that on average, GSE-listed firms fall within the ‘safe zone’, and they are most likely to succeed.

The results showed an average board size of 9, the minimum was 3 and maximum 15. This indicates that on average board members of listed firms on the GSE are 9 members. The average firm age was 40, minimum time of existence was 2 and maximum 124, indicating that on average listed firms on the GSE were 40 years.

## **4.2. Regression Results**

The regression results showed a negative relationship between normalize EVA and normalized MVA (significant at 1%), indicating that for the Ghanaian-listed firms, an increase in MVA led to a decrease in EVA and although contrary to expected sign, this was consistent with the results from the South African data. Theoretically, an increase in EVA should lead to corresponding increase in MVA because MVA is the present value of future EVA, but these results showed the contrary. Consistent with the South African results, a more careful analysis showed that the relationship between MVA and EVA was not bi-causal. This implied that in practice, an increase in EVA will lead to an increase in MVA, however, an increase in MVA does not necessarily lead to an increase in EVA. This is practical because EVA is based on internal productivity whereas MVA is based market trading driven by information regarding internal productivity. An increase in internal productivity and real value added (EVA) will be well understood by investors to mean good financial performance and therefore it will lead to an increase in MVA. An increase in MVA, however, will not necessarily increase internal

productivity (EVA), rather, since MVA is the present value of future EVA, a present increase in MVA will have a corresponding decrease in present EVA (lower EVA) if investors believe that future EVA will be higher.

**Table 3:** Multivariate regression results with EVA as dependent variable (Model 1)

| NormEVA            | Coef.  | St.Err.    | t-value | p-value           | [95% Conf | Interval] | Sig |
|--------------------|--------|------------|---------|-------------------|-----------|-----------|-----|
| NormMVA            | -0.023 | 0          | -90.07  | 0                 | -0.023    | -0.022    | *** |
| iSpread            | 0.411  | 0.004      | 101.49  | 0                 | 0.403     | 0.419     | *** |
| ROE                | 0      | 0          | -3.28   | 0.001             | -0.001    | 0         | *** |
| ROA                | 0.144  | 0.003      | 45.67   | 0                 | 0.138     | 0.15      | *** |
| BIG4               | 0.013  | 0.002      | 7.81    | 0                 | 0.01      | 0.016     | *** |
| EPS                | 0.001  | 0          | 46.47   | 0                 | 0.001     | 0.001     | *** |
| Leverage           | 0.039  | 0.001      | 68.86   | 0                 | 0.038     | 0.04      | *** |
| ROCE               | 0.186  | 0.003      | 66.23   | 0                 | 0.18      | 0.191     | *** |
| Liquidity          | 0.001  | 0          | 12.72   | 0                 | 0         | 0.001     | *** |
| AgenCost1          | 0      | 0          | 50.10   | 0                 | 0         | 0         | *** |
| AgenCost2          | -0.014 | 0.001      | -24.61  | 0                 | -0.015    | -0.013    | *** |
| Z-score            | 0.006  | 0          | 89.65   | 0                 | 0.005     | 0.006     | *** |
| BoardSize          | 0.013  | 0          | 60.04   | 0                 | 0.012     | 0.013     | *** |
| FirmSize           | -0.029 | 0          | -59.30  | 0                 | -0.03     | -0.028    | *** |
| Constant           | 0.269  | 0.012      | 23.20   | 0                 | 0.247     | 0.292     | *** |
| Mean dependent var |        | -0.105     |         | SD dependent var  |           | 0.202     |     |
| Overall r-squared  |        | 0.948      |         | Number of obs     |           | 245       |     |
| Chi-square         |        | 695065.619 |         | Prob > chi2       |           | 0.000     |     |
| R-squared within   |        | 1.000      |         | R-squared between |           | 0.767     |     |

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

There was also a 1% significant positive relationship between normalized EVA and spread, EVA and ROA, EVA and BIG4, EVA and EPS, EVA and Leverage, EVA and ROCE, and EVA & Liquidity. The implication was that an increase in a firm`s spread led to - an increase in its EVA, an increase in its ROA will increase EVA, an increase in its EPS will increase EVA, an increase in its return on capital employed (ROCE) will increase EVA and an increase in its liquidity will increase EVA. This means EVA has a general positive effect on all these performance indicators. The nexus between EVA and BIG4 implied that GSE-listed firms audited by any of the BIG4 accounting firms tend to generate positive EVA. This could be because stringent application of IFRS and IAS standards leads to value creation for investors, therefore, when the BIG4 ensured application of IFRS and IAS, they helped these firms to achieve a positive EVA.

There was a positive nexus between EVA and website reporting, EVA and Z-score, and EVA & Board size. The implication was that when GSE-listed firms generate positive EVA, they tend to increase their website reporting; when they generate positive EVA, they tend to increase their z-score, avoid failure, move to a safe zone and become certain to succeed. In addition, GSE firms with large board size tend to generate positive EVA and this could be caused by the diverse experience and knowledge of the board members. There was a significant negative relationship between EVA and agency cost and EVA and firm size. The implication of these was that GSE-listed with high agency cost tend to generate less EVA, and big firms generate less EVA. That means high agency cost dissipates value created.

#### Model 2 Results

The objective here was to test the relationship between Liquidity as dependent variable and the independent variables. The results from this model (5.3) showed an overall R2 of 100% and overall model significance of 1% (Prob > F =0.00).

**Table 4:** Multivariate regression results with liquidity as the dependent variable (Model 2)

| Liquidity          | Coef.             | St.Err. | t-value              | p-value   | [95% Conf | Interval] | Sig |
|--------------------|-------------------|---------|----------------------|-----------|-----------|-----------|-----|
| NormEVA            | 1966.318          | 0       | 11003822.36          | 0         | 1966.318  | 1966.319  | *** |
| NormMVA            | 44.524            | 0       | 10823457.07          | 0         | 44.524    | 44.524    | *** |
| Spread             | -809.893          | 0       | -10929467.77         | 0         | -809.893  | -809.893  | *** |
| ROE                | 0.609             | 0       | 1852313.62           | 0         | 0.609     | 0.609     | *** |
| ROA                | -286.474          | 0       | -10564079.81         | 0         | -286.474  | -286.474  | *** |
| BIG4               | -29.47            | 0       | -6393486.85          | 0         | -29.47    | -29.47    | *** |
| EPS                | -1.307            | 0       | -10624326.20         | 0         | -1.307    | -1.307    | *** |
| Leverage           | -71.403           | 0       | -10750483.38         | 0         | -71.403   | -71.403   | *** |
| ROCE               | -361.504          | 0       | -10823890.59         | 0         | -361.504  | -361.504  | *** |
| AgenCost1          | -0.871            | 0       | -10686810.95         | 0         | -0.871    | -0.871    | *** |
| AgenCost2          | 27.306            | 0       | 9735548.25           | 0         | 27.306    | 27.306    | *** |
| Z-score            | -10.865           | 0       | -10822129.02         | 0         | -10.865   | -10.865   | *** |
| BoardSize          | -25.892           | 0       | -10805459.09         | 0         | -25.892   | -25.892   | *** |
| FirmSize           | 70.759            | 0       | 10673326.11          | 0         | 70.759    | 70.759    | *** |
| Firm Age           | -3.279            | 0       | -7867213.37          | 0         | -3.279    | -3.279    | *** |
| Constant           | -659.655          | 0       | -10073681.37         | 0         | -659.655  | -659.655  | *** |
| Mean dependent var | 1.707             |         | SD dependent var     | 6.605     |           |           |     |
| R-squared          | 1.000             |         | Number of obs        | 245       |           |           |     |
| F-test             | 7147530710410.818 |         | Prob > F             | 0.000     |           |           |     |
| Akaike crit. (AIC) | -5090.688         |         | Bayesian crit. (BIC) | -5031.166 |           |           |     |

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

The regression result showed a 1% significant positive relationship between liquidity and EVA and liquidity and MVA, indicating that positive EVA firms tend to be generally liquid firms, and positive MVA firms also tend to be liquid firms. There was a positive nexus between liquidity and ROE, liquidity and agency cost2 as well as liquidity and firm size. These indicated that GSE firms which generated positive ROE tend to be liquid, and GSE-listed firms which increased their asset turnover (agency cost2) used their assets efficiently and therefore tend to be liquid and that big firms generally tend to be liquid firms.

Liquidity, however, tend to have a significant negative relationship with spread, ROA, BIG4, EPS, leverage, ROCE, webreport, agency cost1, z-score, board size, and firm age. The implication of this is that, spread is the difference between the rate funds are obtained and the returns generated from these funds. A positive spread is supposed to lead to increase liquidity, however, if the profit is dissipated or the firm incurs high expense ratio, then the relationship between spread and liquidity will be negative. Liquidity can also reduce because of investment in less profitable projects due to complacency; this then leads to lower return on assets, lower earnings per share and lower return on capital employed. The results showed that firms audited by the BIG4 tend to be less liquid because they must ensure fair play and make normal profit. The negative nexus between liquidity and leverage was due to the fact that debt financing comes with the obligation to pay interest which reduces liquidity. Higher webreport increases transparency, which will include disclosure of both good and bad news; disclosure of bad news generally reduces liquidity. Agency cost1(expense ratio) reduces liquidity because funds that are supposed to be available for shareholders or for investments are being dissipated or spent, therefore, firms can have lower z-score and gradually fall into the financial distress zone. Finally, firms with smaller board size tend to be liquid and younger firms tend to have more potential to be liquid.

### 4.3. Analysis

The preceding results show that on average, listed firms on the Ghana Stock Exchange (GSE) generated a negative EVA (-3.891 units). This implied that on average, listed firms on the GSE did not create value for its shareholders, but rather destroyed value. Another implication was

that, even though these firms may look profitable when measured with the conventional accounting performance measures, they generated negative returns when measured with EVA, although, these firms recorded positive mean of ROE (19.3%), positive mean of ROA (3.5%) and a positive mean of EPS (GHS 1.59). The positive 19.3% of ROE, 3.5% of ROA and GHS 1.59 EPS showed that these firms appear profitable but generated minimum negative ROE of -1,117.9%, minimum negative ROA of -91.6% and a minimum negative EPS of -170.9 cedis. The average MVA was rather found to be positive (6.891 units).

On the issue of agency costs, the GSE-listed firms recorded average agency cost1 (expense ratio) of 1.619, which indicated that the average total expenses incurred by GSE listed firms represent 162% of sales. This implied that there was a high presence of agency cost1 among GSE-listed firms during the period of study. This means agency cost1 is a real corporate governance problem in Ghana which needs attention from board of directors, shareholders, and regulators. The average agency cost2 (asset turnover) recorded by GSE-listed firms, on the other hand, was 0.866, indicating that the average asset turnover produced by GSE listed firms was 0.87 cedis (87 pesewas). This implied that for every 1 cedi invested in the assets, a GSE-listed firm produced 87 pesewas of sales, which was less than what was invested, therefore, not an efficient use of asset.

GSE firms audited by BIG4 tend to generate positive EVA; they also tend to generate positive EPS, increase their liquidity, tend to increase their website reporting, and score higher in  $WDI_{scale}$ , PUDI and UDI. GSE firms which increased their asset turnover (lower agency cost2) tend to generate positive EVA, which meant management efficiency generated or increased EVA. The positive correlation between EVA and agency cost2 (expense ratio) implied that probably management expenses motivate employees and serve as incentive for them to work harder and generate positive EVA. The significant correlation between EVA and Z-score implied that the listed firms that generated positive EVA fall within the safe zone and are certain to succeed.

An increase in a GSE firm's spread led to - an increase in its EVA, an increase in its ROA increased EVA, an increase in its EPS increased EVA, an increase in its return on capital employed (ROCE) increased EVA and an increase in its liquidity increased EVA. This means that EVA has a general positive effect on all these performance indicators. The nexus between EVA and BIG4 implied that GSE-listed firms, audited by any of the BIG4 accounting firms tend to generate a positive EVA. This could be because stringent application of IFRS and IAS standards leads to value creation for investors, therefore, when the BIG4 ensured application of IFRS and IAS, they helped these firms to achieve positive EVA. In addition, there was a positive nexus between EVA and website reporting, EVA and Z-score, and EVA and Board size. The implication is that when GSE-listed firms generate positive EVA, they tend to increase their website reporting and when they generate positive EVA, they tend to increase their z-score, avoid failure, move to a safe zone and become certain to succeed. GSE-listed firms with high agency cost tend to generate less EVA, meaning that high agency cost dissipated value created.

The regression result showed a 1% significant positive relationship between liquidity and EVA and liquidity and MVA, indicating that positive EVA firms tend to be generally liquid firms, and positive MVA firms also tend to be liquid firms. An increase in EVA was caused by a 51% increase in agency cost1 (expense ratio); this implied that to increase EVA, managers must increase expenses (agency cost1). These expenses could be in the form of incentives or administrative expense. Agency cost1 is, therefore, a two-edged sword, such that high expenses may be an indication of good incentives to employees which in turn motivate managers to work harder and generate positive EVA. In addition, when these expenses are channelled into

productive use, they will generate positive EVA, positive MVA and positive ROE but will produce negative results, otherwise.

## 5. Conclusion

GSE firms audited by BIG4 tend to generate positive EVA, which in turn generated positive EPS, goes on to increase their liquidity, tend to increase their website reporting, and score higher in WDI scale, PUDI and UDI. In addition, GSE firms that increase their asset turnover (lower agency cost<sup>2</sup>) tend to generate positive EVA, which meant that management efficiency generated or increased EVA. EVA had a general positive effect on all these performance indicators. On average, GSE firms scored 74% on website reporting indicating that majority of GSE-listed firms disclosed substantial financial statements online. The study found that *agency costs can increase value (EVA) or dissipate value depending on what it is used for. High agency costs dissipate liquidity and causes financial distress.*

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# Monetary Union in the GCC Area: An Assessment of Sources of Macroeconomic Fluctuations

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## Abstract

The Gulf Cooperation Council (GCC) countries are undertaking plans to form a monetary union and issue a single currency in future. Using a structural VAR model, this anticipatory paper examines the sources of macroeconomic shocks and analyzes their impacts on the region’s economies hypothesized as a single bloc. The findings suggest that the hypothesized GGC union has a modest impact on world real oil prices in the short-run. Supply shocks have sizable effects on the GCC output movements, while terms of trade shocks seem to explain movements in the real exchange rate and the price level. The results should be of interest to individual GCC country policy-makers and financial market participants who can use them as a baseline scenario before they embark on creating a monetary union and introducing a common currency.

**Keywords:** shocks, impulse response, variance decomposition, monetary union

## 1. Introduction

The six members of the Gulf Cooperation Council (GCC)—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE--formed a customs union to increase economic integration among them. “They made plans to create a monetary union and introduce a single currency. The creation of a monetary union will necessitate a modification of GCC members’ economic structures, fiscal policies, and monetary regimes. The introduction of a pan-GCC common currency would also strengthen financial integration and create a single capital market in the region.

As a forward-looking study, this anticipatory paper hypothesizes the GCC countries as a single monetary union and thus constructs weighted averages of key macroeconomic variables across the GCC members<sup>2</sup>. The objective is to assess the roles of macroeconomic shocks: terms of trade, aggregate supply, trade balance, aggregate demand and monetary changes as sources of macroeconomic fluctuations in the GCC-wide economic system. The results of this study should be of interest to individual GCC member’ policy-makers and financial market participants [for use as a baseline scenario] before embarking on the creation of monetary union and introduction of a common currency.

Examining the sources of economic fluctuations [in the GCC economic system] on the bases of constructed macroeconomic variables may raise some concerns pertaining to the validity of the results. Asymmetry of economic structures among participating countries if it exist may raise scepticism over the relevance of the constructed weighted average variables to represent the union-wide economic system. One possible reason for the scepticism is the relevance of the constructed variables relationship for the whole union with each participating country if indeed asymmetric economic structures exist. Another reason for the scepticism is the possible distortion in the data resulting from aggregation (Monticelli and Tristani, 1999). While the above argument may in fact have some merit, the GCC countries are nonetheless quite similar

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<sup>2</sup> The weighted average of the GCC countries’s GDPs is constructed based on the 2018 GDP and PPP exchange rates.

in terms of the dominance of oil and gas in the overall economy, similarities of economic structures and trade patterns, and the likelihood of experiencing symmetric shocks.

In the literature on monetary unions, Frankel and Rose (1997) reason that as the European countries enter into a monetary union, the structures of their economies will change, and therefore the suitability of these countries for joining the monetary union can not be judged on the bases of historical data. Furthermore, Fatas (1997) argues that asymmetric business cycles can come from two different sources. First, regional specialization in different product mixes will lead to asymmetries due to the existence of industry-specific shocks. Second, economic policy can play a key role in regional economic stability as policy differences can impact regional business cycles asymmetrically. In contrast, in the GCC area all member states share a common production base dominated by oil, gas, and their related products. Additionally, the coordination of economic policies dates back to the inception of the GCC in 1981. It follows that although there will be some bias from constructing the union-wide series, it would be small due to similarities in production base, harmonization of fiscal and monetary policies, and coordination of laws and regulations. Moreover, one has to consider the advantages of pre-emptive assessments of the impacts of macroeconomic shocks on the union-wide economic system over waiting for a long time for the pan-GCC data to be available to do the analysis.

The literature on theory of common currency areas (OCA) pioneered by Mundell (1961) and subsequent work by McKinnon (1963) and Kenen (1969) suggests several criteria for the suitability of a common monetary arrangement. The criteria include symmetry of underlying macroeconomic shocks, factor mobility, openness, fiscal redistribution schemes and real wage flexibility, among others. More recent authors emphasize the need for a supra-national government body to conduct interregional transfers (De Grauwe (1997). Frankel and Rose (1997 and 1998), Corsetti and Pesenti (2002), and De Grauwe and Mongelli (2005), among others, examine the endogeneity of the optimum currency area (OCA). They confirm that monetary unions lead to significant increases in trade integration. For example, Frankel and Rose (1997 and 1998) argue that even if a country does not meet OCA criteria *ex ante*, the increase in trade within the monetary union resulting from the common currency may qualify this country to satisfy the OCA criteria *ex post*.

The GCC economies seem to be fairly integrated in terms of economic structures and trade. The GCC members have a remarkable degree of monetary and fiscal convergence, low inflation in all member states, and narrow movements in short-term interest rates. These members have highly open economies and a high degree of labour and capital mobility within the GCC region. Furthermore, the GCC countries have established a broad range of institutions to support the economic integration process. The aforementioned factors support the views that the GCC is more likely to experience symmetric shocks and make the monetary union feasible.

The study will use a macroeconomic model and structural Vector Autoregression (SVAR) methods to assess the roles of terms of trade, aggregate supply, trade balance, aggregate demand, and monetary shocks in effecting macroeconomic fluctuations in the GCC area. Specifically, we will try to answer the following questions: to what extent do the GCC countries influence and “to what extent are they influenced by” real oil prices? What are the principle determinants of fluctuations in the GCC GDP? What are the sources of fluctuations in prices and real exchange rates in the GCC region?

The balance of the paper is organized as follows: section 2 provides an overview of the GCC economy. Section 3 describes the model and identifies the shocks. Section 4 reports the estimation results. Section 5 reports the estimation results of the role of oil production. Section 6 provides the main conclusions.

## 2. An Overview of the GCC Economies

Although some of the GCC countries have been to some extent successful in diversifying their production base, oil production still continues to be a key element of their output (Table 1). This table shows that the oil sector still accounts for about 33.5% of the combined GCC GDP and over 79 percent of government revenues over the period 2000-15. The table also shows that the GCC share of world oil production account for 21.5 percent. It also shows that the GCC member countries had a remarkable growth rate with modest inflation rate over the period 2000-015.

**Table 1:** Selected macroeconomic indicators for the GCC as a one bloc (2010-15)

|                                      | Bahrain | Kuwait | Oman  | Qatar | Saudi Arabia | UAE   | The GCC |
|--------------------------------------|---------|--------|-------|-------|--------------|-------|---------|
| Nominal GDP (\$billion)              | 31.1    | 114.6  | 78.7  | 161.7 | 669.5        | 370.3 | 1,425.9 |
| GDP Growth Rate (%/year)             | 2.5     | 0.6    | 5.1   | 4.8   | 4.7          | 6.8   | 4.1     |
| CPI Inflation Rate (%/year)          | 1.9     | 3.8    | 0.3   | 1.0   | 1.2          | 4.1   | 2.1     |
| Current Account Balance (\$billion)  | -0.75   | 4.1    | -10.9 | 13.8  | -56.7        | 17.6  | -32.9   |
| Current Account / GDP (%)            |         |        |       |       |              |       |         |
| % of Oil in Total Real GDP           | 15.3    | 36.8   | 32.3  | 57.7  | 32.6         | 30.3  | 33.5    |
| % of Oil in Total Government Revenue | 71.5    | 74.1   | 83.4  | 68.8  | 70.1         | 76.4  | 74.1    |
| Share in World Oil Production (%)    | 21.5    | 21.0   | 20.2  | 22.0  | 21.9         | 22.6  | 21.5    |
| Share in World Gas Production (%)    | 0.4     | 0.4    | 0.6   | 1.2   | 2.3          | 1.7   | 6.5     |
| Share of the GCC GDP (%)             | 2.4     | 11.4   | 5.6   | 5.6   | 53.7         | 21.4  |         |

**Sources:** International Financial Statistics (IFS), World Economic Outlook (WEO), Oil and Gas production figures, British Petroleum ([www.bp.com](http://www.bp.com)) for all except Bahrain from Energy Information Administration ([www.eia.doe.gov](http://www.eia.doe.gov))

**Note:** the calculations of the weighted average of national output, weights for each country based on 2000 GDP and PPP exchange rates.

The individual members’ as well as a single bloc exports trade pattern within the GCC region and with other countries and regions are provided in Table 2. Excepting Bahrain, GCC exports are concentrated in Asia. But imports seem to be concentrated in the European Union, accounting for about 32 percent for the GCC as a bloc. The table also shows that the GCC countries have highly open economies as evidenced by the high ratios of imports and exports to GDP. Furthermore, the table shows that intraregional trade between the GCC countries is fairly limited<sup>3</sup>.

<sup>3</sup> Jaderesic (2002) suggests that excluding crude and refined of products, the share of intra-trade within the GCC increases to about 34%.

**Table 2:** Direction of the GCC countries Trade (2010-15)

| Country/Region            | Bahrain | Kuwait | Oman | Qatar | Saudi Arabia | United Arab Emirates | The GCC |
|---------------------------|---------|--------|------|-------|--------------|----------------------|---------|
| Exports <sup>4</sup>      |         |        |      |       |              |                      |         |
| Within the GCC            | 6.7     | 1.6    | 10.0 | 5.1   | 4.8          | 5.5                  | 5.1     |
| Middle East               | 8.3     | 3.3    | 16   | 5.9   | 8.1          | 11.3                 | 8.5     |
| United States             | 3.5     | 12.5   | 3    | 2.1   | 18.3         | 2.0                  | 12.0    |
| European Union            | 3.9     | 11.0   | 3    | 3.0   | 16.2         | 8.1                  | 12.1    |
| Japan                     | 1.9     | 22.1   | 16   | 43.1  | 16.0         | 26.8                 | 20.2    |
| Asia (Ex. Japan)          | 9.3     | 49.0   | 60   | 36.8  | 33.1         | 31.4                 | 35.7    |
| Total Exports (\$Billion) | 10.7    | 21.7   | 12.2 | 15.3  | 94.3         | 54.9                 | 209.0   |
| Exports/GDP               | 79.2    | 29.0   | 39.6 | 44.4  | 30.4         | 42.3                 | 35.3    |
| Imports <sup>5</sup>      |         |        |      |       |              |                      |         |
| Within the GCC            | 37.2    | 11.3   | 30.3 | 14.9  | 7.5          | 4.2                  | 10.2    |
| Middle East               | 38.4    | 16.2   | 32.0 | 16.9  | 6.8          | 6.9                  | 10.6    |
| United States             | 9.2     | 13.4   | 6.1  | 11.2  | 13.7         | 7.7                  | 11.7    |
| European Union            | 25.0    | 35.0   | 23.6 | 39.2  | 31.2         | 33.7                 | 32.0    |
| Japan                     | 6.5     | 9.1    | 16.4 | 9.4   | 9.0          | 7.1                  | 9.0     |
| Asia (Ex. Japan)          | 12.3    | 16.5   | 14.2 | 15.6  | 22.0         | 33.8                 | 22.9    |
| Total Imports (\$Billion) | 4.8     | 10.6   | 6.8  | 5.4   | 46.7         | 49.7                 | 124.0   |
| Imports/GDP               | 36      | 14     | 22   | 16    | 15           | 38                   | 21      |

Sources: Direction of Trade Statistics, IMF

Table 3 shows that the GCC countries not only have stable and low inflation, but also have a significant correlation of inflation averaging around 50 percent. Excepting Oman, the correlations of output growth between the member states seem modest, but they seem to have higher correlations with the GCC as a bloc.

**Table 3:** Correlations of the GCC output growth and inflation (2010-15)

|                   | Bahrain | Kuwait | Oman  | Qatar | Saudi Arabia | UAE   | GCC   |
|-------------------|---------|--------|-------|-------|--------------|-------|-------|
| Bahrain           | ----    | 0.26   | 0.13  | 0.00  | 0.14         | 0.14  | 0.29  |
| Kuwait            | 0.33    | ----   | -0.20 | 0.37  | -0.18        | 0.09  | 0.33  |
| Sultanate of Oman | 0.22    | 0.63   | ----  | -0.28 | -0.27        | -0.13 | -0.28 |

<sup>4</sup> In (%) of total exports

<sup>5</sup> In (%) of total imports

|                      |      |      |      |      |      |      |      |
|----------------------|------|------|------|------|------|------|------|
| Qatar                | 0.45 | 0.41 | 0.45 | ---- | 0.20 | 0.20 | 0.47 |
| Saudi Arabia         | 0.52 | 0.54 | 0.43 | 0.39 | ---- | 0.30 | 0.81 |
| United Arab Emirates | 0.51 | 0.12 | 0.46 | 0.51 | 0.39 | ---- | 0.60 |
| GCC                  | 0.61 | 0.67 | 0.66 | 0.58 | 0.93 | 0.60 | ---- |

**Note:** Correlations of output growth are above the diagonal and correlations of the inflation are below the diagonal

**Table 4:** Correlations of the GCC supply and demand shocks

|                      | Bahrain | Kuwait | Oman  | Qatar | Saudi Arabia | UAE   | GCC  |
|----------------------|---------|--------|-------|-------|--------------|-------|------|
| Bahrain              | ----    | 0.01   | 0.16  | 0.03  | 0.47         | 0.11  | 0.49 |
| Kuwait               | 0.23    | ----   | -0.05 | 0.16  | 0.14         | 0.06  | 0.15 |
| Sultanate of Oman    | 0.01    | 0.24   | ----  | 0.01  | 0.02         | -0.09 | 0.01 |
| Qatar                | 0.13    | 0.25   | 0.01  | ----  | 0.04         | 0.19  | 0.05 |
| Saudi Arabia         | 0.29    | 0.27   | 0.17  | 0.28  | ----         | 0.13  | 0.98 |
| United Arab Emirates | 0.10    | 0.11   | 0.12  | 0.13  | 0.17         | ----  | 0.18 |
| GCC                  | 0.30    | 0.26   | 0.18  | 0.29  | 0.99         | 0.21  | ---- |

**Note:** Correlations of supply shocks are above the diagonal and correlations of demand shocks are below the diagonal.

### 3. Model and Methodology

Following Monticelli and Tristani (1999) who assess the structural features of the European economy through the aggregation of key macroeconomic variables, we construct similar weighted macroeconomic averages of the GCC countries. We apply an open economy aggregate, dynamic supply/aggregate demand model to examine the structural features of the GCC economy as a union-wide economic system. Since the aim of this paper is to investigate the sources of macroeconomic fluctuation in the GCC area as a single bloc, an aggregate supply/aggregate demand model will be suitable to identify the sources of the shocks impinging on the region as a whole. In a related topic Ahmed (2003) examines the sources of macroeconomic fluctuations in six Latin American countries and investigates the eligibility of these countries to form an (OCA)—with the United States.

Since all of the GCC countries are dependent on oil revenues and the oil sector makes up a large part of their GDPs, the model should first assimilate terms of trade shocks. Second, the model should incorporate exogenous shifts in the balance of payments, currency premiums, and currency substitutions in case of speculations. Economic growth and price stability can be modelled by using the conventional aggregate supply/aggregate demand model.

In order to justify the restrictions in the structural VAR model, we consider the following dynamic, open economy aggregate supply/aggregate demand model:

$$h_t = h_{t-1} + \varepsilon_t^h \quad \text{Oil price} \quad (1)$$

$$y_t^s = \tilde{y}_t + \theta h_t \quad \text{Aggregate supply} \quad (2)$$

$$\tilde{y}_t = \tilde{y}_{t-1} + \varepsilon_t^s \quad \text{Evolution of capacity output} \quad (3)$$

$$k[i_t - i_t^* + (E_t s_{t+1} - s_t) - \rho_t] + \eta_1(s_t - p_t) - \eta_2 y_t + b_t = 0 \quad \text{Balance of payments (BOP)} \quad (4)$$

$$i_t = (E_t s_{t+1} - s_t) - (\eta_1 / k)(s_t - p_t) + (\eta_2 / k)y_t + [i_t^* + \rho_t - (1/k)b_t] \quad (4')$$

$$z_t = [i_t^* + \rho_t - (1/k)b_t] \quad \text{BOP shock} \quad (5)$$

$$z_t = z_{t-1} + \varepsilon_t^z \quad \text{Evolution of BOP shock} \quad (5')$$

$$y_t^d = d_t - \gamma[i_t - E_t(p_{t+1} - p_t)] + \eta_1(s_t - p_t) - \eta_2 y_t \quad \text{Aggregate demand /IS} \quad (6)$$

$$d_t = d_{t-1} + \varepsilon_t^d \quad \text{Evolution of autonomous aggregate demand} \quad (7)$$

$$m_t^d = p_t + y_t - \lambda i_t - u z_t \quad \text{Money demand} \quad (8)$$

$$m_t^s = m_{t-1}^s + \varepsilon_t^m \quad \text{Money supply} \quad (9)$$

$$y_t^s = y_t^d = y_t \quad \text{Good market equilibrium} \quad (10)$$

$$m_t^s = m_t^d = m_t \quad \text{Money market equilibrium} \quad (11)$$

where  $h$  is the terms of trade (or real world oil price),  $y$  is real GDP,  $\tilde{y}$  is capacity output,  $i$  is domestic nominal interest rate,  $i^*$  is foreign interest rate,  $s$  is nominal exchange rate expressed as domestic currency price of foreign currency,  $p$  is domestic price level,  $m$  is money stock,  $d$  is autonomous aggregate demand,  $\rho$  is a risk premium on domestic currency investments,  $b$  represents an exogenous shift in net exports due to a change in competitiveness,  $z$  represents exogenous elements in the balance of payments equation,  $\varepsilon^j$  is stochastic disturbance,  $E_t$  is the conditional expectations parameters. All variables except the interest rate are in logarithms, and all Greek parameters are positive.

The observed movements in the variables are due to five mutually uncorrelated “structural” shocks with finite variances. These are: terms of trade (real world oil price) shocks,  $\varepsilon_t^h$ ; aggregate supply shocks,  $\varepsilon_t^s$ ; trade balance shocks,  $\varepsilon_t^z$ ; aggregate demand shocks,  $\varepsilon_t^d$ ; and money supply shocks,  $\varepsilon_t^m$ .

Equation (1) is the evolution of the terms of trade (real world oil price), which is assumed to be exogenous. Equation (2) is the aggregate supply equation, where aggregate supply depends on capacity output and terms of trade. Capacity output in equation (3) is a function of the productive capacity of the economy (e.g., capital stock and employment), and for simplicity, is assumed to be a random walk process.

A distinguishing feature of the model is that it can accommodate non-instantaneous adjustments in the balance of payments as explained by Equation (4). Capital inflows are a function of the net domestic rate of return adjusted for a risk premium. Note that the parameter  $k$  represents the degree of capital mobility and large values of  $k$  indicate higher levels of capital mobility. The trade balance is a function of the real exchange rate ( $s_t - p_t$ ), and domestic real income. For simplicity, we normalize the foreign price level to unity so that ( $s_t - p_t$ ) measures the relative price of foreign goods in terms of domestic goods<sup>6</sup>. Moreover, due to exogenous changes in terms of trade,  $b_t$  represents exogenous increases in net exports. Although Equation (4) may seem to impose a zero balance of payments, the existence of the shift term,  $b_t$  provides a more general specification. For example, one can view,  $b_t$  as an exogenous or target level for the balance of payments. Equation (4') rewrites equation (4) in terms of the domestic nominal interest rate, whereas equation (5) pools all exogenous elements in the balance of payments

<sup>6</sup> In the empirical analysis we will use real effective exchange rates, which does not assume unit foreign prices.

equation to define  $z_t$ . Equation (5') specifies the evolution of  $z_t$  as a nonstationary stochastic process<sup>7</sup>.

Equation (6) is a conventional aggregate demand (IS) equation where aggregate spending depends on the expected real interest rate, net exports and income. The autonomous portion of aggregate demand,  $d_t$ , is assumed to follow a random walk in Equation (7). Equation (8) is a conventional money demand equation with unitary income elasticity. Money demand is also a function of the exogenous elements in the balance of payments. This specification allows for the reductions in money demand when there are exogenous shifts in the balance of payments, which may necessitate a depreciation of domestic currency. Moreover, when there is a risk premium associated with domestic currency or self-fulfilling fads in exchange rate expectations  $z_t$  will be positive. In such cases, money demand is reduced by  $uz_t$ .

Equation (9) is the evolution of money supply, which for simplicity, is assumed to follow a random walk<sup>8</sup>. Finally, we close the model by postulating goods and money market equilibrium relationships (equations 10 and 11) and solve the model for rational expectations equilibrium. Note that in the empirical model, exogenous variables will not be forced to follow random walk process.

To solve the model, we eliminate the interest rate from equations (6) and (8), using equation (4') to get the following system<sup>9</sup>:

$$\begin{aligned} \begin{vmatrix} \lambda(1+[\eta_1/k]) & 1-(\lambda\eta_1/k) \\ \gamma(1+[\eta_1/k]) + \eta_1 & -\gamma(1+[\eta_1/k]) - \eta_1 \end{vmatrix} \begin{vmatrix} s_t \\ p_t \end{vmatrix} &= \begin{vmatrix} \lambda & 0 \\ \gamma & -\gamma \end{vmatrix} \begin{vmatrix} E_t s_{t+1} \\ E_t p_{t+1} \end{vmatrix} \\ + \begin{vmatrix} m_t - ([\lambda\eta_2/k] - 1)y_t + (\mu - \lambda)z_t \\ (1 + \eta_2[\eta_2\gamma/k])y_t - d_t - \gamma z_t \end{vmatrix} & \end{aligned} \quad (12)$$

The system can be rewritten compactly as  $AY_t = BE_t Y_{t+1} + W_t$  or  $Y_t = \Pi E_t Y_{t+1} + CW_t$ , where  $C = A^{-1}$  and  $\Pi = A^{-1}B$ . The eigenvalues of the matrix  $\Pi$  are  $\{1/(1+\lambda); \gamma k / (\lambda k + \gamma\eta_1 + k\eta_1)\}$ . The eigenvalues are both within the unit circle for finite values of the parameters, hence the forward-looking solution is convergent. The forward-looking solution to the system in relations (12) is

$$E_t Y_{t+1} = C \sum_{i=1}^{\infty} \Pi^i E_t W_{t+i+1}. \quad (13)$$

Given the stochastic processes for exogenous variables, it is evident that  $E_t W_{t+i} = W_t$ , for  $i=1, 2, \dots$ . Then the complete solution of the real exchange rate, real money balances, and the price level in terms of the exogenous variables is given by

$$s_t - p_t = [(k/\eta_1)(\gamma + k) + (\eta_2/\eta_1)]y_t - (\gamma k/\eta_1)(\gamma + k)z_t - (k/\eta_1)(\gamma + k)d_t \quad (14)$$

<sup>7</sup> Although  $\varepsilon_t^z$  is labelled a BOP shock, it is evident that it captures foreign interest rate shocks, risk premium shocks, and competitiveness shocks. Without further structure, it is impossible to disentangle  $\varepsilon_t^z$  into its constituent parts. To keep the dimensions of the VAR tractable,  $\varepsilon_t^z$  will be a composite shock of the above.

<sup>8</sup> In the empirical model, we do not restrict the exogenous variables to follow any particular process, the assumption of random walk is to illustrate the identification restrictions.

<sup>9</sup> The GCC countries maintain a fixed exchange rate system, as such the money supply is more likely to be endogenous. Hence, it is more appropriate to define monetary shocks as money supply shocks rather than interest rate shocks.

$$m_t - p_t = c_1 y_t + c_2 z_t + c_3 d_t, \quad (15)$$

$$c_1 \equiv [2\lambda\eta_2 + \lambda k / k(\gamma + k)] - 1; \quad c_2 \equiv (\lambda k / [\gamma + k]) - \mu; \quad c_3 \equiv -(\lambda / [\gamma + k]);$$

$$p_t = m_t - c_1 y_t - c_2 z_t - c_3 d_t. \quad (16)$$

The observed movements in the vector of variables  $X_t = [h_t y_t (m_t - p_t) (s_t - p_t) p_t]$ , are due to five mutually uncorrelated “structural” shocks with finite variables,  $\varepsilon_t = [\varepsilon_t^h \varepsilon_t^s \varepsilon_t^z \varepsilon_t^d \varepsilon_t^m]$ . these are terms of trade shocks,  $\varepsilon_t^h$ ; aggregate supply shocks,  $\varepsilon_t^s$ ; BOP shocks,  $\varepsilon_t^z$ ; aggregate demand shocks,  $\varepsilon_t^d$ ; and monetary shocks,  $\varepsilon_t^m$ .

It can be shown that the long-run impact of the structural shocks on the endogenous variables has a peculiar triangular structure. In order to show the long-run impact of the five structural shocks  $\varepsilon_t = [\varepsilon_t^h \varepsilon_t^s \varepsilon_t^z \varepsilon_t^d \varepsilon_t^m]$  on the system of endogenous variables

$X_t = [h_t y_t (s_t - p_t) (m_t - p_t) p_t]$ , we express the solution of the model in first differences:

$$\Delta h_t = \varepsilon_t^h$$

$$(17)$$

$$\Delta y_t = \theta \varepsilon_t^h + \varepsilon_t^s$$

$$(18)$$

$$\Delta(m_t - p_t) = c_1 (\varepsilon_t^s + \theta \varepsilon_t^h) + c_2 \varepsilon_t^z + c_3 \varepsilon_t^d$$

$$(19)$$

$$\Delta(s_t - p_t) = [(k / \eta_1 (\gamma + k)) + (\eta_2 / \eta_1)] (\varepsilon_t^s + \theta \varepsilon_t^h) - (\gamma k / \eta_1 (\gamma + k)) \varepsilon_t^z - (k / \eta_1 (\gamma + k)) \varepsilon_t^d \quad (20)$$

$$\Delta p_t = -c_1 \theta \varepsilon_t^h - c_1 \varepsilon_t^s - c_2 \varepsilon_t^z - c_3 \varepsilon_t^d + \varepsilon_t^m \quad (21)$$

Note that from equations (15) and (21) the long-run effect of a BOP shock on the price level depends on the degree of capital mobility and on the magnitude of the semi-interest elasticity of money,  $\lambda$ , relative to the elasticity of money demand with respect to BOP deterioration,  $\mu$ . Assuming  $k$  is sufficiently large, the coefficient  $c_2$  in equation (21) reduces to  $\lambda - \mu$ . when  $\mu < \lambda$  ( $\mu > \lambda$ ), the predicted effect of a BOP shock on the price level is positive (negative). Also, the long-run effect of a supply shock on the price level can be of either sign. Notice that although all endogenous variables are unit root stochastic processes, the vector  $X_t$  is difference stationary. Finally, the long-run impact of the structural shocks on the endogenous variables is triangular.

### 3.1 Identification of the shocks

Assume that the covariance stationary vector  $X_t$  can be written as an infinite moving average process in the structural shocks:

$$X_t = \sum_{i=0}^{\infty} A_i \varepsilon_{t-i} = A(L) \varepsilon_t \quad (21)$$

where  $A(L)$  is a matrix whose elements are polynomials in the lag operator  $L$ . Denote that the elements of  $A(L)$  by  $a_{ij}(L)$ . The time path of the effects of a shock in  $\varepsilon_j$  on variable  $i$  after  $k$  periods can be denoted  $\omega_{ij}(k)$ . Note also that  $A(1)$  is the matrix of long-run effects whose elements are denoted  $a_{ij}(1)$ ; each element gives the cumulative effect of a shock in  $\varepsilon_j$  on variable  $i$  over time. Similarly,  $A_0$  is the matrix of the contemporaneous impact effect and



consists of  $\omega_{ij}(0)$ . the objective of identification is to discern the 25 elements of  $A_0$ . Given the model structural, the long-run effects of the shocks on the endogenous variables are given by

$$\begin{pmatrix} \Delta h_t \\ \Delta y_t \\ \Delta(m_t - p_t) \\ \Delta(s_t - p_t) \\ \Delta p_t \end{pmatrix} = \begin{pmatrix} a_{11}(1) & 0 & 0 & 0 & 0 \\ a_{21}(1) & a_{22}(1) & 0 & 0 & 0 \\ a_{31}(1) & a_{32}(1) & a_{33}(1) & 0 & 0 \\ a_{41}(1) & a_{42}(1) & a_{43}(1) & a_{44}(1) & 0 \\ a_{51}(1) & a_{52}(1) & a_{53}(1) & a_{54}(1) & a_{55}(1) \end{pmatrix} \begin{pmatrix} \mathcal{E}_t^h \\ \mathcal{E}_t^s \\ \mathcal{E}_t^z \\ \mathcal{E}_t^d \\ \mathcal{E}_t^m \end{pmatrix} \quad (22)$$

Given the key role of some of the GCC countries on OPEC and their market share of the oil market, particularly Saudi Arabia, restricting supply shocks to have no long-run impact on the terms of trade may sound arguable. But as the GCC countries may affect the crude oil price, one can argue that they may have no effect on real oil prices in the long run. First, since the GCC countries produce about 22.4 % of the world’s oil supply they may not have enough market power to influence the real price of a commodity such as oil. [There are other major sources of oil in Russia, the North Sea, and Central Asia,] in addition to the increased uses of non-oil energy sources that may influence the real oil price. Second, the run-ups in oil prices over the past few years have been the result of factors such as limited capacity of production, transportation, and refinery. The regional mismatch between the grade of oil supplied and that demanded which led to a widening premium on the different types of crude oil, is also a determining factor. Finally, crude oil price changes are known to be inflationary in the long run (Rosser and Sheehan, 1995), and it is likely that changes in crude oil prices will be fully reflected in export prices of industrial countries and the real price will be left unchanged in the long run. The aforementioned factors support the view that the GCC countries may have limited influence on the global oil market.

### 3.2. Data

In this study we estimate the model for the prospective GCC union as single bloc using aggregated quarterly data. The data were collected from the six GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) on money supply (m1), real exchange rates, consumer prices index (CPI), and real GDP, real oil price. The data run from 1980:1 to 2015:4 and are taken from the IMF’s International Financial Statistics CD-Rom database. Due to the lack of quarterly data on GDP, we use the Ginsburgh method to extract quarterly GDP from annual data. We also use the available oil production series as an alternative to the interpolated GDP series to test the sensitivity of results to data selection. Furthermore, we have individual countries series constructed weighted averages for real GDP, CPI, M1, real effective exchange rate and exchange rate. All of the constructed series from the six countries, however, due to the lack of availability for Oman, Qatar and United Arab Emirates we used the CPI from Bahrain, Kuwait and Saudi Arabia<sup>10</sup>.

We proxy terms of trade by real oil price (crude oil price converted to domestic currency and deflated by GCC CPI), real output by the GCC real GDP, money stock by GCC M1, price by the GCC price index, real exchange rates by GCC real effective exchange rates. Using a macroeconomic model and structural VAR methods constructed to suit the GCC economies for the 1980-2015 period, our focus will be on five macroeconomic shocks: terms of trade shocks,

<sup>10</sup> The weighted averages of the GCC countries’ were constructed based on the 2018 GDP and PPP exchange rates.

trade balance shocks, aggregate supply shocks, aggregate demand shocks, and monetary shocks.

#### 4. Empirical Results

To properly specify the empirical model, an important step is to test for unit roots and stationarity. The results of Augmented Dicky Fuller (ADF) and KPSS tests are presented in Table 5A. The ADF test statistics suggest that the presence of a unit root in output, real exchange rate, real oil price, real money balance and the price level cannot be rejected. Similarly, the KPSS test rejects stationarity for all variables at conventional significance levels. Hence, it is appropriate to model the variables in first differences.

**Table 5A:** Unit root and stationarity tests

| Tests          | p     | y     | h     | m-p   | q    |
|----------------|-------|-------|-------|-------|------|
| ADF Statistic  | -0.95 | -2.48 | -2.54 | -1.32 | -1.5 |
| KPSS Statistic | 1.35  | 1.55  | 1.10  | 1.57  | 1.50 |

**Notes:** h=real oil price, y=real GDP, p=domestic price level, m=money stock, x=oil production. The test assume a constant in both ADF and KPSS procedures. The ADF critical values are -2.89 (5 percent), and -3.51 (1 percent). The KPSS critical values are 0.463 (5 percent), and 0.739 (1 percent). Both tests estimated using 4 lags

Table 5B presents the test statistics of the cointegration among the variables using the Johansen method. The results show weak evidence of one cointegrating vector among terms of trade, output, real money balances, real exchange rate and the price level. Moreover, in this study we first present the VAR model. And because of the presents of one cointegrating vector, we use Vector Error Correction Model (VECM) as an alternative specification in which one cointegrating vector is imposed.

**Table 5B:** Cointegration test

| Null Hypothesis | Likelihood Ratio | 5% Critical Value |
|-----------------|------------------|-------------------|
| $r=0$           | 47.56            | 33.46             |
| $r \leq 1$      | 23.19            | 27.07             |
| $r \leq 2$      | 14.29            | 20.97             |
| $r \leq 3$      | 11.2             | 14.07             |
| $r \leq 4$      | 4.38             | 3.76              |

Since the GCC countries are highly open economies, we assume that perfect capital mobility exists. Next, we let  $X_t = [h_t y_t (m_t - p_t)(s_t - p_t)p_t]$ , and estimate the VAR with five lags. The diagnostic tests indicate that five lags are appropriate for residuals to approximate white noise. We then obtain the moving average representation and impose the triangular structure on the A(1) matrix as implied by the model above. The  $A_0$  matrix is then constructed accordingly. The dynamic effects of the innovations can best be understood by using variance decompositions (VDC) and impulse response functions which are typical of the VAR methods.

Table 6 reports variance decomposition of forecast errors for terms of trade, output, real exchange rates, real money balances, and the price level. At a one-quarter forecasting horizon, the GCC terms of trade shocks are modestly impacted by the GCC domestic supply shocks in the short run, which account for 10% in the first quarter and account for over 9% after one year. Interestingly, the GCC countries do not seem to have a strong impact on real oil prices even

with their important market shares in the global oil market. Because some GCC countries, particularly Saudi Arabia, play an important role in OPEC oil policy, GCC supply shocks should have a significant impact on the GCC terms of trade. Dibooglu and Aleisa (2004) examine the role of Saudi Arabia supply shocks on the real oil price and found that the Saudi supply shocks explain less than 2% of the forecast error variance of the terms of trade in the long run. One possible justification of the result is that the increases in oil prices lead to proportional inflation, and therefore real oil price may not be affected by the increases in nominal oil prices. In that sense, given that Saudi Arabia is the largest oil producer and the most powerful member in OPEC producers and has such limited influence on oil prices, one should expect that the whole GCC bloc will not affect real oil prices.

The variance decomposition for output reveals that supply shocks account for over 85% of the forecast-error variance within one quarter. Even within 24 quarters, supply shocks still account for over 73% with persistent important effects on output variations. In contrast, trade balance, demand, and monetary shocks have a negligible impact on the GCC output. Although terms of trade shocks seem to have a modest impact within the first quarter, accounting for about 9% of forecast-error variance, the overall impact of terms-of-trade-shocks seems to persist in the long run, reaching 25% of the forecast-error variance. One would expect that using a weighted average series of the GCC block GDP would reduce the impact of real oil price, as some of the GCC countries have a more diversified output. This result comes in contrast to the fact that Saudi Arabia’s GDP constitutes large portions of the GCC GDP, which has a steadily growing non-oil sector. It is also inconsistent with the findings of Choudhury and Al-Sahlawi (2000) who suggest that the government sector and the growing non-oil sector insulate the Saudi economy from fluctuations in oil prices. It could be the case that because the GCC government sector is largely dependent on oil revenue, the correlated movements of oil prices will continue to have an important role. One would expect that the creation of the GCC monetary union may somehow change this result because there will be more economic diversification and specialization of the production base as the new union will become more attractive to foreign investments. Moreover, the creation of the monetary union would add weight to a coordinated GCC oil policy within OPEC, by forming a single oil policy representing the region. Such a powerful and coordinated oil policy may also play a key role in minimizing the fluctuations in world oil prices.

The variance decomposition of real exchange rates indicates that trade balance shocks seem to have a dominant impact on exchange rate movements, accounting for over 76% of the forecast-error variance within one quarter. Although the terms-of-trade shocks have a negligible impact in the short run, they play an important role in real exchange rate movements in the long run, being responsible for over 42% of the forecast-error variance within 24 quarters. This is consistent with the results presented by Aleisa and Dibooglu (2002) who found that real oil price shocks are responsible for real exchange rate movements in Saudi Arabia.

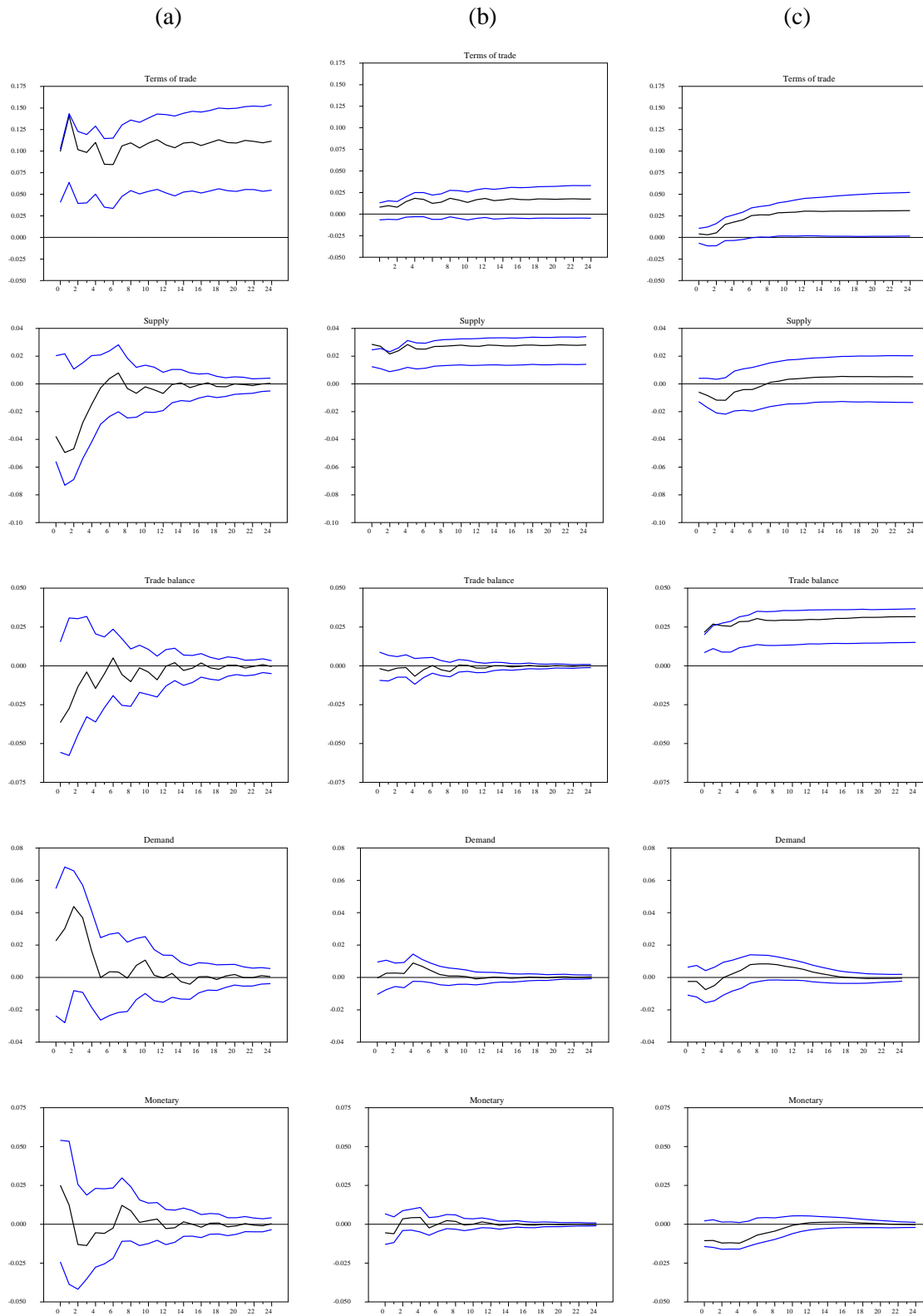
**Table 6:** Variance decompositions

|         | Percent of forecast error variance attributed to |                   |                   |                   |                   |
|---------|--|-------------------|-------------------|-------------------|-------------------|
|         | $\varepsilon_t^h$                                | $\varepsilon_t^s$ | $\varepsilon_t^z$ | $\varepsilon_t^d$ | $\varepsilon_t^m$ |
| Horizon | Terms of trade (real oil price)                  |                   |                   |                   |                   |
| 1       | 78.4   | 10.3              | 5.5               | 3.8               | 2.1               |
| 4       | 79.7   | 9.2               | 3.2               | 6.4               | 1.5               |
| 8       | 85.9   | 6.2               | 2.3               | 4.3               | 1.2               |
| 16      | 92.0   | 3.5               | 1.3               | 2.5               | 0.7               |
| 24      | 94.5   | 2.4               | 0.9               | 1.7               | 0.5               |
|         | Output   |                   |                   |                   |                   |
| 1       | 8.9  | 86.2              | 0.8               | 0.4               | 3.8               |

|                     |      |      |      |      |      |
|---------------------|------|------|------|------|------|
| 4                   | 17.2 | 76.5 | 1.4  | 2.2  | 2.6  |
| 8                   | 21.0 | 74.3 | 1.1  | 2.0  | 1.6  |
| 16                  | 23.6 | 74.0 | 0.6  | 1.0  | 0.8  |
| 24                  | 25.0 | 73.4 | 0.4  | 0.7  | 0.5  |
| Real exchange rate  |      |      |      |      |      |
| 1                   | 1.7  | 6.9  | 76.5 | 0.8  | 14.2 |
| 4                   | 11.7 | 8.3  | 65.2 | 1.9  | 12.9 |
| 8                   | 26.5 | 4    | 59.7 | 2.2  | 7.5  |
| 16                  | 38.9 | 2.3  | 53.5 | 2    | 3.3  |
| 24                  | 42.4 | 2    | 52.3 | 1.2  | 2.1  |
| Real money balances |      |      |      |      |      |
| 1                   | 3.5  | 1.0  | 2.4  | 86.0 | 7.2  |
| 4                   | 2.0  | 3.8  | 2.1  | 88.2 | 3.9  |
| 8                   | 1.4  | 3.3  | 2.7  | 90.6 | 2.0  |
| 16                  | 1.6  | 2.9  | 3.7  | 90.9 | 0.9  |
| 24                  | 2.0  | 3.0  | 4.1  | 90.3 | 0.6  |
| The price level     |      |      |      |      |      |
| 1                   | 0.6  | 0.3  | 42.7 | 0.1  | 56.3 |
| 4                   | 3.6  | 0.9  | 34.2 | 1.4  | 59.9 |
| 8                   | 9.4  | 2.2  | 22.6 | 1.1  | 64.7 |
| 16                  | 10.2 | 4.1  | 18.6 | 1.6  | 65.5 |
| 24                  | 10.9 | 4.4  | 18.6 | 2.3  | 63.7 |

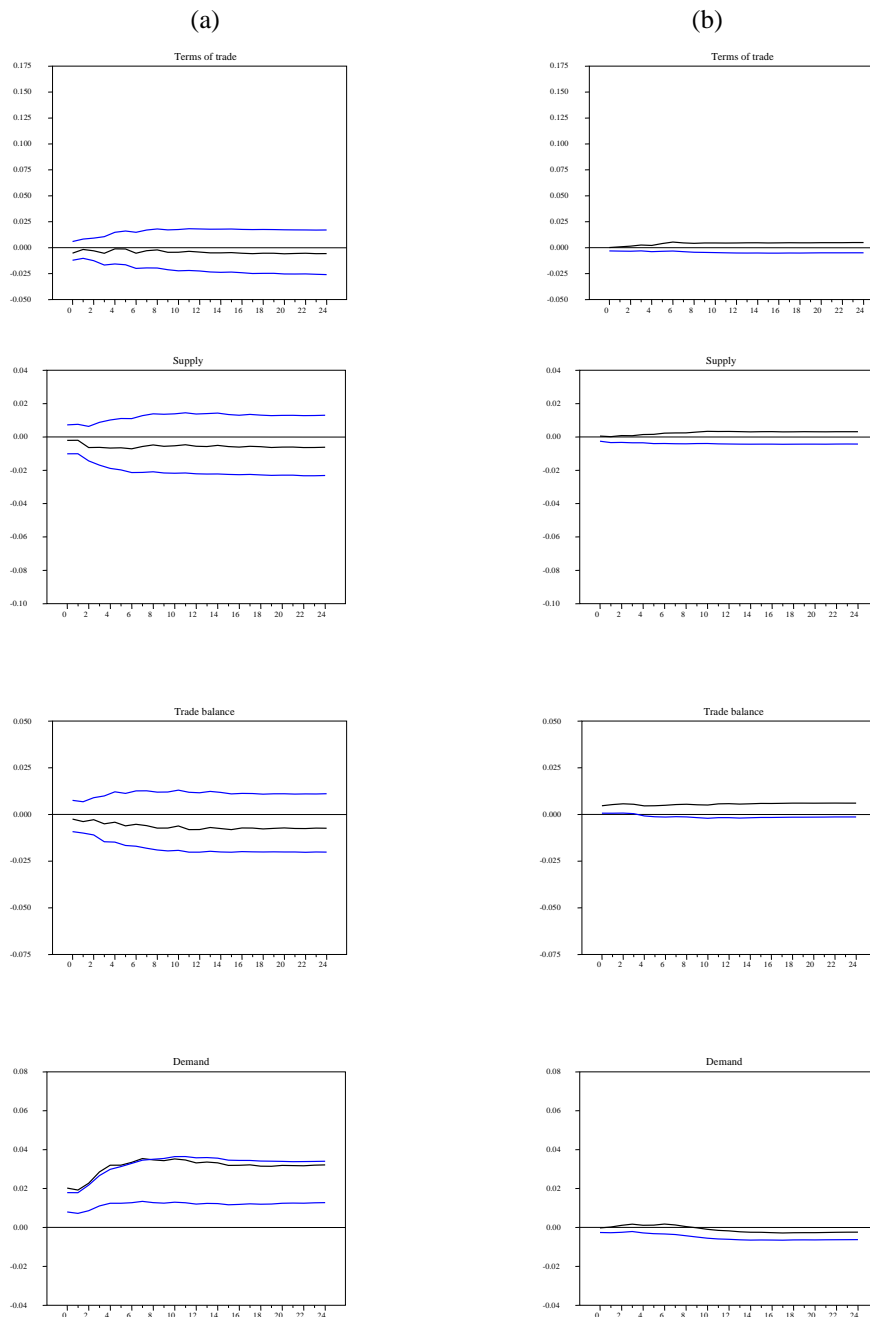
Although terms of trade, supply, trade balance and monetary shocks have a negligible impact on real money balances, the demand shocks seem to explain the bulk of real money balance movements. In the short run, the impact of the terms-of-trade shocks on price level movements is insignificant; this impact is sizeable in the long run. Supply and demand shocks have a negligible impact on price level movements, while terms of trade shocks have a modest impact in the long run. Trade balance shocks seem to have an important impact on price level movements given the highly open GCC economy. Finally, monetary shocks explain the bulk of price level movements. This is consistent with the results presented by Bashire et al (1995) who found that monetary shocks rather than oil price shocks are responsible for inflation in the Gulf Arab countries.

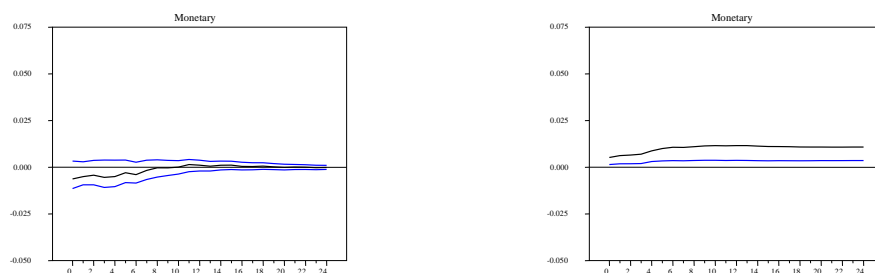
Figures 1 and 2 depict the results of the impulse response function analysis for the real oil price, output, real exchange rate, real money balances and price level due to terms-of-trade, supply, trade balance, demand and monetary shocks. Figure 1 shows that the real oil price responds positively to own shocks; the shocks cause an immediate jump in the real oil price. In contrast, this real price responds negatively to supply and trade balance shocks. Moreover, demand and monetary shocks have a positive effect on this price.



**Figure 1:** Response of real oil price (a), Response of output (b), and Response of real exchange rate (c)

Figure 2 indicates that output responds positively to terms-of-trade, demand and supply shocks. However, it responds negatively to trade balance and monetary shocks. The effects of the demand and supply shocks on output seem to be insignificant. Figure 3 shows that the real exchange rate responds positively to the terms-of-trade and trade balance shocks, but responds negatively to supply, demand, and monetary shocks. Figure 4 shows that real money balances respond positively to demand shocks, but negatively to terms of trade, supply, trade balance, and monetary shocks. Figure 5 suggests that monetary shocks explain a sizable portion of price level movements compared to terms-of-trade, supply, and trade balance shocks. This result indicates that inflation in the GCC economies is more or less a monetary phenomenon.





**Figure 2:** Response of real money balances (a) and Response of the price level (b)

## 5. The Role of Oil Production

In this section we estimate the model with oil production as an alternative to the interpolated real GDP. The purpose of substituting oil production for GDP is to test the sensitivity of the results to data selection and given the key role that the GCC countries play on the world oil market, to examine the role of oil production in their economies, we re-estimate the model substituting the quarterly oil production index for the quarterly GDP.

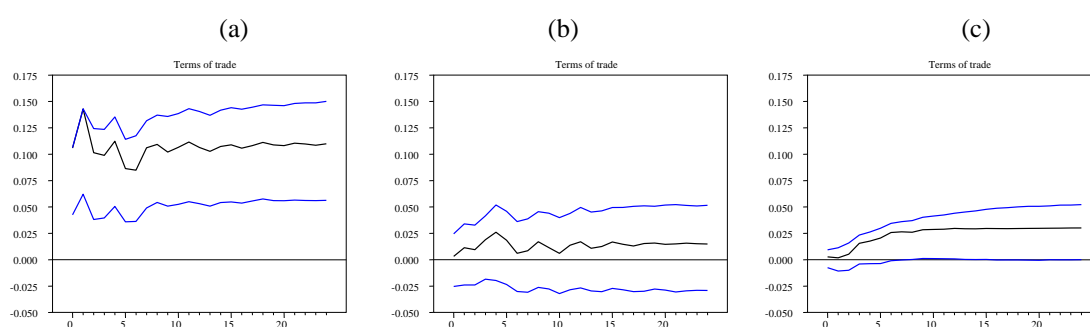
Table 7 reports variance decomposition of forecast errors for terms of trade, output, real exchange rate, and the price level. Overall the results of this model are similar to those of the benchmark model. The GCC domestic shocks seem to have no impact on terms of trade. In that sense the GCC faces exogenous terms-of-trade shocks. Furthermore, GCC oil production does not seem to be responsive to the terms-of-trade-shocks. However, there are some notable differences. The GCC oil production shocks explain a relatively sizable proportion of real exchange rate and real money balances movements than in the benchmark case.

**Table 7:** Variance decompositions: The oil production case

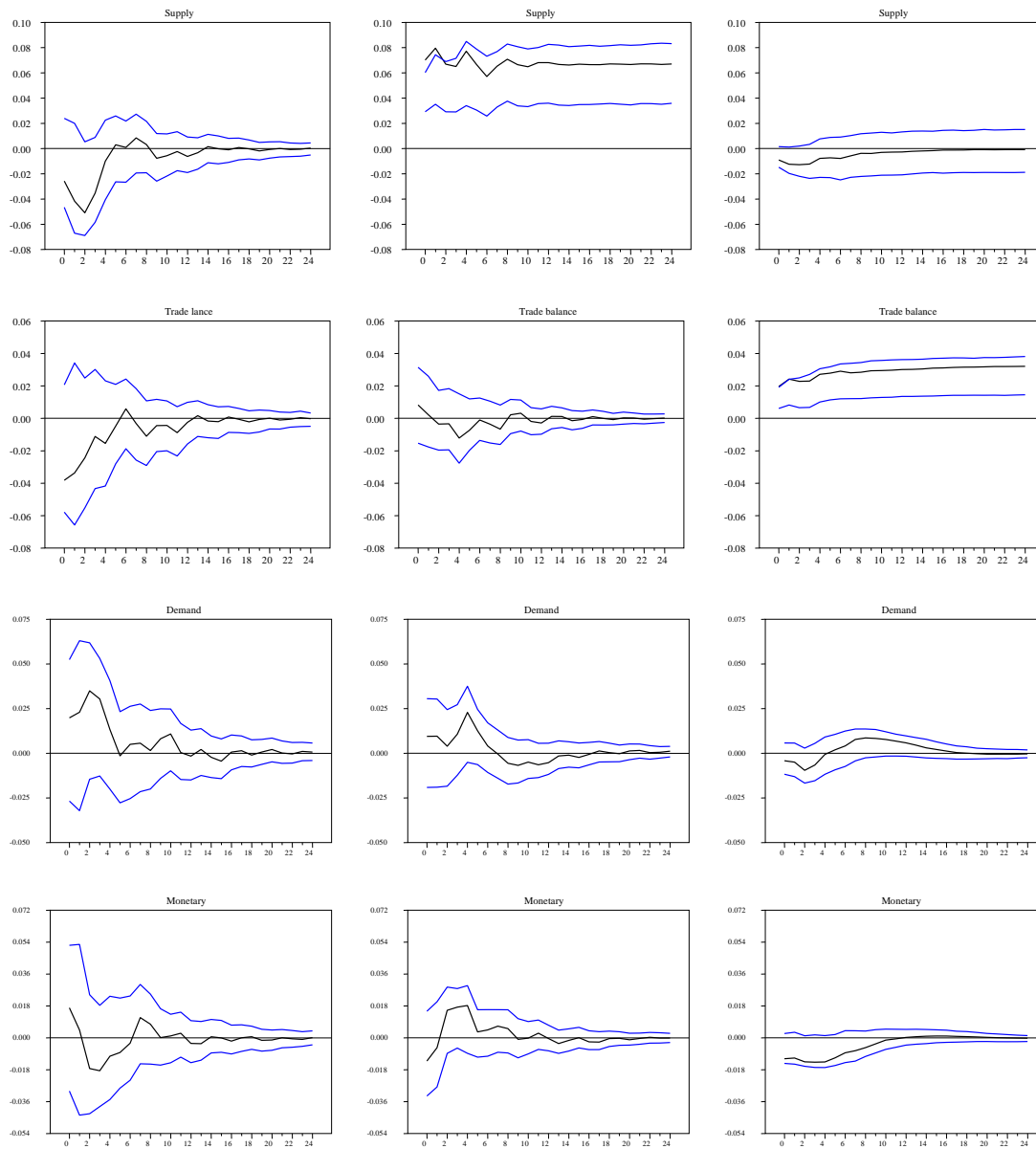
|         | Percent of forecast error variance attributed to |                   |                   |                   |                   |
|---------|--|-------------------|-------------------|-------------------|-------------------|
|         | $\mathcal{E}_t^h$                                | $\mathcal{E}_t^s$ | $\mathcal{E}_t^z$ | $\mathcal{E}_t^d$ | $\mathcal{E}_t^m$ |
| Horizon | Terms of trade (real oil price)                  |                   |                   |                   |                   |
| 1       | 83.5   | 6.4               | 6.9               | 2.4               | 0.8               |
| 4       | 81.9   | 8.1               | 4.5               | 4.1               | 1.3               |
| 8       | 87.3   | 5.5               | 3.2               | 2.8               | 1.1               |
| 16      | 92.6   | 3.2               | 1.9               | 1.7               | 0.7               |
| 24      | 94.9   | 2.2               | 1.3               | 1.2               | 0.4               |
|         | Output   |                   |                   |                   |                   |
| 1       | 1.2  | 95.0              | 0.6               | 1.5               | 1.7               |
| 4       | 4.3  | 88.3              | 0.8               | 2.8               | 3.7               |
| 8       | 4.2  | 90.3              | 0.8               | 2.2               | 2.5               |
| 16      | 4.0  | 92.7              | 0.5               | 1.4               | 1.4               |
| 24      | 4.3  | 93.4              | 0.3               | 1.0               | 1.0               |
|         | Real exchange rate                               |                   |                   |                   |                   |
| 1       | 0.7  | 15.6              | 63.3              | 2.8               | 17.6              |

|                     |      |      |      |      |      |
|---------------------|------|------|------|------|------|
| 4                   | 11.9 | 12.4 | 55.4 | 3.6  | 16.7 |
| 8                   | 27.2 | 7.0  | 53.0 | 3.0  | 9.9  |
| 16                  | 38.5 | 3.3  | 51.5 | 2.3  | 4.4  |
| 24                  | 41.6 | 2.1  | 52.1 | 1.4  | 2.8  |
| Real money balances |      |      |      |      |      |
| 1                   | 4.3  | 5.6  | 3.2  | 80.1 | 6.7  |
| 4                   | 2.2  | 10.6 | 3.3  | 80.1 | 3.9  |
| 8                   | 1.4  | 10.6 | 4.0  | 82.1 | 1.9  |
| 16                  | 1.7  | 10.6 | 5.3  | 81.5 | 0.9  |
| 24                  | 2.2  | 11.0 | 5.9  | 80.3 | 0.6  |
| The price level     |      |      |      |      |      |
| 1                   | 1.4  | 1.9  | 44.3 | 0.2  | 52.2 |
| 4                   | 4.6  | 1.4  | 36.1 | 0.9  | 57.0 |
| 8                   | 10.7 | 0.6  | 25.3 | 0.7  | 62.8 |
| 16                  | 10.8 | 0.5  | 21.8 | 1.8  | 65.2 |
| 24                  | 11.3 | 0.5  | 21.9 | 2.7  | 63.7 |

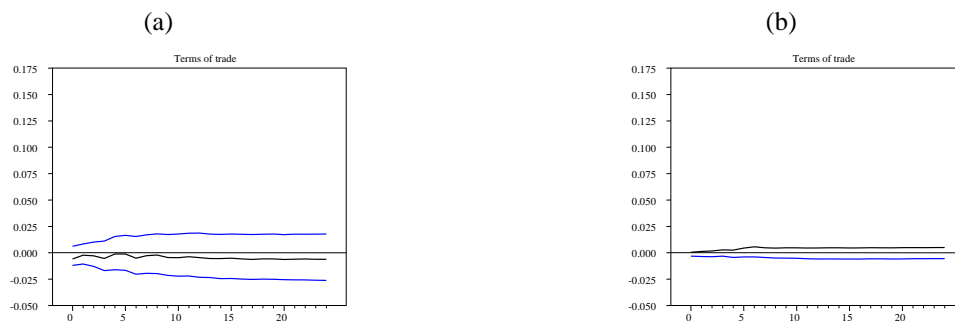
Figure 3 and 4 show the impulse response function of the real oil price, output, real exchange rate, real money balances and price level to the terms-of-trade, supply, trade balance, demand and monetary shocks. Overall, the results are similar to the benchmark model, and thus do not seem to be sensitive to the data selection. As oil represents a large share of most of the GCC countries’ GDPs, one should expect the similarity of the results of the two cases.

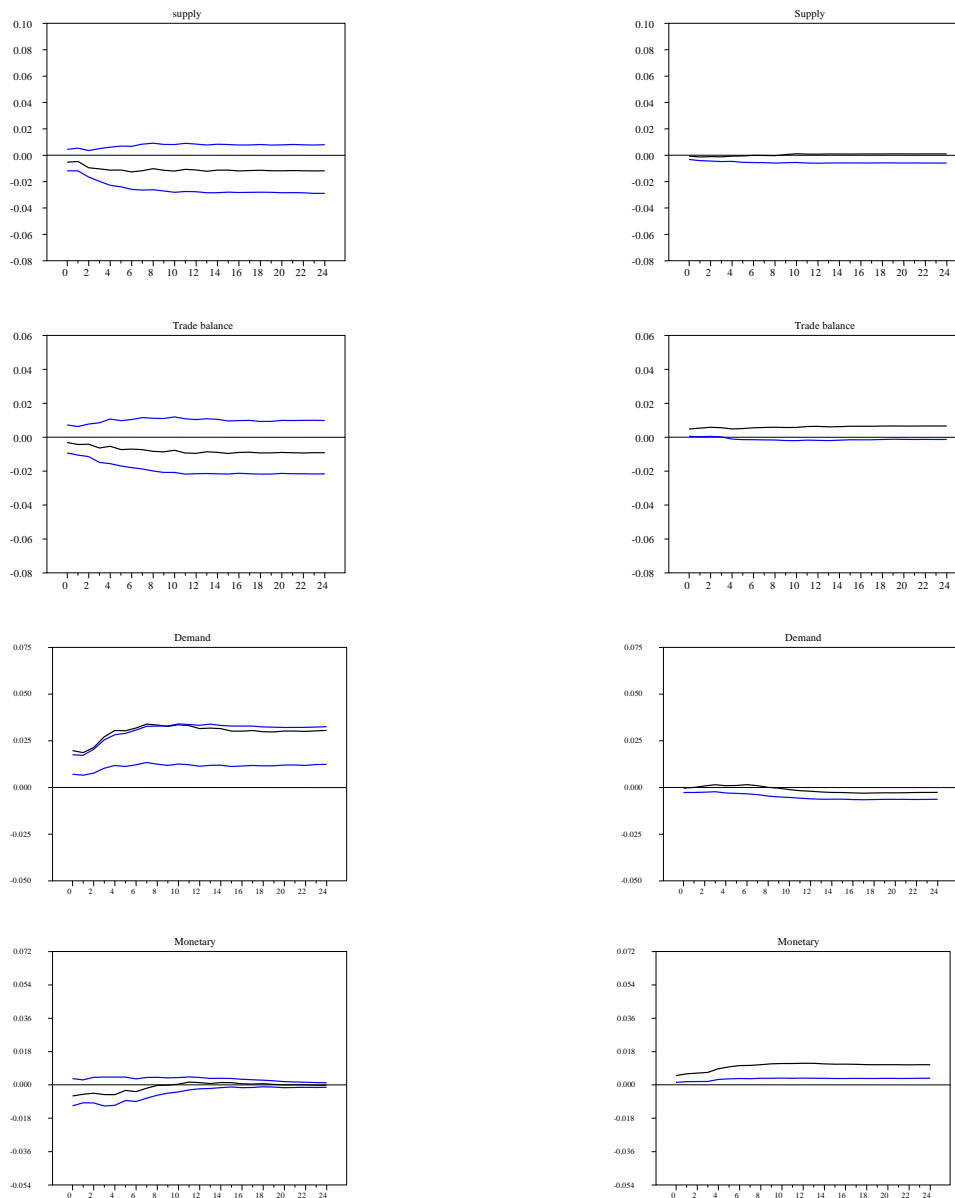






**Figure 3:** Response of real oil price (a), Response of output (b), Response of real exchange rate (c)





**Figure 4:** Response of real money balances (a) and Response of the price level (b)

## 6. Conclusions

As the GCC countries are taking very important steps towards forming a monetary union and introducing a single currency in the future, this paper examines the sources of macroeconomic shocks and analyzes their impacts on the region’s economies hypothesized as a single bloc. We have constructed weighted averages of key macroeconomic variables of the GCC countries to shed some light on the structural properties of the GCC area as a single economic system. This study has applied structural VAR methods to examine the sources of macroeconomic shocks in the GCC area. We identify the shocks as terms-of-trade (real oil price), supply, trade balance, demand, and monetary. The results show that the GCC has a modest impact on world real oil prices in the short run. Supply shocks have a sizable effect on GCC output movements. Although terms-of-trade (real oil price) shocks have a relatively small impact in the short run, they seem to have an important impact on output and to explain a sizable movement in the real exchange rate and the price level. On the other hand, although terms-of-trade, supply, trade

balance and monetary shocks have a negligible impact on real money balances, the demand shocks explain a sizable proportion of the real money balances variations.

Overall, the price of oil seems to play an important role in the GCC economies, hence macroeconomic diversification may reduce the impact of the oil price fluctuations on these economies. One would expect that the GCC as a bloc will structurally and institutionally speed up the process toward more diversification. The creation of the monetary union will necessitate coordinated economic policies to promote the role of the private sector. The pan-union policies should create a better investment environment that can attract more foreign investments. Finally, to reduce the vulnerability of the domestic economies to fluctuations in the oil price, there is a need for a coordinated oil policy that can also work more decisively within OPEC.

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# Determining the Factors Affecting Work Life Balance with the Help of Logistic Regression Analysis: The Case of Banking Sector

Nursel Aydintuğ Myrvang<sup>1</sup>

## Abstract

The interaction between work and non-work life, which are the two main areas in the life of the working individual, is important for employees. When work-life balance is not established, it causes significant changes in individuals' attitudes and behaviours and negativities in terms of work outcomes. Therefore, the desire of employees to establish a balance between work life and home life has become inevitable. While trying to establish work-life balance, individuals are influenced by a number of individual and environmental factors. From this point of view, the aim of this study is to determine the effect of intrinsic and extrinsic factors affecting work-life balance for banking sector employees with the help of logistic regression analysis. As a result of the analysis, marital status, presence of dependents, number of children, having a helper at home, having family support and having supervisory support have significant effects on work-life balance.

**Keywords:** work-life balance, banking sector, logistic regression analysis

## 1. Introduction

Work-family life balance means that people have time to give importance to their social and family life in their working life. An employee who can control the conflicts in family and work roles can maintain a healthy work-family life balance (Valcour, 2007).

The ability of the employee to maintain work-family life balance means that they create time for work and family roles in the same way and have equal responsibilities. The employee can establish a positive or negative work-family life balance. A positive work-family life balance implies a high level of equal attention, concern and time; a negative work-family life balance implies a low level of equal attention, concern and time. The balance that an individual perceives between work and family life is subjective (Padma and Reddy, 2013).

The social structure in which both women and men have to work is spreading rapidly, and the desire to fully fulfil the responsibilities in work and family life makes it necessary to keep work life and private life in balance (Amstad et al., 2011). In many cultures, the desire to be economically independent as well as creating additional income for their families is one of the factors that lead women to work life. Considering that women have different needs in the field of work and this is not taken into consideration, that the payments made are not made in the same way and in a fair manner between women and men, and that women maintain their routine housework and childcare roles, it shows that women have more difficulty in achieving work-family life balance (Kelliher et al., 2019).

Work-life balance guides people to achieve an optimal quality of life by controlling when, where and how they work. Work-life balance is achieved by recognising and respecting an individual's right to life, which consists of work and private life, as the norm for the mutual benefit of society, work and the individual (McCloskey, 2016). However, work-life balance varies with the perceptions of individuals. The fact that work is more important and takes

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precedence over private life may not lead to the perception of imbalance. On the contrary, the fact that the work conditions of an individual who prioritises his/her private life prevent his/her private life can be an element of pressure and stress (Roy, 2016). It is stated that balance is achieved by minimising the conflict between the roles of the person in work and non-work life (Haar et al.,2014). The work-life balance created makes the employee less likely to experience role conflict, spend more quality time in the workplace, control his/her own life better, and have a high level of happiness (Sharma and Nayak, 2016.).

## **2. Conceptual Framework**

The concepts of work and family are the most important elements in people's lives and the roles they play in these two areas are generally important in people's lives. According to the theory developed by Clark (2000) about the centrality of these two spheres in people's lives, if a person is working, the boundary between these two worlds is temporary and they pass through the boundaries that exist in their daily lives. In addition, the primary relationship between work and family is a human behaviour, not an emotional one. It is possible for a person to reorganise the environment in which he/she lives and it is also possible for him/her to shape the environment. According to the work-family theory, the person who is working tries to balance the transitions between these two worlds. For this reason, individuals with temporary boundaries have to reinsert themselves into the world through which they pass and be in harmony with the environment.

For a person who values family life highly, the frequent demands arising in working life contradict the person's perception of work-family life balance and cause role tension. For a person who values working life more, spending less time with his/her family does not mean that this person is out of balance. It means that this person has achieved a balance by centring his/her working life and does not perceive the situation occurring by his/her own will as an imbalance (Casper et al., 2017).

Work-family life balance, which has many different aspects due to its social, institutional and individual aspects, focuses on the solution of conflicts that inevitably arise when the roles of the person in work and family life do not match. The solution of this conflict is an important social policy issue. Policies aimed at balancing work and family life are defined as plans that aim to resolve the conflict between family and work life by creating differences in work organisation, working hours, workplace practices and corporate culture (Boles et al., 2013). Conflict between roles negatively affects employment opportunities, job quality, productivity, health of employees and families with children. In this context, the EU takes important steps at the institutional level and regulates the work-family life balance through harmonisation policies with a dynamic approach. These policies, which are generally expressed as childcare practices, parental leave and flexible working methods, offer remedies to individuals regarding family-work life balance. These regulations protect the family on the one hand and support the work-family life balance of the individual on the other (De Jong et al., 2015).

Studies on work-family life balance are handled according to some theoretical foundations. *The partition theory* states that people can separate their work and non-work lives and that there is no connection between work and private life (Pandu et al., 2013). *Diffusion theory* is based on the fact that the experiences gained by individuals as a result of the behaviours and practices they develop on a subject affect other areas of their lives. Individuals transfer the behaviours they develop in their work roles to their private lives and their attitudes in their private life roles

to work (Ajith and Patil, 2013). *Compensation theory* refers to the efforts to balance dissatisfaction in one area by seeking satisfaction in another area. In the work-family literature, this balancing takes place in two ways. According to the first one, the person's involvement in the area of dissatisfaction may decrease while his/her involvement in the potentially satisfying area may increase. According to the second one, the person can create a solution to the dissatisfaction in the area of dissatisfaction by gaining rewards in another area (Jailaxmi & Gautam, 2017). *Conflict theory* is based on the conflict that arises due to the role pressure created by the existing role in one area in another area, and is based on the conflict between work, family and life. Individuals may experience time, tension and behavioural conflicts (Choudhary and Singh, 2016). *The instrumentality theory* states that activities in one area facilitate the success in another area and mediate the other, which is a priority for the individual (Yadav and Dabhade, 2013).

Among the benefits of work-family life balance, it can be said that it increases workplace productivity and reduces absenteeism (Varatharaj and Vasantha, 2012). In addition, families who are good and satisfied especially in terms of childcare experience less work-family conflict and therefore less absenteeism (Zhao et al., 2011). In addition, it can be concluded that work-life balance has a positive effect on the morale of employees, increases their commitment to their organisations, reduces labour turnover and contributes to raising healthy children and more peaceful individuals for the society (Sirgy and Lee, 2018). However, the fact that men and women work together in the family reveals similarities in the roles that exist between spouses. Housework and family livelihoods are handled jointly. In families where men and women work together, people have to take each other's work situation into account when making business decisions. Due to these developments, the primary task of firms is to help their employees to show a high level of productivity and to contribute to better integrate their lives inside and outside of work life in order to retain skilled labour (male or female) (Sullivan, 2019).

Work-family imbalance has many negative consequences in the work and family domains, such as exhaustion, anxiety, high blood pressure, low marital satisfaction, low role performance, low occupational well-being, life dissatisfaction, low organisational commitment, desire to quit and high turnover (Wang and Verma, 2012).

Factors affecting work-family life balance can be classified as individual and organisational. Individual factors are the factors arising from the individual's own characteristics. Individual factors include education, gender, career planning, marital status and parenting status (Beigi et al., 2017).

Gender role is a factor affecting women's place in society and career choice. Sometimes the occupations chosen by women and men may depend on gender status. As a role of gender bias, it can be said that women are more inclined towards professions requiring expertise rather than managerial professions. Due to social prejudices, women also take into consideration the roles that they have to undertake in family life (Wang and Verma, 2012). Many studies have shown that women employees have more responsibilities, duties and roles than men both in and out of work life and thus they have more difficulties in establishing work-family life balance compared to men.

Education is one of the important factors that are effective in achieving work-family life balance. Career is important for individuals with high levels of knowledge and education. If an individual works in a job related to the education he/she has received, his/her motivation

increases. More solutions and responsibilities expected from highly educated employees in enterprises cause individuals to experience stress. With the reflection of the stress they experience on their private lives, individuals have difficulty in establishing a work-family life balance (Dave and Purohit, 2016).

According to marital status and parental status, being married, single or having children are other factors affecting work-family life balance. Married people have more difficulty in maintaining work-family life balance than single people. It is more difficult to maintain work-family life balance in a family structure with children. In addition to one's own responsibilities, the individual also has parental duties that he/she is obliged to fulfil with regard to the child (Cho and Allen, 2019). This situation was revealed by Duxbury and Higgins (2001) in their study on families with and without children.

Considering the age factor, the boundary between work and family life becomes much clearer at a young age. Since individuals are at the beginning of their careers, they have more difficulty in establishing a work-family life balance at a young age than in later years. With the experience gained in business life, the ambiguous boundary between working life and family life may become clearer as age progresses, so it may become easier to establish a work-family life balance (Haar et al., 2019). Tausing and Fenwick (2001) also found that employees' success in achieving work-family life balance increases as they get older.

The organisational consequences of negative situations in work-family life balance can be classified as direct and indirect costs. In direct costs arising from organisational consequences, imbalance directly affects the business. The results of this effect may cause losses to the organisation. These damages may include absenteeism, labour turnover, strikes, work slowdowns, etc. Indirect costs arising from the organisational consequences of work-family life imbalance can be counted as poor quality human relations, job satisfaction, organisational commitment (Hirschi et al., 2019).

When work-family life imbalance is considered for working life, it can lead to decreased desire for work and stress, decreased organisational commitment, increased absenteeism, increased work accidents and low performance, and it can negatively affect the relationship of the person with his/her environment, family and friends and impair his/her physical and psychological health (Johari et al., 2018). If employees cannot establish a work-family life balance, they first start to experience restlessness, and if this process is prolonged, major disturbances may occur. Work-life balance is of great importance for both personal and organisational success and happiness (Russo et al., 2016).

### **3. Statistical Analysis**

#### **3.1. Purpose of the Study**

In the business world, which has developed and become more complex as time progresses, ensuring work-life balance has become one of the serious problems of working individuals. Working individuals make efforts to adapt to the increasingly difficult working conditions and to ensure work-life balance in line with the aforementioned conditions. While trying to achieve work-life balance, individuals are affected by some personal and environmental factors. Frone and Cooper (1992) revealed that conflict may occur in various ways as work life affects family life and family life affects work life. For this reason, an individual's family life can affect his/her work life and work life can also affect his/her family life. The bidirectionality of the relationship

between work and family life is important in terms of the consequences of work-family life conflict, and in this framework, the bidirectionality of work-family conflicts comes to the fore. Various work and individual characteristics such as excessive and irregular working hours, overtime, autonomy status, size of the organisation, low wages, negative attitudes of top managers, working relationships, excessive time spent at work, promotion, family relationships, family expectations, health status, number of children, income, age, workforce performance are among the major causes of work-family life conflict (Parasuraman et al., 2001; Madsen, 2003; Cinamon et al., 2007). From this point of view, the aim of this study is to determine the factors affecting work-family conflict and family-work conflict for employees working in the banking sector, which has stressful and intensive working hours, with the help of logistic regression analysis.

### **3.2. Research Sample, Assumptions and Limitations**

In the study, the population consists of the employees of the head offices of four private capital deposit banks serving in Istanbul, which are at the top of the asset rankings. The number of employees of these banks is determined as 62,405 people according to the Our Banks 2022 report published by the Banks Association of Turkey. The number of samples to be drawn from this population was determined as 381 people for  $p=0.50$  and  $q=0.50$  for 0.05 sampling error in the sample size table developed by Yazıcıoğlu and Erdoğan (2004). The sample of the study consists of 450 people who voluntarily participated in the study.

It was assumed that the people who answered the applied questionnaires stated their real feelings and thoughts while answering the questions in the measurement tools. It was assumed that the people included in the study answered the questionnaire voluntarily, accurately and completely. It was accepted that the participants perceived the words with their actual meanings while answering the questions. Misconceptions about the statements that may arise have been put into the background. Employees' acceptance of the survey application can be stated as an important constraint. The study was limited to Istanbul province and general directorate employees. In addition, due to the difficulties in obtaining permission for the survey, analyses were conducted for four private banks, which constituted the limitation of the study.

### **3.3. Data Collection Tool**

The study has a non-experimental quantitative research design and is stated as a survey model in terms of its method of conducting. In the study, the survey model (field survey) was used to collect data from the sample. In collecting data from the sample, the questionnaire method, which is a data collection method in which the opinions of those included in the questionnaire are taken in written form, was applied. The first part of the questionnaire is in the form of measuring general information about the participants. In the second part, there is a work-life balance scale and all of the problems are organised in a 5-point Likert format. Regarding the work-life balance scale, the work-family and family-work conflict scales developed by Netemeyer (1996) were used. Guest (2002) stated in his study that work-life balance has two aspects: work and family balance. Accordingly, the work-life balance scale is considered as two aspects of work and family balance. Efeoğlu (2006) translated the scale into Turkish and applied it in the pharmaceutical sector. As a result of the reliability analyses, Cronbach's alpha reliability coefficients of the items were found to be between .83 and .88.



### 3.4. Hypotheses of the Research

The main hypothesis of the study is that age, gender, marital status, dependents, length of employment, number of children, number of children, domestic help status, family support status and supervisor support status have statistically significant effect on work-family and family-work conflict.

### 3.5. Findings

The results of the reliability analysis of the questionnaire; Cronbach-Alpha = 0.912, Parallel = 0.911, Strict = 0.912. Since each of the reliability criteria is higher than 70%, it is revealed that the questionnaire is consistent within itself and the results to be obtained will reflect the facts. The data regarding general and demographic information about the employees are explained below:

- 59.1% of the respondents are female and 40.9% are male.
- 39.0% of the respondents are in the 23-35 age group, 42.2% are in the 36-45 age group and 18.8% are in the 46 and over age group.
- 58.6% of the respondents are married, 34.1% are single and 7.3% are divorced/widowed.
- 82.5% of the respondents said that they did not have a sick parent, disabled person, etc. at home, while 17.5% said that they did.
- It was determined that 24.1% of the respondents had a total working period of 1-10 years, 28.7% 11-15 years, 25.0% 16-20 years and 22.2% 20 years or more.
- 34.3% of the respondents have one child, 27.1% have two children, 7.9% have three children and 30.7% do not have children.
- 56.3 % of the respondents stated that they had paid domestic helpers, 43.7 % stated that they did not.
- 67.4 % of the respondents stated that they did not benefit from family support, while 32.6 % stated that they received support from their families.
- 66.5% of the respondents stated that their managers provided support, while 33.5% stated that they did not receive support from their managers.

In the study, 71.2% of the participants stated that they could not achieve work-life balance, while 28.8% stated that they achieved work-life balance. The average response score obtained from the scale was 3.98. In general, according to the average answer of work-family and family-work conflict, employees experience conflict. This indicates that work-life balance cannot be established. In the study, the work-life balance dependent variable (binary variable) was created by giving code "1" for people with an average answer score value above 3.98 for work-family and code "0" for people below the value. Independent sample t test was used to determine the significant difference for the 2 groups (there is balance and there is no balance).

**Tablo 1:** Independent t test result

|                   | <b>Group</b> | <b>n</b> | <b>mean</b> | <b>St.dev.</b> | <b>p</b> |
|-------------------|--------------|----------|-------------|----------------|----------|
| work-life balance | <3.98        | 130      | 3.01        | 0.45           | 0.000*   |
|                   | ≥ 3.98       | 320      | 4.07        | 0.94           |          |

\*Significant difference at 0.05

As can be seen in Table 1, significant differences were obtained for the values above and below the mean, which are the cut-off points, for work-life balance. The work-life status obtained as the dependent variable was significantly divided into 0 and 1 codes. In the next stage, the logistic regression model was estimated in terms of work-life balance aspects and the influencing factors were revealed.

**Table 2:** Logistic Regression Estimation Results for Work-Life Balance

| Variables   | B      | S.E. | Wald   | df | Sig.  | Exp(B) |
|---|--------|------|--------|----|-------|--------|
| Gender  | .499   | .208 | 5.772  | 1  | .016* | 1.647  |
| Age   | -.145  | .108 | 1.805  | 1  | .179  | .865   |
| Marital Status  | -.178  | .057 | 9.619  | 1  | .002* | .837   |
| Dependent Person  | -1.287 | .445 | 8.368  | 1  | .004* | 3.622  |
| Time Worked   | -.166  | .160 | 1.076  | 1  | .300  | .847   |
| Number of Children  | -1.002 | .431 | 5.400  | 1  | .020* | 2.725  |
| Having a helper at home   | 1.260  | .433 | 8.461  | 1  | .003* | 3.527  |
| Receiving Family Support  | 1.368  | .428 | 10.196 | 1  | .001* | 3.928  |
| Receiving Manager Support   | 1.068  | .414 | 6.655  | 1  | .010* | 2.910  |
| Constant  | -1.662 | .788 | 4.450  | 1  | .035* | .190   |
| <b>Significance Tests for Logistic Model:</b>   |        |      |        |    |       |        |
| <b>Omnibus Test for Model Coefficients :</b> Chi-Square = 489.34, Prob = 0.000                    |        |      |        |    |       |        |
| <b>-2 Log likelihood = 491.55 ; Cox &amp; Snell R Square= 0.609 ; Nagelkerke R Square = 0.612</b> |        |      |        |    |       |        |
| <b>Hosmer and Lemeshow Test:</b> Chi-Square = 7.306 , Prob=0.124                                  |        |      |        |    |       |        |

\*Significant variable at 0.05 level

Considering the test results for the significance of the logistic regression model, Omnibus Test for model coefficients : Chi-Square Value for the model = 489.34, Prob = 0.000 and all coefficients are significant together. By following the stepwise estimation process for logistic regression estimation, at each step -2 Log likelihood = 491.55 value is at the lowest level, Cox & Snell R Square = 0.609 and Nagelkerke R Square = 0.612 value is at the highest level, increasing the significance in the model. Hosmer and Lemeshow Test, which is accepted as a basic test for the suitability of the model: Chi-Square Value= 7.306, Prob=0.124 > 0.05. Therefore, since the significance level in the test is more than 5%, Ho is accepted that the model is appropriate. The model is appropriate for the analysis and the results obtained are reliable.

According to Table 2, age and length of employment did not have a significant effect on work-life balance ( $p>0.05$ ). On the other hand, marital status, gender, number of children, number of dependents, having a helper at home, receiving family support and receiving manager support were found to be significantly effective on work-life balance. According to Exp(B) values, the high risk factors for work-life balance were Receiving Family Support (Exp(B)=3.928), Dependent Person (Exp(B)=3.622), Having a helper at home (Exp(B)=3.527).

### 3. Conclusion

In the finance sector, negative working conditions such as irregular and excessive working hours, high number of working hours, intensity of weekend work and business travelling, low

wage level lead to conflict. Different family structures such as having a large family, having a high number of children with care obligations in the family, having young children, both spouses working are also among the factors that trigger conflict. As a result of the conflict, there is a significant decrease in the individual's satisfaction with family or work life and life in general.

Conflicts between the family and work lives of working individuals have negative effects on the organisation they work for. However, although it is an important factor, the development of work-life balance programmes is often put on the back burner by organisations due to its cost. In the context of the effects of work-life balance on human resource management, its effect on business results, which has been discussed more intensively in recent years, should also be evaluated. Organisations think about the return effect of the work-life balance programmes they have initiated in terms of work productivity and plan how they can make the programmes more effective.

The aim of this study is to determine the factors affecting the work-life balance of banking sector employees who have intensive working hours. As a result of logistic regression model estimations, age and years of employment were not found to have a significant effect on work-life balance ( $p > 0.05$ ). On the other hand, marital status, gender, number of children, dependents, having helpers at home, having family support and having manager support were found to be significantly effective on work-life balance. According to  $\text{Exp}(B)$  values, the high risk factors for work-life balance were receiving family support ( $\text{Exp}(B)=3.928$ ), dependent person ( $\text{Exp}(B)=3.622$ ), having a helper at home ( $\text{Exp}(B)=3.527$ ).

Work engagement will improve positively when organisations, apart from working methods practices, establish a work-life balance culture through various arrangements or when they enable people to achieve work-life balance. Human resources specialists, who are responsible for the development of the labour force in organisations, should lead the change in order to be in the position of the institution that supports the work-life culture. Although work-life integration is not only a concern of human resources, but of the whole organisation, the human resources department has a key role to play. This is because human resource managers have the best understanding of the abilities, capacities and degree of commitment of employees to the organisation. On the other hand, employers may need to determine family-friendly company strategies and provide counselling and support services to their employees if necessary. Flexible working patterns that allow employers to allow women to work for shorter periods of time at any time would be an option to enable them to fulfil their family responsibilities. Part-time work or other forms of flexible working may be preferable for mothers in terms of both earning and creating more time for their children. Socially family-friendly regulations should be reconsidered and improvements should be made in this regard; flexibility should be offered to employees as much as necessary in order to express organisational effectiveness, and priorities should be set to protect the rights and needs of the family and family members more.

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# Human Capital and Economic Growth Evidence from BRICS Economies

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## Abstract

Human capital is a significant indicator of economic development level and important for economic growth of a country. In other words, human capital are the most important source of investments and economic growth. Therefore, interplay between human capital and economic growth is important for the countries. This study investigates the interplay between human capital and economic growth in BRICS Economies through causality test over the 2000-2022 period. The causality analysis unveils a bilateral causal relationship between human capital and economic growth.

**Keywords:** human capital, economic growth, panel causality analysis, BRICS countries

## 1. Introduction

Human capital is defined as the knowledge, skills, competence and other qualities acquired by individuals or groups of individuals throughout their lives and used to produce goods, services or business ideas under market conditions (OECD, 2017). The source of human capital is human being and investments in human capital can increase the speed and quality of the human beings and in turn increases in human quality can improve the quality of human capital. The quality of human capital is important in order to increase effectiveness and productivity during the investment and production processes. In conclusion, a human capital with higher quality will contribute to economic growth and productivity (Sulisnaningrum et al., 2022). Human capital can make a contribution to the economic growth if the following conditions are satisfied (Awan, 2012):

Human capital investments to contribute to the improvements in labor productivity.

Human capital has a key role in the implementation and spread of technological progress.

Human capital is more attractive for the investments when compared with the other factors.

The policies to increase the quality and quantity of the human capital stock are compatible with social integration.

To increase the economic growth and development through improving the human capital is among the crucial goals of the countries. Therefore, the countries can enhance their welfare and life quality levels. This paper studies the interplay between human capital and economic growth in the BRICS economies within this framework. The next part outlines the related literature and data and method are explained immediately afterwards. The empirical analyses are performed in Section 4 and the paper is concluded with the Section 5.

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## 2. Literature Review

The nexus between human capital and economic growth has been extensively studied in the literature and most of the studies have discovered a positive impact of human capital on economic growth (Mankiw et al., 1992; Ay and Yardimci, 2008; Yapraklı and Sağlam, 2010; Pablo-Romero and Sanchez-Braza, 2015; Manga et al., 2015; Wusiman and Ndzembanteh, 2020; Sawitri et al., 2022; Chaabouni and Mbarek, 2023).

Mankiw et al. (1992) explored the effect of physical capital and human capital on economic growth in 75 countries through regression approach and found a positive effect of schooling rate and physical capital on economic growth.

Ay and Yardimci (2008) investigated the effect of physical and human capital accumulation on economic growth in Turkiye over the 1950-2000 period and unveiled that physical and human capital accumulation positively affected economic growth and productivity. On the other hand, Yapraklı and Sağlam (2010) investigated the relationship among GNP, labor force, physical capital and human capital in Turkiye between 1980 and 2008 by way of Granger causality test, Johansen cointegration test and VECM methods and found a positive relationship between economic growth and physical capital, labor force, human capital and knowledge in the long term.

Pablo-Romero and Sanchez-Braza (2015) analyzed the interplay between human capital, physical capital, energy consumption and economic growth in OECD, BRIC, NAFTA, East Asian, East European and EU15 countries for the 1995-2007 period via cointegration analysis and discovered a positive relationship among all variables for all country groups.

Fang and Wolski (2015) investigated the relationship among physical capital stock, human capital, energy consumption, and GDP in China for the period 1965-2014 using the asymmetric causality test and Johansen cointegration test. They revealed weak evidence in favor of the substitution effect between human capital and energy/coal use. Manga et al. (2015) investigated the relationship between human capital and economic growth in Turkiye and BRICS countries for the period of 1995-2011 and disclosed a long-term positive relationship between human capital and economic growth in Turkiye and BRICS countries.

Wusiman and Ndzembanteh (2020) analyzed the effect of human capital and innovation output on economic growth in Malaysia and Turkiye for the period of 1988-2013 and determined that human capital, innovation and physical capital positively affected economic growth in the long run.

Sawitri et al. (2022) investigated the impact of poverty and human capital on economic growth in Malaysia for the period of 1990-2020 via autoregression moving average method and determined that human capital positively affected economic growth, while poverty had a negative effect on economic growth. Chaabouni and Mbarek (2023) investigated the relationship between human capital and economic growth in 17 EU members over the period of 2015-2019 and 2019-2022 via dynamic regression approach and revealed that the increases in the level of human capital significantly increased the economic growth. Also, their findings showed a bidirectional causality between economic growth and health, as well as education and economic growth, and a unidirectional causal relationship from education to health for the period before Covid-19, but there were no significant causality among the variables after Covid-19.

Rahman et al (2023) investigated the impact of technological innovation, foreign direct investment, trade, and human capital on economic growth in Bangladesh for the period of 1990-2020 using the dynamic ARDL simulation method and determined a long-term symmetric



relationship among technological innovation, human capital, and economic growth. On the other hand, there was a significant relationship among the variables in the short run.

On the other hand, In and Doucouliagos (1997) examined the causal relationship between human capital and economic growth in the US through Granger causality test and discovered a significant causal relationship between human capital and economic growth. Yaylalı and Lebe (2011) also examined the causal relationship between human capital and economic growth in Turkiye over the period of 1938-2007 and identified a one-way causal relationship from human capital to economic growth. Sulisnaningrum et al. (2022) analyzed the causal relationship among human capital, technological progress and economic growth in Indonesia for a period of more than 20 years through VAR approach and detected a bidirectional causal relationship between all variables.

Mohamed (2022) explored the impact of women’s human capital on economic growth in Sudan for the period of 1975-2021 through ARDL and NARDL approaches and discovered a negative impact of women’s human capital on economic growth, but women's participation to the workforce had a significant positive effect on economic growth. On the other hand, Siddiqui (2004) analyzed the relationship among GDP, capital stock, labor force, human capital, export, and energy consumption in Pakistan for the period 1969-2002 through using ARDL approach and VAR analysis and revealed an insignificant relationship between human capital and GDP.

### 3. Data and Method

This paper studies the relationship between human capital and economic growth in sample of BRICS states. The economic growth (GRW) is proxied by GDP per capita based on constant 2015 US\$ and is taken from World Bank (2023). On the other hand, human capital (HUMAN) is represented with human capital index of UNCTADSTAT (2023). The study period is specified as 2000-2022, because human capital variable is available during the 2000-2022 period.

The econometric analyses are performed through Stata 15.0 statistical program. The causal relationship between human capital and economic growth is investigated by JKS (Juodis, Karavias, Sarafidis) (2021) causality test which is developed for heterogeneous panels.

The summary statistics of real GDP per capita and human capital index are reported in Table 1. The mean of real GDP per capita (constant 2015 US\$) and human capital index are 6027.619 US\$ and 46.194 respectively. However, real GDP per capita (GRW) exhibits too volatility in BRICS states for the 2000-2022 period.

**Table 1:** Summary statistics of the series

| Summary statistics | GRW      | HUMAN  |
|--------------------|----------|--------|
| Mean               | 6027.619 | 46.194 |
| Std. Dev.          | 3009.644 | 9.375  |
| Maximum            | 11560.33 | 63.942 |
| Minimum            | 755.482  | 26.861 |
| Observations       | 115      | 115    |

### 3. Econometric Analysis

In the econometric analysis, cross-sectional dependency between human capital and economic growth is examined with tests of LM, LM<sub>adj.</sub>, and LM CD, and the test results are reported in Table 2. The null hypothesis of cross-sectional independency is abnegated given the probability values of three tests and the subsistence of cross-sectional dependency is disclosed between two variables.

**Table 2:** Cross-sectional dependence tests’ results

| Test                           | Test statistic | Prob. |
|--------------------------------|----------------|-------|
| LM (Breusch and Pagan, 1980)   | 108.5          | 0.000 |
| LM adj* (Pesaran et al., 2008) | 57.05          | 0.000 |
| LM CD* (Pesaran, 2004)         | 7.184          | 0.000 |

The homogeneity is examined with delta tilde tests of Pesaran and Yamagata (2008) and their results are reported in Table 3. The homogeneity is abnegated given the probability values of two tests and subsistence of heterogeneity is disclosed.

**Table 3.** Homogeneity tests’ results.

| Test                    | Test statistic | Prob. |
|-------------------------|----------------|-------|
| $\tilde{\Delta}$        | 20.715         | 0.000 |
| $\tilde{\Delta}_{adj.}$ | 22.214         | 0.000 |

The stationarity of GRW and HUMAN is investigated with Pesaran (2007) CIPS unit root test owing to the subsistence of cross-sectional dependency and its results are reported in Table 4. The test results unveil that GRW and HUMAN is I(1).

**Table 4:** Unit root test’s results

| Variables | Constant  | Constant +Trend |
|-----------|-----------|-----------------|
| GRW       | -0.332    | -0.513          |
| D(GRW)    | -4.135*** | -5.325***       |
| HUMAN     | -0.137    | -0.325          |
| d(HUMAN)  | -3.793*** | -2.880***       |

\*\*\* and \*\* indicates that it is respectively significant at 1% and 5% level.

The causal relationship between human capital and economic growth is investigated with JKS (2021) causality test and its results are reported in Table 5. The results disclose a bilateral causal relationship between human capital and economic growth. In other word, both human capital and economic growth affects each other. Our results coincide with the theoretical views and empirical results of Sawitri et al. (2022) and Sulisnaningrum et al. (2022) on the nexus between human capital and economic growth.

**Table 5:** JKS (2021) causality test results

| H0                      | HPJ Wald Test | Probability Values |
|-------------------------|---------------|--------------------|
| HUMAN $\rightarrow$ GRW | 16.6561       | 0.0002             |
| GRW $\rightarrow$ HUMAN | 5.5827        | 0.0181             |

## 5. Conclusion

The measures to improve the human capital in the underdeveloped and developing countries are very important given the effect of human capital on technological progress which fosters the economic growth through increases in labor productivity. Furthermore, improvements in human capital is critical for making progress in economic development. Therefore, this study investigates the interplay between human capital and economic growth in BRICS states through causality test over the 2000-2022 period and unveils a bilateral causal relationship between

human capital and economic growth in compatible the associated theoretical views and results empirical of studies. Our results indicate that human capital is a significant instrument to achieve economic growth and development.

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# Trade Globalization and CO<sub>2</sub> Emissions Evidence from MINT Economies

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## Abstract

Environmental impairment has become one of the vital threats in the world and countries, regional unions, and international institutions have tried to combat environmental problems as of 1950s. Therefore, this paper examines the causal relation between CO<sub>2</sub> emissions and trade globalization in the MINT states by way of causality test over the period of 1990-2020. The results of causality test reveal a feedback interaction between CO<sub>2</sub> emissions and trade globalization.

**Keywords:** Trade globalization, CO<sub>2</sub> emissions, panel causality analysis, MINT countries

## 1. Introduction

The flows of trade and foreign direct investment have remarkably increased together with globalization. The environmental effects of trade and foreign direct investments have been one of the main subjects of political debates. One view suggests that trade liberalization causes the economic growth and negative environmental effects of trade liberalization begin to decrease when the countries reach a threshold of income level (Gallagher, 2009). On the other hand, another view, the firms direct their production processes with intense pollution to the countries with lax environmental rules and in turn environmental degradation will be increased in the world and this process creates a negative pressure on countries with stringent environmental regulations (Gallagher, 2009).

Grossman and Krueger (1991) suggested that the increases in trade and economic globalization would increase the CO<sub>2</sub> emissions, but firms and households could control the environmental pollution to some extent by employing the green technologies. As a matter of fact, the use of environmentally friendly technologies in the production process will lead to less pollution per unit of output. In addition, the individuals in a society will increase their demands for a healthier and more sustainable environment as society becomes richer. Thus, the governments, aiming to maximize votes, may implement more stringent environmental regulations to achieve a healthier and more sustainable development.

The theoretical and empirical literature about the effect of trade liberalization on CO<sub>2</sub> emissions has stayed inconclusive. Thus, the empirical studies on the relation between trade liberalization and CO<sub>2</sub> emissions has uncovered different findings for different countries and country groups (Olsthoorn, 2003, Farooq et al. 2022, Gaies et al. 2022, Jahanger, 2022). This mainly can be resulted from that each country's priorities are different. Therefore, this paper investigates the causal relation between CO<sub>2</sub> emissions and trade globalization in the MINT (Mexico, Indonesia, Nigeria, and Turkiye) countries for the duration of 1990-2020. The next section of the study outlines the associated literature and data and method are explained immediately afterwards. The causality test is conducted in Section 4 and the paper is concluded with the Section 5.

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## 2. Literature Review

The following empirical literature on the nexus between trade globalization and CO<sub>2</sub> emissions have reached mixed results. In this context, Ahmed and Le (2021) studied the connection among CO<sub>2</sub> emissions, communication technology, and trade globalization in ASEAN members (Indonesia, Malaysia, Philippines, Singapore, Thailand, Veitnam) for the period of 1996-2017 through causality and cointegration tests. Their findings point out a unilateral causality from both communication technology and trade globalization index to CO<sub>2</sub> emissions. On the other hand, Yang et al. (2021) explored the interaction among CO<sub>2</sub> emissions, population aging, and economic globalization in OECD countries through panel data analysis and found that economic globalization and population aging has a negative effect on long-run CO<sub>2</sub> emissions and there was a unilateral causal relation from economic globalization and population aging to CO<sub>2</sub> emissions.

Sun et al. (2021) analyzed the effect of service trade globalization on low carbon globalization in 30 countries for the period of 1980-2013 via regression approach and discovered that service trade openness positively affected the productivity of CO<sub>2</sub> emissions. You and Lv (2021) conducted the spatial effects of economic globalization on CO<sub>2</sub> emissions in 83 countries over the period of 1985-2013 spatial panel data analysis. Their findings indicated a negative effect of economic globalization on CO<sub>2</sub> emissions.

Afşar and Yüksel (2022) analyzed the asymmetric effect of economic globalization and financial development on CO<sub>2</sub> emissions in Turkiye for the period of 1980-2019 through NARDL approach and uncovered that globalization increased the CO<sub>2</sub> emissions in both short and long run. Alam et al. (2022) investigated the nexus among CO<sub>2</sub> emissions, globalization, renewable energy, and agriculture in India by way of Maki cointegration test and ARDL approach. They found that increases in economic and social globalization raised the agricultural production and in turn negatively influenced the atmospheric quality.

Gaies et al. (2022) explored the long-term asymmetric effects of economic globalization on CO<sub>2</sub> emissions in 17 MENA countries for the period of 1980-2018 via ARDL and NARDL approaches and revealed that globalization raised the CO<sub>2</sub> emissions and the effect of trade globalization on CO<sub>2</sub> emissions was found to be much higher than that of financial globalization. Jithin and Ashraf (2023) analyzed the interaction between global value chains participation and CO<sub>2</sub> emissions in 61 countries over the period of 2000-2018 and revealed a positive effect of global value chains participation on CO<sub>2</sub> emissions.

Mehboob et al. (2023) investigated the nexus among CO<sub>2</sub> emissions, nuclear energy consumption, environmental tax, population density, economic growth and trade globalization in the highest five emitter countries for the period of 1990-2020 and found that trade globalization decreased the consumption-based carbon emissions. On the other side, Liu et al. (2023) examined the effect of global supply chains on carbon emissions in 14 countries most affected by Covid-19 for the period of 2019-2020 through multi-regional input-output method and revealed that total global carbon emissions decreased by 6.01% during COVID-19.

Yeter (2023) examined the effect of renewable energy and economic globalization on carbon emissions per capita in Turkiye for the of period 1980-2020 through unit root, cointegration and causality analysis methods based on Fourier functions and found that economic globalization positively affected environmental quality.

## 3. Data and Method

This paper examines the causal relation between trade globalization and CO<sub>2</sub> emissions in the MINT economies. The CO<sub>2</sub> emissions (CO) is represented by CO<sub>2</sub> emissions (metric tons per

capita) and obtained from World Bank (2023). On the other hand, trade globalization (TG) is proxied by trade globalization index of KOF Swiss Economic Institute (2023). The study covers the period of 1990-2020, because CO<sub>2</sub> emissions data is available for MINT economies as of 1990 and the series of CO<sub>2</sub> emissions and trade globalization ends in 2020.

The econometric analyses are performed through Stata 15.0 statistical program. The causal relationship between trade globalization and CO<sub>2</sub> emissions is investigated by JKS (Juodis, Karavias, Sarafidis) (2021) causality test which is developed for heterogeneous panels.

The summary statistics of CO<sub>2</sub> emissions and trade globalization are shown in Table 1. The mean of CO<sub>2</sub> emissions and trade globalization index are respectively 2.422 metric tons per capita and 45.049. But, the series of trade globalization index is too volatile for the period of 1990-2020.

**Table 1:** Summary statistics of the series

| <b>Summary statistics</b> | <b>CO</b> | <b>TG</b> |
|---------------------------|-----------|-----------|
| Mean                      | 2.422     | 45.049    |
| Std. Dev.                 | 1.436     | 10.468    |
| Maximum                   | 5.093     | 63.766    |
| Minimum                   | 0.491     | 22.398    |
| Observations              | 124       | 124       |

#### 4. Econometric Analysis

In the econometric analysis, cross-sectional dependency between human capital and economic growth is examined with tests of LM, LM<sub>adj.</sub>, and LM CD, and the test results are reported in Table 2. The null hypothesis of cross-sectional independency is abnegated given the probability values of three tests and the subsistence of cross-sectional dependency is disclosed between two variables.

**Table 2:** Cross-sectional dependence tests' results

| <b>Test</b>                    | <b>Test statistic</b> | <b>Prob.</b> |
|--------------------------------|-----------------------|--------------|
| LM (Breusch and Pagan, 1980)   | 53.46                 | 0.000        |
| LM adj* (Pesaran et al., 2008) | 42.56                 | 0.000        |
| LM CD* (Pesaran, 2004)         | -2.805                | 0.005        |

The homogeneity is examined with delta tilde tests of Pesaran and Yamagata (2008) and their results are reported in Table 3. The homogeneity is abnegated given the probability values of two tests and subsistence of heterogeneity is disclosed.

**Table 3.** Homogeneity tests' results.

| <b>Test</b>             | <b>Test statistic</b> | <b>Prob.</b> |
|-------------------------|-----------------------|--------------|
| $\tilde{\Delta}$        | 4.171                 | 0.000        |
| $\tilde{\Delta}_{adj.}$ | 4.389                 | 0.000        |

The stationarity of CO and TG is examined by Pesaran (2007) CIPS unit root test because of the cross-sectional dependency between two series and its results are shown in Table 4. The test results identify that CO and TG are integrated to I(1).

**Table 4:** Unit root test’s results

| Variables | Constant  | Constant +Trend |
|-----------|-----------|-----------------|
| CO        | 2.610     | 2.384           |
| D(CO)     | -2.459*** | -2.285**        |
| TG        | 0.342     | -2.880***       |
| d(TG)     | -4.933*** | -3.971***       |

\*\*\* and \*\* are respectively significant at 1% and 5% level.

The causal relationship between CO<sub>2</sub> emissions and trade globalization is analyzed by way of JKS (2021) causality test and its results are shown in Table 5. The results denote a bilateral causal relation between CO<sub>2</sub> emissions and trade globalization. In other word, a feedback connection between CO<sub>2</sub> emissions and trade globalization subsists for the MINT countries.

**Table 5:** JKS (2021) causality test results

| H0      | HPJ Wald Test | Probability Values |
|---------|---------------|--------------------|
| TG → CO | 4.6711        | 0.0307             |
| CO → TG | 51.8956       | 0.0000             |

## 5. Conclusion

In recent years, the impact of globalization on every field has gradually increased. The most important impact of globalization has been experienced in the economies. The countries have struggled to attract foreign investments for achievement of their economic goals. In this context, environmental degradation has generally accompanied the increases in the production with the contribution of foreign direct investments. Trade globalization can influence the CO<sub>2</sub> emissions through three aspects including scale effect, composition effect and technological effect. According to the scale effect, economic activities will increase with trade globalization and in turn cause environmental pollution. According to the composition effect, trade liberalization will enable countries to focus on products in which they have a comparative advantage. In this case, environmental pollution may increase or decrease. According to the technological effect, environmental pollution will decrease with the tendency to use green technologies. Therefore, the net impact of trade globalization on environment depends on which factors are dominant. This study investigates the causal relation between trade globalization and CO<sub>2</sub> emissions in the MINT countries for the period of 1990-2020 and the results of causality test reveal a feedback interaction between CO<sub>2</sub> emissions and trade globalization.

In conclusion, the countries should act together about environmental issues, follow the sustainable growth policies, increase the environmental education and training programs to improve the environmental awareness, develop and use green technologies and energy efficient technologies and arrange the financial incentives and regulations to direct the firms toward the production with less carbon emissions.



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# Public Relations in the Tourism Sector: Digital Transformation in Hospitality

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## Abstract

Today, people have become more digitalized than ever when it comes to creating travel plans, selecting accommodations, and evaluating experiences. Social media has become a powerful tool for travellers and tourists, providing real-time information about local experiences, allowing them to share their own experiences, and assess their travel experiences. The digital communication transformation has also presented significant opportunities for tourism businesses. Businesses can reach potential customers more quickly and in a more personalized manner. They can track feedback more effectively and enhance customer satisfaction by customizing experiences.

Furthermore, the internet's global reach has turned the world into a global village, increasing access to international markets for tourism businesses. Through international collaborations and strategic partnerships, businesses can reach more customers worldwide. However, because of this digital transformation, consumer expectations have also evolved. Consumers, who have greater access to information and quicker responses, now expect businesses to provide unique experiences and improve their customer service. In the tourism sector, public relations are no longer just about communication; they are about the ability to provide personalized and meaningful experiences.

This study focuses on the digital transformation of public relations in the tourism sector and emphasizes the shift in consumer expectations. It helps us understand this significant change in the industry by discussing how digitalization and public relations are integrated for tourism businesses.

**Keywords:** public relations, digital transformation, tourism industries, social media

## 1. Introduction

The tourism sector serves as a means for people worldwide to explore different cultures, experience new adventures, and relax. However, today's tourism experience is undergoing a dramatic transformation due to the rapid development of digitalization and communication technologies. Travelers and tourists now extensively use digital platforms when planning vacations, searching for accommodation options, and evaluating their experiences. This has fundamentally reshaped the travel and tourism industry, presenting new opportunities and challenges for businesses (Bhatt & Pickering, 2023).

The rise of social media has made travel experiences more accessible and shareable, providing instant access to information about local experiences and facilitating travellers in sharing and evaluating their own experiences (Papasolomou & Melanthiou, 2012, p. 321). Consequently, tourists are no longer limited to visiting tourist attractions but also seek to discover and evaluate factors that affect their travel experience. It is evident that this digital transformation brings significant advantages and requirements for tourism businesses.

One of the significant advantages provided by this digital transformation to tourism businesses is the potential for broader access. Digital platforms eliminate boundaries and offer businesses easy access to international markets. This allows businesses to reach not only local customers but also potential customers worldwide. Furthermore, the digital transformation enhances the capacity to provide customers with more personalized experiences. By better understanding

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customer preferences and habits, businesses can offer special vacation packages or experiences, which is crucial for increasing customer satisfaction and building a loyal customer base. Digital platforms also help businesses communicate with their customers quickly and effectively. Social media, email marketing, and mobile applications facilitate interactions by enabling businesses to send instant notifications and special offers, particularly advantageous for gaining customer loyalty and re-marketing. Lastly, the digital transformation allows businesses to provide real-time feedback. Customers can instantly share their travel experiences, and businesses can use this feedback to make quick improvements and continually enhance their services. This supports businesses in their efforts to increase customer satisfaction and competitiveness (Abbasi, Tsiotsou, Hussain, Rather, & Ting, 2023).

However, there are also some disadvantages that come with the digital transformation for tourism businesses. First and foremost, with this transformation, businesses are starting to use customer data more extensively, raising concerns about data security. The risk of customer information being stolen or misused poses a serious threat to businesses. Additionally, as technological changes progress rapidly, businesses must constantly adapt to new technologies. This can result in high-cost updates and training requirements. Increased competition is another disadvantage. Digital platforms enable more businesses to establish an online presence, intensifying competition. Lastly, rising customer expectations can create significant pressure on businesses. Customers expect faster services and higher standards in their experiences, necessitating continuous improvements by businesses. These disadvantages reflect the challenges that businesses may encounter while managing digital transformation (Abbasi, Tsiotsou, Hussain, Rather, & Ting, 2023).

This study examines the impact of this digital transformation on public relations (PR) in the tourism sector. It will particularly explore how the digital transformation in the accommodation industry has created a range of new opportunities and challenges. Tourism businesses can now reach customers in a more personalized manner, track feedback more effectively, and enhance customer satisfaction by customizing experiences. However, this digital transformation has also raised consumer expectations, demanding businesses to offer more unique and meaningful experiences. In the following sections, we will delve into how digitalization has transformed public relations and explore this crucial topic in more depth.

## **2. Literature Review**

In the study conducted by Yavuz (2016), it was emphasized that the tourism industry is a significant part of the global economy. It was noted that approximately one billion people participate in tourist activities each year, contributing to an economic value of approximately one trillion dollars worldwide. However, this growth and mobility are threatened by unsustainable tourism practices. It was underscored that such practices would not be sustainable in the long term. The study focused on the role of tourism businesses as a critical factor for the sustainability of the tourism industry. It was stated that these businesses should pay close attention to the balance between preservation and utilization, offering products and services that meet consumer expectations while also being sensitive to society and the environment. This approach will not only ensure the preservation of tourism resources for future generations but also shape a positive consumer perception. The study also highlighted the importance of public relations efforts in the context of sustainability within the tourism sector. It was emphasized that informing and educating all stakeholders, including the general public, about the responsibilities and sustainability goals of tourism businesses is necessary for the successful implementation of sustainable tourism. Therefore, it was emphasized that effective public relations campaigns have the potential to promote the sustainable development of the tourism industry and prevent unsustainable practices. It was strongly emphasized that businesses in the

tourism sector should create awareness about sustainability and social responsibility through public relations. In conclusion, efforts to ensure the sustainability of resources are observed in nearly every sector. Particularly, the importance of sustainability in the tourism industry has started to be understood by all stakeholders who want to meet their material and spiritual needs from this sector. In a densely populated field like tourism, it is crucial that resources, including natural, cultural, and physical ones, are evaluated with a careful balance of preservation and usage, considering the needs of future generations. To maintain sustainability systematically and permanently in tourism, it is necessary to utilize public relations as an effective and guiding tool in raising awareness among all components of the industry, such as business owners, employees, the public sector, non-governmental organizations, and local communities.

Tourism sector holds an indispensable place in today's world as a significant component of economic growth, cultural interaction, and international relations. For countries with high tourism potential like Turkey, effective management of this sector and ensuring its sustainability are of paramount importance. Yetkin's (2016) study clearly highlights the fact that Turkey does not give sufficient importance to public relations in the tourism sector and lacks a strategic approach in this regard. It is pointed out that no significant changes are expected in public relations in strategic plans, and effective steps to improve the sector's growth rate and resilience are not taken. This situation emerges as a significant obstacle to fully realizing Turkey's tourism potential. While sustainability of tourism constitutes a crucial agenda item for the sector, study reveals that sustainable tourism is under threat due to deficiencies in promotion, marketing, and public relations. Initiatives such as diversifying tourism, supporting domestic tourism, and identifying new target markets are positive steps. However, for these initiatives to be successful, more investment is needed in the fields of communication and public relations. The study also suggests that public relations hold strategic importance in the sector and should be emphasized more at the upper management level. Maintaining effective communication with internal and external stakeholders is a critical factor for the successful implementation of tourism policies. The new understanding of tourism, which highlights individual tourism, places communication and public relations at its core. Utilizing public relations effectively in a wide range from diplomatic communication to communication with employees can enhance the sector's success. In conclusion, study emphasizes the need for Turkey's tourism sector to give more importance to public relations and adopt a strategic approach in this field. Effective use of public relations is crucial for the sustainability and international competitiveness of the tourism sector. In this context, incorporating more communication and public relations topics into the curricula of tourism faculties in Turkey and supporting scientific research will contribute to the development of the sector.

In the study by İmre (2020), the impacts of social media on the tourism sector were examined. The advantages that social media offers to tourism businesses, such as low-cost communication of activities like customer relations, sales development, and advertising to a wide audience, were highlighted. However, it was also emphasized that the rapid sharing on social media could lead to the rapid spread of negative news, which businesses might find challenging to manage.

In conclusion, the study emphasizes that tourism businesses can create communities effectively by using social media and can succeed if they manage these communities well. Additionally, it is noted that tourism destinations can utilize social media for promotional and marketing purposes. Therefore, the development of appropriate strategies and effective use of social media are essential. Furthermore, considering age and intergenerational differences it is stated that the examination of social media usage in the tourism sector is crucial.

In the study by Özgüner and Uçar (2015) demonstrates that in today's world, widespread internet usage provides individuals with opportunities to engage in various online activities. In

this context, one of the most preferred platforms among internet users is social media. The researchers emphasize that the success of tourist destinations relies on a thorough understanding and effective implementation of tourism marketing. Hence, the study underscores the significance of effectively managing public relations and advertising strategies, especially on social media platforms. This is essential for a tourist destination to gain popularity, establish a positive image, and emerge as a focal point of attraction. The study underscores that comprehending and applying marketing techniques are of critical importance for tourism businesses. It also emphasizes the significance of promoting sustainable use of natural resources and enhancing customer satisfaction.

In the study, Çiftçi (2016) emphasizes the significant role of social media in facilitating active and two-way marketing communication for individuals. He highlights that individuals not only consume information but actively engage in sharing it, leading to the creation of virtual spaces for businesses to establish their online presence and marketing efforts. Also, it cautions about the presence of inaccurate or misleading information on social media and underscores the importance of ensuring accuracy in content. Additionally, he emphasizes the need for proper education and information dissemination about social media use, targeting professionals and individuals involved in the tourism industry to create a more informed and skilled workforce.

Taking into consideration these researchers' comments and looking at the bigger picture, it becomes evident that social media holds significant importance in the tourism sector. The widespread use of the internet and social media platforms presents substantial opportunities for tourist destinations and businesses. However, to harness the potential effectively, the right marketing strategies, public relations efforts, advertising campaigns, and information management are essential. Furthermore, the training and development of knowledgeable professionals and staff members play a critical role in ensuring accurate information dissemination and customer satisfaction. Social media is poised to continue playing a central role in the future of the tourism industry. Therefore, industry stakeholders must enhance their skills in effectively utilizing and managing these platforms. By doing so, tourist destinations can gain more popularity, create a positive image, and reach a broader customer base.

### **3. Digital Transformation in Public Relations**

Text In today's world, communication technologies, especially the internet and social media, make it possible for businesses to implement their public relations strategies more easily and effectively (Akar, 2010). Through the internet, rapidly reaching a wide audience, learning the opinions and suggestions of the target audience in real-time, delivering corporate updates and news to the target audience instantly, and managing these processes with lower costs have become more accessible. These communication technologies have turned public relations into not only a means of communication but also a strategic management tool.

Public relations involve planning and implementing communication strategies with different target audiences based on the objectives of not only non-profit organizations but also profit organizations (Broom & Sha, 2013, p. 8). These audiences can vary, including customers, distributors, employees, depending on the goals of the organization or campaign. In this context, public relations professionals have more opportunities to reach these different audiences and influence them by utilizing communication technologies.

Social media is one of the most prominent and effective of these communication technologies. With its user base growing exponentially every year, it has become a communication platform accessible to a significant portion of the world's population. Social media is considered one of the most efficient ways for nearly all industries to reach their target audience rapidly and cost-effectively. These platforms are not only used for communication but also for various public

relations applications, including marketing, advertising, crisis management, and reputation management (Yeniçıktı & Tarakçı, 2023).

The execution of marketing campaigns on social media, designing advertising strategies more effectively on social media platforms, sharing public relations campaigns on social media, and developing all communication strategies with a focus on social media are becoming increasingly important. Therefore, public relations and marketing professionals must stay up to date, review their strategies, and establish deeper connections with their target audiences by effectively utilizing social media platforms (Roth-Cohen & Avidar, 2022).

The significance of social media is an opportunity that should not be missed, particularly for organizations in service-oriented sectors such as tourism, which aim to survive and gain a competitive advantage in the rapidly changing digital world. These platforms have become powerful tools not only for shaping the communication of businesses but also for managing their reputation and strengthening customer relationships. In short, the ability of public relations to adapt to this new era by effectively using communication technologies is of critical importance (Gesualdi, 2019).

#### **4. Social Media Awareness in Public Relations Practices for The Hospitality Industry**

In the digitized world, every sector, including the tourism industry, is experiencing the influence of social media as a significant factor directly impacting the success of businesses. The tourism sector, with its unique characteristics, is an area where tourists sharing their travel experiences on social media platforms significantly influence the choices of other travellers. Furthermore, information about tourism shared accurately and effectively by all stakeholders in tourist destinations also has a substantial impact on tourism consumers. With the rise of social media, travellers' now can instantly share their travel experiences and read comments from other travellers about the experiences shared. A vacationer can share a fantastic restaurant or hotel encountered during their journey on social media platforms, inspiring other vacationers to visit the same place. Similarly, negative experiences can spread rapidly and alert other travellers. For tourist destinations, social media management and engagement play a critical role in encouraging positive experiences and addressing negative ones. An online reputation of a destination can influence the decisions of potential vacationers. A strong online reputation is a powerful tool for attracting tourists and building a loyal customer base. Social media also influences the marketing and public relations strategies of the tourism sector. Tourist destinations use social media platforms to reach and interact with their target audiences. Through these platforms, destinations can showcase their beauty and attractions to entice potential vacationers. Additionally, by encouraging vacationers to share their holiday experiences, they can enhance customer satisfaction. In short, the role of social media in the tourism sector is significant and continuously growing. The posts made by vacationers on social media platforms can impact the reputation of destinations and serve as a crucial marketing tool for tourism businesses (Khan, 2022).

The tourism sector must carefully plan and manage its social media strategies to effectively thrive in this dynamic digital world. Harnessing the opportunities presented by digital transformation will primarily rely on the effective collection, utilization, and sharing of information. Information management encompasses businesses defining, capturing, sharing both internally and externally, and ultimately supporting the creation of new knowledge. These processes are crucial to keeping up with developments in the industry and promoting the creation of innovative tourist products. The information capture stage involves gathering important data and information related to the sector, which can include customer preferences, travel trends, destinations, and more. This information can then be shared, and communication with the target audience can take place at this stage. Digital tools like social media platforms

can expedite this information sharing and facilitate reaching broader audiences. The information application stage includes how the collected information can be practically utilized. For instance, travel agencies can use this data to offer customized holiday packages to customers. Furthermore, they can enhance the customer experience by using this data to improve travel services. Finally, the information creation stage involves discovering how new ideas and tourist products can be created by utilizing existing information. Particularly, this stage highlights the importance of innovation. Innovation can lead to the development of new ideas and services that enhance the travel experience. In summary, digital transformation in the tourism sector has the potential to create a more competitive industry through the development and utilization of information management processes. This can enable industry players to better respond to customer needs, develop more targeted marketing strategies, and offer more innovative tourist products (Sarihan, 1996, p. 236).

In a comprehensive manner, the management of new communication technologies occurs at five maturity levels. When considering the first level, the "Zero Level," the management of new communication technologies, such as social media, is still largely overlooked by many tourism organizations. At this stage, the full potential of new communication technologies has not been completely understood, and awareness in the sector is quite low. The second level is the "Awareness" stage. Here, the tourism sector begins to become familiar with new communication technologies and the concept of information sharing. People start using websites and social media to acquire information about tourist destinations and shape their travel decisions accordingly. Some players in the industry begin to understand the power of social media, websites, and other new communication technologies in terms of communication and marketing. The third level is the "Initiation" stage. Here, the management of new communication technologies is initiated. Organizations in the tourism sector develop small-scale information management pilot projects. These pilot projects start to spread throughout the sector. Tourism organizations begin to grasp the potential of websites and social media more fully. The fourth level is the "Interest" stage. At this stage, social media pilot projects generate more interest. Organizations in the tourism sector progress towards fully developed information management projects. The potential of social media becomes more apparent. The sharing of tourists and customers has the potential to influence destination choices. The fifth and final level is the "Penetration" stage. This stage represents a period in the tourism sector where the management of new communication technologies is widely accepted. New communication technologies are embraced by employees at all levels in the sector and are effectively implemented in organizations. Principles of information sharing become an integral part of daily work life. The tourism sector has fully grasped and adopted the potential of new communication technologies, especially social media (Liebowitz, 2010, pp. 11-13).

The impact of technological transformation has resulted in significant changes in public relations practices that need to be managed on digital platforms, leading tourism sector organizations to transition from traditional hierarchical structures to more flexible and open organizational models. Digital media assigns a more global, strategic, interactive, and socially responsible role to the discipline of public relations. In this context, public relations is no longer merely a promotional tool but also assumes the role of shaping organizational behaviour and adopting a strategic management approach. In summary, with the adoption of new communication technologies, social media has become a fundamental component of public relations campaigns. Especially for companies that offer high-quality products and services, adhere to transparent management principles, and successfully adapt to new media trends, the use of social media offers many advantages (İmre, 2020):



- Social media platforms provide opportunities to reach a broader audience and do so more quickly. This allows organizations to reach potential customers more widely and operate effectively in international markets beyond geographical boundaries.
- Companies' identities, missions, and visions can be conveyed more rapidly and effectively to broader audiences through social media. This helps organizations establish closer and more meaningful relationships with their target audience.
- Social media platforms make it easier to monitor and understand user behaviours. These data offer the opportunity to better target and personalize public relations campaigns.
- Brand awareness and value can be strengthened through social media. Effectively communicating the brand's story, values, and achievements can help it gain wider acceptance.
- Information about products, services, brand, and the business can be quickly and timely conveyed through social media. This can increase consumer loyalty and create new opportunities.
- The accurate transmission of public relations strategies through social media can enhance the company's reputation and play a crucial role in maintaining the sustainability of this reputation.

In conclusion, for organizations operating in the tourism sector, it is critical to leverage the opportunities brought by technological change to strengthen public relations strategies and adapt to them. This approach will be a significant step in improving customer satisfaction, promoting innovation, and achieving long-term success in the industry.

## 5. Conclusion

The digital transformation revolutionizes public relations in the tourism sector, presenting both opportunities and challenges for businesses. As travelers increasingly rely on digital platforms to plan their trips, evaluate experiences, and share their adventures, the role of social media becomes pivotal. It empowers tourists with real-time information and a platform for sharing their journeys, influencing the decisions of fellow travelers. Tourism businesses seize this transformation to reach potential customers more effectively, personalize experiences, and gather feedback for enhanced customer satisfaction.

The global reach of the internet turns the world into a global village for tourism businesses, allowing them to access international markets and engage in strategic collaborations. However, these opportunities also raise consumer expectations for unique, tailored experiences and better customer service. In response to these evolving dynamics, public relations in the tourism sector shifts from traditional communication to becoming a vital tool for shaping organizational behaviour and adopting a strategic management approach.

The integration of digitalization and public relations in tourism organizations is essential for surviving in this ever-changing digital landscape. By effectively utilizing communication technologies like social media, tourism businesses can extend their reach, build stronger relationships with their audience, and ultimately enhance their customer satisfaction and competitiveness. The ability to adapt to this new era by leveraging new communication technologies becomes a crucial factor for success in the tourism industry.

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# Is There an Effective Approach to Measure Capital Via Integrating Thinking for Companies?

Mehmet Nuri İnel<sup>1</sup>

## Abstract

Companies are in a competition and power of their capital provide them to survive in their sector. The measurement of capital, which has many different types, is important. In this study effectiveness of measurement capital types issue evaluated in the framework of integrated thinking for companies.

**Keywords:** SMEs, sustainability

## 1. Introduction

Integrated thinking is a vision of integrated reporting. It examines at the whole company in a wide view. There are types of capital according to integrated reporting which are named financial, manufactured, intellectual, human, natural, social and relationship capitals. Integrated thinking includes these capitals. All of them have their unique aspects. Companies should measure both capital and performance metrics for sustainable development. This paper presents a vision about measuring of types of capital. This study also aimed at raising awareness using types of capital and their indicators for decision makers. Each capital asset should have their key performance indicator sets. Hypothetically, types of capital can be interrelated. This relationship can be output and input relationship. The importance of capital categories and relationship can vary from company to company (International Integrated Reporting Framework 2021), (Integrated Thinking Principles 2022) (Capitals Background Paper for Integrated Reporting 2012).

Integrated reporting helps shareholders evaluate the organization's ability to create and sustain value in the short, medium and long term. Integrated reporting considers not only financial capital, but also all other types of capital. Integrated reporting has many benefits. (Topçu and Korkmaz G. 2015)

Not only reporting situation of types of capital but also the performance of KPI's that are derivate as a part of capital type is important. This study highlights the importance of identifying KPI's as a part of capital type in order to measure and control whole capital of company

## 2. Literature Review

In the literature, human capital usually includes indicators such as years of education, the expenditure-based cost approach, or the income approach, which measures expected future earnings growth; It is envisaged that the income approach, often giving higher values than the cost approach, can be harmonized with human capital by changing various assumptions. (Abraham and Mallatt, 2022). In another study, while aiming to evaluate the concept of social capital, which is stated to be difficult to measure, and to make it easier to choose between various measures, a typology groups addresses the five main social capital structures (Engbers

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et. al., 2017). Another study aimed to develop reliable, valid and meaningful methods for measuring social capital by using different approaches such as creating a single measure of social capital and developing a cluster-based typology of social capital (Stone and Hughes, 2002). It is stated that managerial trends and intellectual capital based on financial performance measures are often difficult due to the intangible nature, but the measurement of certain measures and flows can help determine the amount and strength of capital (William, 1999).

Scrivens and Smith (2013) aimed to identify the different elements within the broad framework of the concept of social capital and the areas in which statistical research and development should advance in order to lay the groundwork for better comparative measurements in the future (Scrivens and Smith, 2013).

In response to contemporary challenges such as globalization, the knowledge-based economy, and technological evolution, it demonstrates the notion that people with higher levels of individual talent are today becoming more valuable assets and can be recognized within the framework of human capital (Kwon, 2009). The difficulty of measuring the impact of human capital and investments in this field is discussed in the literature (Bassi, and McMurrer, 2008).

International practices in measuring investments by organizations in intangible capital are examined and it is stated that there is a need for a standardized framework to measure intangible capital (Hunter et. al., 2005). In another study it is stated that traditional accounting systems do not fully reflect the value creation processes and draw attention to the intangible nature of many resources and aimed to design an effective measurement model for businesses to manage their intellectual capital and create competitive advantage (Gogan, 2014).

In an era where tangible assets lose their importance and information-based assets increase in importance, accounting issues that are important in the management of assets such as brand names, trade secrets, production processes are addressed, while at the same time a framework is created to define and classify the various components of intellectual capital, and both individual and corporate (Luthy, 1998). The concept of innovation capital and its measurements are studied in depth in another study (Kijek, 2012). It is reviewed by examining important theoretical and empirical contributions to the measurement and reporting of intellectual capital while analysing its impact on corporate value and national economic performance, which is involved in developments in economics, management, technology and sociology in largely unpredictable ways within the framework of knowledge-based economics and innovation in the literature (Petty and Guthrie, 2000).

In another study, the integrated reporting and intellectual added values of the enterprises in the BIST Corporate Governance Index were examined, the value created by the enterprises was measured quantitatively with the data obtained from here, and a positive relationship was found between the integrated reporting scores and the intellectual added value coefficient (Yüksel, 2018). In another study the relationship between the financial performance of enterprises and integrated reporting is examined, and the role of non-financial information in the decision-making processes of stakeholders is emphasized (Akyüz and Yangibayev, 2020).

In the information age, intellectual capital, and especially human capital, has become more valuable than tangible assets, the efforts of businesses to create value and expand their markets by investing in these assets, and the measurement of intellectual capital and reporting through the accounting system are examined in detail (Sarigül, 2020). Various methods for measuring intellectual capital, including human, structural and customer capital, and transforming it into financial gain are examined in detail, and it is stated how this valuable information asset contributes to the productivity and value of businesses (Çetin, A. 2005). The effect of human capital on innovation has been investigated (Suriçi, 2019).

The efforts of institutions to increase their competitive advantage and market value by improving their financial and non-financial performances are examined, and by determining indicators representing multiple capital elements for integrated reporting, comparable and highly representative indicators that serve as a guide for sound evaluation and transparent measurement are presented. Integrated corporate performance was evaluated in the banking sector through a multi-equity-based model. In addition, a performance evaluation based on both financial and non-financial indicators is presented with an analytical approach, and it is stated that this approach aims to support the decisions of investors and other stakeholders. (Aras and Mutlu, 2019). In another study, integrated reporting practices are examined in the context of multiple capitals and guidelines. It is stated that integrated reporting scores have increased over time, but banks still need to improve in the implementation of capital disclosures and guidelines. (Berberoğlu, 2019).

### 3. Conclusion

In many studies in the literature, the importance of measuring capital types is expressed. Indicators of types of capitals can be determined one by one. The effect of the indicators on each other or on a performance output such as profit of the company can be measured. Here, models such as multiple regression can be established. Decision makers can make decisions according to results of these effects.

As a conclusion companies should determine their own indicator sets according to each type of capital. They should measure them periodically and track their performance metrics. These KPI sets can be analysed with statistical methods and multi criteria decision making methods. Indicators that can be changeable sector by sector can be determined and analysis for performance for further research.

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# Dimensioning of Radioactive Waste Deposits According to Their Evolution: Study Case

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Mihaela Toderaş<sup>2</sup>

Vlad Alexandru Florea<sup>3</sup>

## Abstract

Currently, across the world, a particular problem is related to the activities that produce radioactive material and generate radioactive waste that is dangerous for human health and the environment. Radioactive waste is the result of the activity of nuclear reactors, the use of isotopes in industry, research, medicine, and mining activities for the extraction and processing of uranium ores. In order to ensure the sustainability of industries producing radioactive waste, efficient management is required. The disposal of low- and medium-level radioactive waste through final storage is currently a viable industrial practice. The practices used for this type of radioactive waste are also not suitable for the disposal of high-activity waste, the latter implying particular risks for human health and the environment. In addition, high-level waste generates significant amounts of residual heat produced by radioactive decay, which requires intermediate storage for deactivation (50–100 years). This time interval is used for the development and implementation of technologies for the final storage of high-activity waste. The safe management of radioactive waste produced in Romania is a priority objective of the national policy in the nuclear field, capable of contributing to the sustainable development of nuclear energy. The paper presents a solution for the long-term management of waste generated today, taking into account the technologies used for each type of radioactive waste. Thus, for the type of radioactive waste that is produced in the largest quantity, a case study has been developed that aims to determine the appropriate location, the correct dimensioning, and the construction of the repository. The case study was developed in accordance with the national legislation and aligned with international legislation in the field of radioactive waste storage. The method of choosing the location of the warehouse was realised by superimposing all the maps accepted for storage, and thus a result was designed that covers all the site and legislative requirements. The proposed deposit can be placed in almost any location (provided that the legislative requirements are met), given the fact that the safety of the deposit is not based on geological and natural factors but to a large extent on the anthropic factor. The concept can be modified and adapted depending on the types of waste that will be stored and their quantities. An advantage of surface storage is the ease of retrieving the material, should it be decided to do so.

**Keywords:** radioactive waste, nuclear burnt fuel, nuclear power plants, long-term management, storage, geological warehouse, waste storage, protective barriers

## 1. Introduction

One of the problems with radioactive and hazardous waste is that although it does not exist in large quantities (it represents about 5% of the volume of all radioactive waste produced globally, according to the International Atomic Energy Agency, it cannot be eliminated definitively, no matter how processed they are, but only stored somewhere far or deep. It seems that the deep storage of this waste is the solution agreed by experts all over the world: the most radioactive waste and what remains unprocessed from the nuclear burnt fuel by the reactors will be stored hundreds of meters deep, in hard and isolated geological formations (Popescu, 2022), where people they can safely consider eliminated for hundreds of years to come (world-nuclear.org). Romania stores radioactive waste in intermediate repositories and the plan to build a deep underground repository for the definitive storage of highly radioactive waste and nuclear

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burnt fuel and a definitive surface repository for waste with a low and medium level of radioactivity was foreseen.

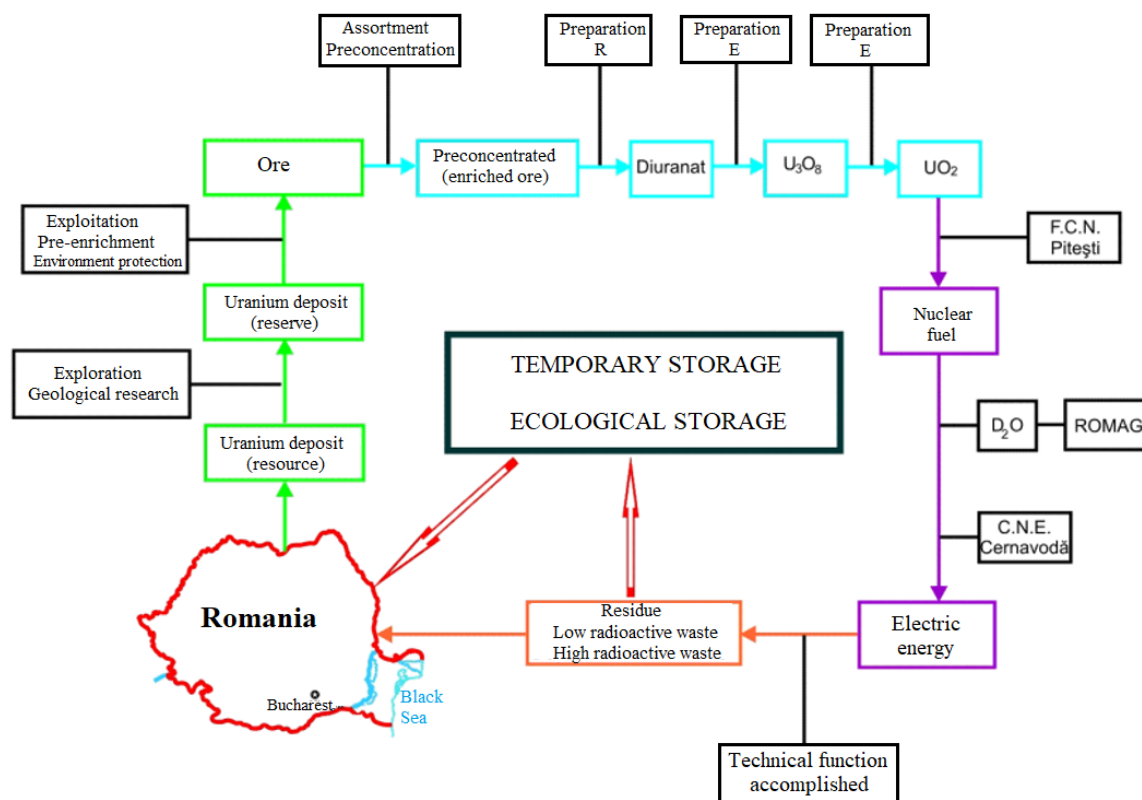
Radioactive sources were used in Romania after the 1950s. From then until now, many activities have been carried out in different fields of activity that used and are using radioactive sources. In these more than 70 years of using different radioactive sources, significant quantities of radioactive materials have been circulated in Romania. All these activities have left behind larger or smaller amounts of radioactive waste (Itu, 2008), properly managed or not by those who generated them. Romania proved to be a country with great potential in terms of radioactive natural resources. The forced industrialization of Romania led to an accelerated increase in electricity consumption. At the end of the 1960s, the power installed in power plants was about 7000 MW(s), and the doubling period of consumption was 5–6 years. The issue of putting into operation by 1985 an additional capacity of over 20,000 MW was raised. In addition to the construction of hydropower plants and coal-fired thermal power plants, it appeared necessary to capitalise on the existing uranium resources by building nuclear power plants (Andrei, 2007). Currently, in Romania, all nuclear activities are closely related to the operation of the Cernavodă Nuclear-Electric Power Plant. To produce electricity, the plant uses nuclear fuel beams. In order for the uranium ore extracted from the mine to be able to produce electricity at the Cernavodă NPP, it travels a long way and goes through various stages of preparation. The ore extracted from the mine is transported for preparation to the Feldioara Plant, or R-Plant, which produces the preconcentrate or enriched ore (diuranat  $\rightarrow$   $U_3O_8 \rightarrow UO_2$ ). This is another stage that the uranium ore goes through and leaves behind large amounts of radioactive waste through the solid-liquid tailings that are deposited in the ponds. The preconcentrate takes the path of the Pitesti Nuclear Fuel Plant to become nuclear fuel for the Cernavodă Nuclear-Electric Power Plant (figure 1).

The day-to-day operation of nuclear power plants produces radioactive waste. A small part of these are released in a controlled manner into the environment through liquid or gaseous emissions, within the limits established by law. Low-level waste (such as protective clothing) is either incinerated or compacted and stored in a concrete enclosure on the plant site. Waste with an intermediate level of radioactivity (resins, filters, etc.) is stored in concrete structures (Itu, 2008), buried or on the surface, and those with a high level of radioactivity (Deak, 2004) are kept for several years until they cool down in pools and are then intermediately stored.

During the operation of a nuclear power plant, these types of radioactive waste represent approximately 1% of the total solid radioactive waste, if we do not take into account: radioactive waste dumps resulting from uranium mining and processing; contaminated waters from uranium mining areas; and radioactive waste resulting from the closure and decommissioning of the plant.

Nuclear power plants do indeed produce highly radioactive waste, but in small quantities and with a high degree of radioactivity. This is the burned nuclear fuel, which requires special care (CNCAN, 2005) until it reduces its radioactivity to levels that can be easily handled and then treated and conditioned to be stored. These quantities of radioactive waste resulting from the operation of the nuclear power plant, being small, can be stored in intermediate radioactive waste storage facilities within the power plant and continuously monitored. CNE Cernavodă, for example, produced in 2007 a volume of 25 m<sup>3</sup> of radioactive waste. According to the statistics produced by the World Nuclear Waste Report, in 2016, Romania had stored a quantity of 1,000 m<sup>3</sup> of low and medium radioactive waste (LILW) (World-nuclear.org) in intermediate deposits. Regarding the nuclear fuel burned by the two reactors, in 2016, Romania recorded a quantity of 2,867 tonnes.





**Figure 1:** Nuclear fuel material flow

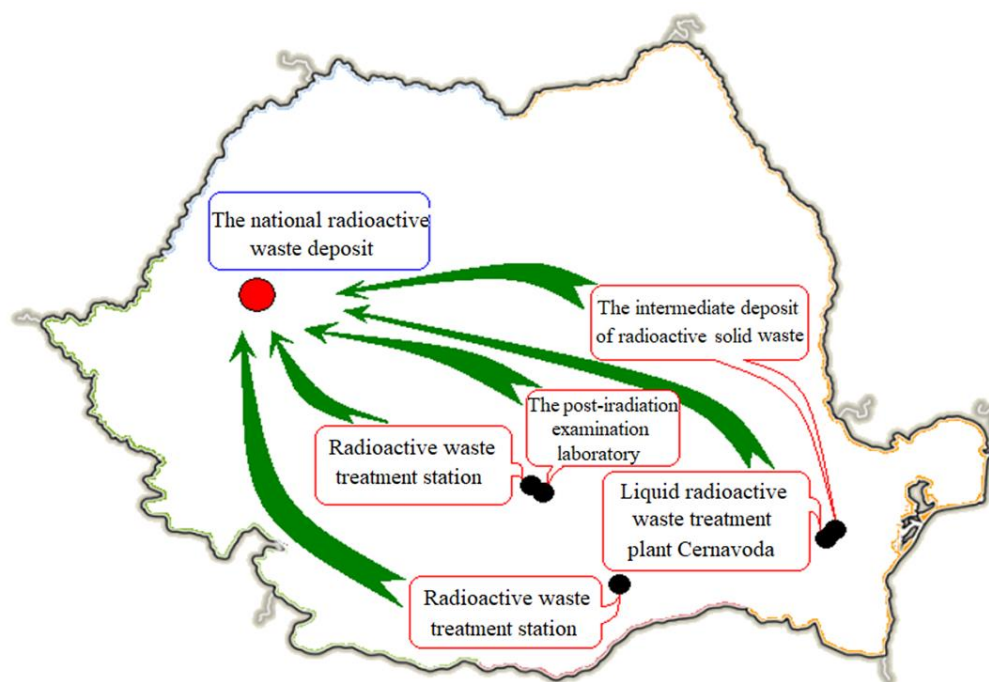
**Source:** (Deak Gy. et al. Contract 2/2001 MENER ICDMRR București 2001-2004)

The problems related to the management of radioactive waste are not only related to the fuel burned from the nuclear power plant but must be looked at from the beginning of the path that uranium ore travels to nuclear electric power. Through hospitals, laboratories, medical offices, and research centres, Romania also produces other quantities of radioactive waste resulting from medical radioactive sources that are taken out of use. A lot of activities that use radionuclides and nuclear energy cause the production of significant amounts of waste. Such activities encompass all the steps that nuclear fuel goes through in its cycle, as well as the steps followed by other types of radioactive material.

Radioactive waste can also be generated outside of nuclear activities, for example, the processing of ores containing natural radionuclides, which in some cases can be considered radioactive, for example, phosphate processing and oil or gas prospecting. The content of radionuclides in the radioactive waste left after the processing of electricity is, as a rule, much higher than in the case of other activities that use radioactive materials (Dąbrowska, 2021), (Csordás, 2022), (Wang, 2022) and (Dogaru, 2008). Radioactive waste is found in different forms and generates different types of contamination. They can be solid, liquid, or gas. These groups include a variety of types of waste, such as depleted uranium ore, host tailings of extracted uranium ore, mining equipment and devices for the exploitation and processing of uranium ore, pumps, pipes, ion exchange resins, sludges, nuclear fuel used, etc. The degree of activity levels, from the high level associated with spent fuel and fuel processing residue, decreases to the low level associated with those in laboratories, hospitals etc. (Comisia Europeană, 2004). The elimination of low- and medium-activity radioactive waste through final storage is currently a viable industrial practice, both internationally and at the level of the European Union. The practices used for this type of radioactive waste are also not suitable for the disposal of high-activity waste, the latter implying particular risks for human health and the

environment. In addition, high-level waste generates significant amounts of residual heat produced by radioactive decay, a fact that requires intermediate storage for deactivation (50–100 years). This time interval is used for the development and implementation of technologies for the final storage of high-activity waste.

In Romania, there are several installations that carry out activities related to the management of low- and medium-level radioactive waste resulting from industry, medicine, and the operation of research reactors. All these installations, after conditioning the radioactive waste, transport it to the National Radioactive Waste Repository for final storage (figure 2).



**Figure 2:** Transport of radioactive waste to the final national deposit

Waste quantities vary depending on the processes that generate them, but there is still a correlation between volume and radioactivity. Thus, waste with lower radioactivity is found and generated in large quantities (tailing dumps, ponds), and waste with high radioactivity is generated in smaller quantities (burnt nuclear fuel, fission products). The paper presents the authors' contribution regarding a long-term management solution for the waste generated today, taking into account the technologies used for each type of radioactive waste. Thus, for the type of radioactive waste that is produced in the largest quantity, a case study has been developed that aims to find the appropriate place for the location, the correct dimensioning, and the construction of the repository. The case study was developed in accordance with national legislation and international legislation in the field of radioactive waste storage. Due to the geomorphological diversity that Romania has, the analysis of the deposit site is complex, and all the required conditions must be met. The correct dimensioning of the warehouse is also important in order to meet the current storage space requirements and, at the same time, the decommissioning of the Cernavodă Nuclear Power Plant in the future.

## 2. Literature Review

Nuclear waste is primarily generated from nuclear power plants, nuclear weapons production, and medical and industrial applications of radioactive materials. It poses significant challenges in terms of long-term storage and disposal due to its hazardous nature and potential harm to the environment and human health (Borgogno-Mondino, 2021), (Luhar, 2023), (Yoon, 2018), (Tyupina, 2023), (Rao, 2021) and (Murasawa, 2021). Proper management and containment strategies are crucial to minimize the risks associated with nuclear waste (Ojovan, 2023, p 419-429). In order to eliminate nuclear waste, the level of the waste class within the IAEA classification scheme must be considered. Unlike HLW that must be disposed of deep underground, ILW can be co-disposed with HLW (world-nuclear.org), or can be disposed into a disposal facility located underground, at intermediate depths (Nuclear Electrica, 2023). Holland et al. (2023) present in their work (Holland, 2023) a set of in situ analysis techniques for NIA applications and define a combined application methodology of this set of analysis techniques, which, if applied to other sites in a manner standardized, allows comparisons between investigations. NIA (Nuclear Industrial Archaeology) adapts radio-analytical laboratory and topography techniques.

In all countries where there are activities resulting in the production of radioactive materials or the generation of radioactive waste, the existence of efficient management that meets the requirements of their management is required. Waste management can also be directed towards the activity of producing some forms of sustainable waste that can present sustainability over long periods of time (Luhar, 2023). In the paper (Luhar, 2023) the authors present the technology of solidification and stabilisation of radioactive waste using different special types of cement based on Portland cement. This is the most commonly used technique for treating radioactive waste due to its very good structural resistance and shielding effects. The authors suggest that magnesium potassium phosphate cements can be used to immobilise radioactive concrete wastes generated during the decommissioning of nuclear power plants (Luhar, 2023). At the international level, the problem of developing a safe method by which high- and medium-level radioactive waste of different degrees of heat generation can be isolated in deep geological formations in compliance with the existing regulatory requirements at the level of each country was discussed. Starting from the idea that any radioactive waste storage unit must be provided with safety-engineered barrier systems to include materials capable of ensuring the safe location of these hazardous materials, Tyupina et al. (Tyupina, 2023) also take into account the impact of cement-based barriers on the other components of engineered barrier systems. In these cases, a complete study is required. These involve experimental laboratory studies and monitoring the behaviour of these barriers (Piccolo, 2023), including the phenomena or processes that may occur as a result of the interaction of the component materials with the underground environment (Matulová, 2023). A solution to eliminate and treat radioactive waste is the reuse of abandoned mines and deep mines (Du, 2022), (Compania Națională a Uraniului), (Radioactive Waste in the Asse Salt Mine in Germany, 2009) and (Leong, 2021), which could also contribute to the sustainable development of mining in many countries. An engineered barrier system (EBS) for the disposal of high-level waste (HLW) was proposed by Yoon, S. et al. (2018) (Yoon, 2018) in which the buffer material plays a very important role in protecting the waste and the container against any external mechanical impact. The authors also study the problem of the conductivity of the buffer material, which is a property that determines the temperature retained from the decay heat of the spent fuel. Yu et al. (2022) (Yu, 2022) study the migration of radionuclides in mobile water in fractures around the disposal hole and calculate two specific quantitative indicators in the field of geological disposal of radioactive waste. The authors performed sensitivity analyses by varying the hydraulic conductivity of the

key hydrogeological unit and the excavation damage zone and uncertainty analyses on discrete fracture networks (DFN) to quantify their influences on flow and advective transport.

## **2.1. Storage methods of used radioactive waste**

Storage solutions for radioactive waste are relatively limited. Storing radioactive waste on the ocean floor in sealed containers was once a promising solution. Both salt water and radioactive waste are highly corrosive; even the most resistant materials cannot remain intact for the periods required to store radioactive waste. However, the storage of radioactive waste at the bottom of the seas and oceans has been done for almost 48 years (United Nations Atlas), with the end of the storage being in 1993. Many countries in the world have practiced this method for decades without thinking about the repercussions of this storage method, (Greene, 2003) and (Badun, 2015, p 279-308).

The most debated method of storing radioactive waste is geological storage. Most nuclear power plants around the world bury radioactive waste in stainless steel containers or encapsulate it in corrosion-resistant containers such as copper, where it is thus buried deep underground in stable rock.

The burial of radioactive waste must take into account the infiltration of underground water (Piccolo, 2023). The waste must be stored in stable geological formations where there are no seismic or volcanic influences. Because there is a degree of seismicity at any point on earth, geological storage presents a certain risk. The geological storage of radioactive waste is based on the principle of deep rocks that are stable and unaffected by climate changes that occur over periods of hundreds of thousands or even millions of years. Waste is stored in this environment, which is isolated from human activity and the surrounding environment. Research and storage technologies have developed a lot in the last 40–45 years in Europe as a result of international cooperation and effort in this field (Environmental Mechanics AB). International cooperation has gathered information to help the evolution of radioactive waste disposal by finding the natural barrier that can solve this problem. Geological deposits must be practical and efficient. It is essential that they can be built, used, and closed safely. It is very important that research and science show that radiological security will work adequately over very long periods of time (Comisia Europeană, 2004). Storing radioactive waste in closed salt mines was once an almost perfect solution. In Germany, a project of this kind was tried at the Asse Salt Mine between the years 1967 and 1978. During all these years of operation, a total of 124,494 packages with a low level of radioactivity and 1293 packages with an average level of radioactivity were stored (Radioactive Waste in the Asse Salt Mine in Germany, 2009). When the storage began in 1967, studies showed that there would be no problems with water infiltrations, but two years later, the press began to write about the infiltrations that endanger the storage. This happened in 1988 with a continuous leakage of water entering the warehouse, a problem unresolved for many years.

## **2.2. The situation regarding the storage of radioactive waste in Romania**

Uranium is an energy source like coal, oil, or natural gas that must go through a series of technological processes to transform into nuclear fuel used for nuclear electricity production. The totality of the technical and technological stages through which uranium passes to generate electricity and heat represents the nuclear fuel cycle. The nuclear fuel undergoes the most profound transformation when it is introduced into the reactor; that is, it undergoes the fission reaction. Natural uranium is extracted from surface or underground mines, and the ore is sent to a refinery, where it is ground and subjected to chemical treatments to obtain a uranium concentrate. Natural uranium is mainly a mixture of two isotopes: uranium 238 (99.3%) and uranium 235 (0.7%). The isotope of uranium that undergoes the fission reaction in nuclear

reactors to produce electricity is uranium 235 (U-235). Underground mining technology was used in all uranium deposits, except for those in the Banat Mountains, where surface mining was practiced. The cycle that uranium ore goes through until generating electricity generates radioactive waste and radioactively pollutes the environment, but also after that.

The most important part of the waste is represented by the spent fuel, which has a very high level of radioactivity. They are stored in storage basins. The fuel produces heat in the nuclear reactor for about two years until some of the uranium 235 (U-235) is used up. After the fuel beam is introduced into the reactor, the uranium atoms in the fuel pellets fission. In this process, heat is released, which is used to transform water into steam; new elements appear (neutrons), which can continue the nuclear reaction; and new radioactive elements appear, called fission products and actinides. The accumulation of these elements, over time, prevents the normal development of the fission process, making the fuel beam ineffective and must be replaced (Itu, 2008) and (Strategia energetică a României pentru perioada 2007–2020, 2007). At this moment, the fuel beam is highly radioactive and requires special measures for protection, storage, and reduction of radioactivity; the spent fuel is stored in this phase in a pool of water to limit the range of action of the emitted radiation and to "cool" it (Figure 3). After removal from the cooling basins, the burned fuel is stored on the plant site in intermediate radioactive waste storage facilities, which then await final disposal. Here, the burned fuel loses some of its radioactivity, but remains highly radioactive for a very long time.



**Figure 3:** Spent nuclear fuel storage pool

**Source:** (\*\*\*) Nuclear Electrica - Reprezintă energia nucleară cea mai bună alegere pentru mediul înconjurător?)

Disposal is an essential step in waste management, ensuring that waste is safely and permanently stored. It involves carefully selecting and designating suitable facilities, such as landfills or incinerators, to handle different types of waste. Proper disposal methods help minimise environmental pollution and the potential health risks associated with improper waste handling (Ojovan, 2023, p 419-429). In Romania, there are a number of significant quantities of radioactive waste stored intermediately in different locations. The temporary storage of radioactive waste is largely due to the fact that in Romania there is only one permanent repository for radioactive waste, and there are many waste generators (ANDRAD, 2006). Waste quantities vary depending on the processes that generate them, but there is still a correlation between volume and radioactivity. Thus, waste with lower radioactivity is found and generated

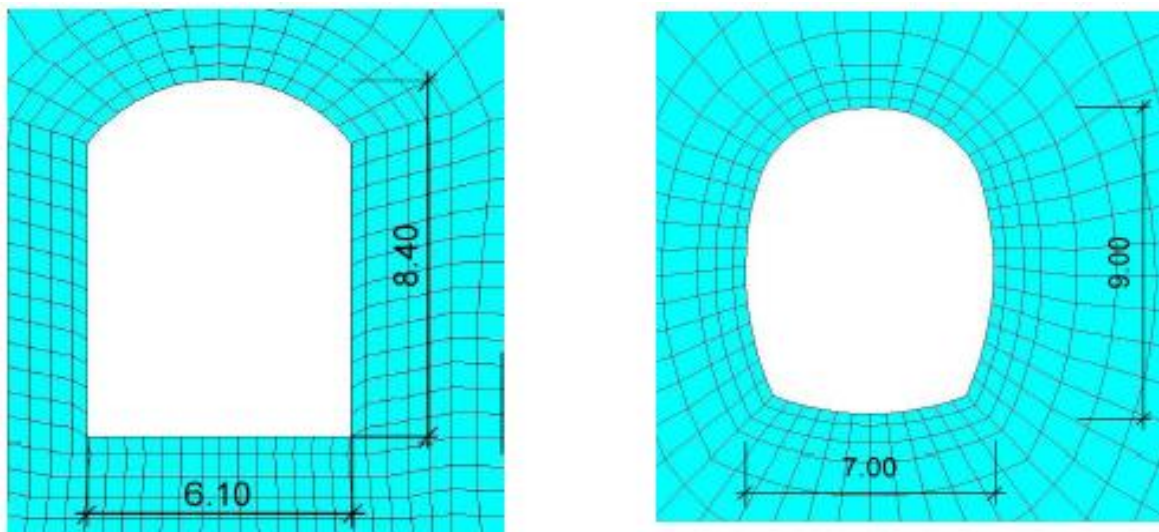
in large quantities (waste dumps, ponds), and waste with high radioactivity is generated in smaller quantities (burnt nuclear fuel, fission products).

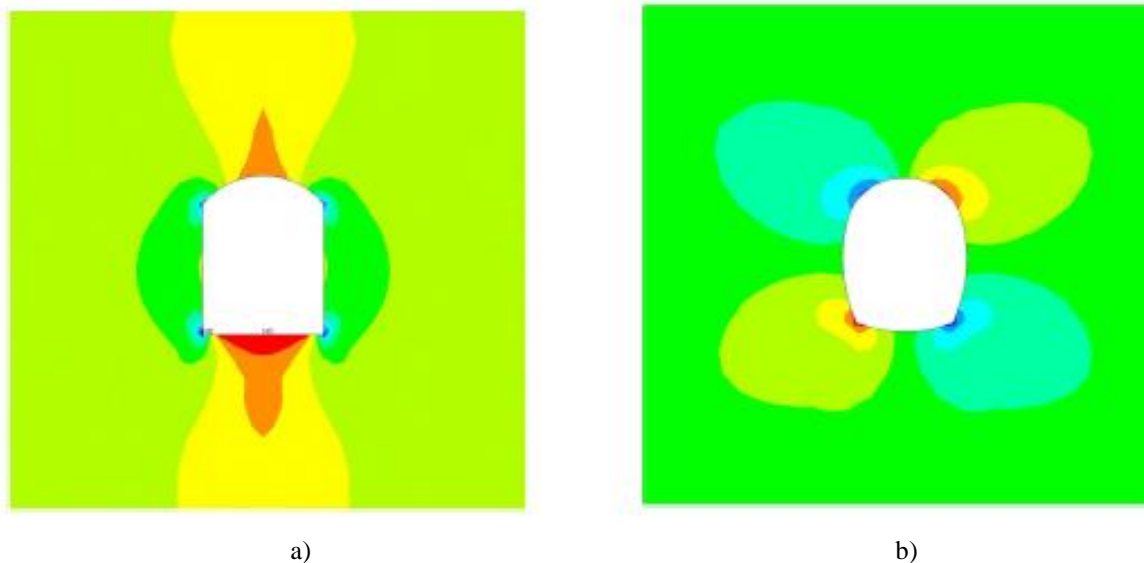
The ALARA principle (As Low As Reasonably Achievable) was the basis for the design of the only underground repository for such waste, along with the assessment of safety conditions to obtain acceptable contamination. The elements taken into account were: the location of the deposit, the toxicity of the waste, the physico-mechanical properties of the host rock, the way of storage, and the transport conditions of the waste, knowing that the waste and its incorporation are the main components of "near-field" engineered barriers (anthropogenic barriers).

The minimum requirements for the geological formations studied as possible for the location of the geological deposit concerned the following aspects: general geological, hydrogeological, and seismic conditions; the existence of mining operations or hydropower installations; climatic conditions; land use; transport distance; and distance to inhabited areas from the region.

A total of 27 sites were prequalified: 5 in green shale, 4 in basalt, 4 in granite, 9 in clay, 4 in salt, and 1 in volcanic tuff. As a result of the application of the IAEA recommendations (Margeanu, 2008), it is considered that the most favourable host rocks from the point of view of final disposal and which are to be investigated further are green shales, granites, and salt.

Starting from the internationally known concepts, different sections of the storage tunnel were analysed, as shown in figure 4, for hard rocks and, respectively, for soft rocks (clays), which were considered optimal for the study in the future.





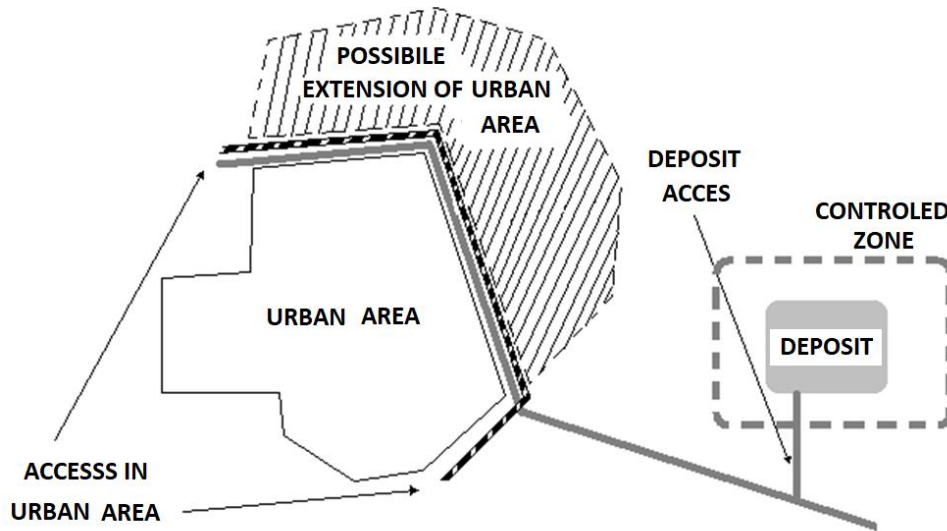
**Figure 4:** Sections of the burned fuel storage tunnels: a) hard rocks b) soft rocks (clays)

Most of the deep geological storage systems assume the realisation of the deposit several hundreds of metres deep in the host rock. The most common approach is represented by a vertical well. The most common approach is represented by vertical wells, access tunnels, or combinations thereof. These underground constructions are drilled to the desired depths or access tunnels, or combinations thereof, which are drilled to the desired depth. At this horizon, the storage galleries where the waste is placed are excavated. These are then surrounded by buffer materials. The remaining empty space can be filled with fillers. In Romania, it is desired to build such a deposit, which is expected to be completed in 2050–2055 and will be built at a depth between 500 and 800 m, depending on the host rock that will be selected, and will mainly house the spent nuclear fuel, but its location study is not yet known.

### 3. Data and Method

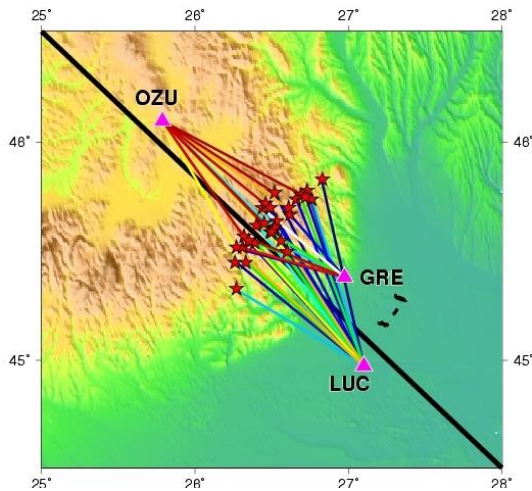
#### 3.1 Data

The design of the radioactive waste repository will be done in such a way that the access paths to the repository do not intersect with human settlements and do not pass through them, and the repository must be located at an appropriate distance from them (realisation of the scenario for the damage and for the ecological accident) and from a possible expansion or urbanisation of nearby localities. The map of the urban expansion of the respective area and the industrial infrastructure of the area will be considered. The design of radioactive waste deposits is made for a long operation of tens or even hundreds of years, and thus the eventual expansion of urban and rural settlements must be taken into account (Figure 5).



**Figure 5:** Location of the warehouse outside the urban area

All risk coefficients were taken into account in the resistance calculations for building the warehouse. In order to help and prevent unwanted situations during the operation of the warehouse, the choice of its location will be made in seismic areas and those with the lowest tectonic activity (Figure 6). A degree of acceptance of the seismicity of the location was established, as was the dimensioning of the construction in the design.



**Figure 6:** Location of the epicenters of the earthquakes in the Carpathian area

In addition to the seismic points that can influence the deposit, crustal movements have been identified. Since the deposit is a surface one, this safety measure will be emphasized. The areas with zero crustal activity were chosen, where there are no surface movements. The location of the deposit was chosen in such a way that possible landslides or water infiltrations that can cause landslides are absent, as they endanger the integrity of the deposit. Due to the temperate zone in which Romania is located and the abundant rainfall in the country, a determining factor in choosing the location of the warehouse is its positioning in relation to flood zones or areas subject to floods. Many times, water has shown us that in relatively short periods of time, it can affect large areas of land by flooding; it can break bridges, dykes, dams, and roads with the force it develops; and it can train in its course from material goods to construction or parts of construction. In Romania, incidents of this kind have happened quite frequently, and thus the areas with a high risk of flooding are known in advance. The transport of waste must also be

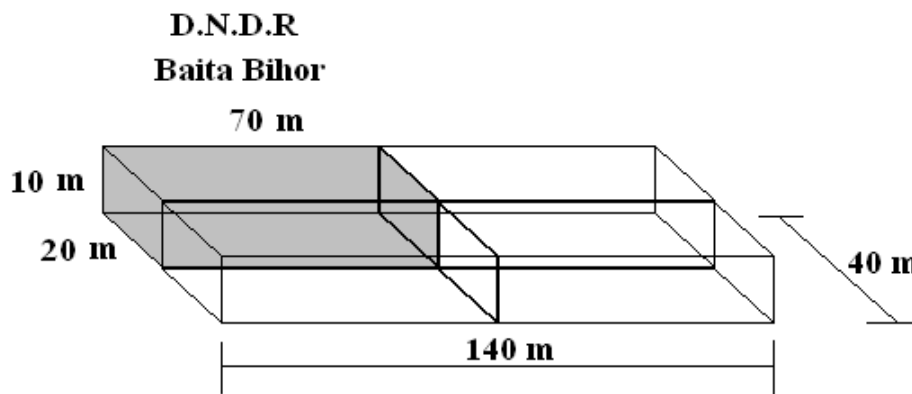


taken into account, so that access routes to the warehouse are safe and stable. A waste transport incident can cause material damage, and leakage or infiltration of the waste into the soil is the most undesirable scenario in these cases.

For choosing the location of the radioactive waste repository, the presence of natural areas was taken into account, and it was taken into account that the transport of radioactive waste does not cross these areas.

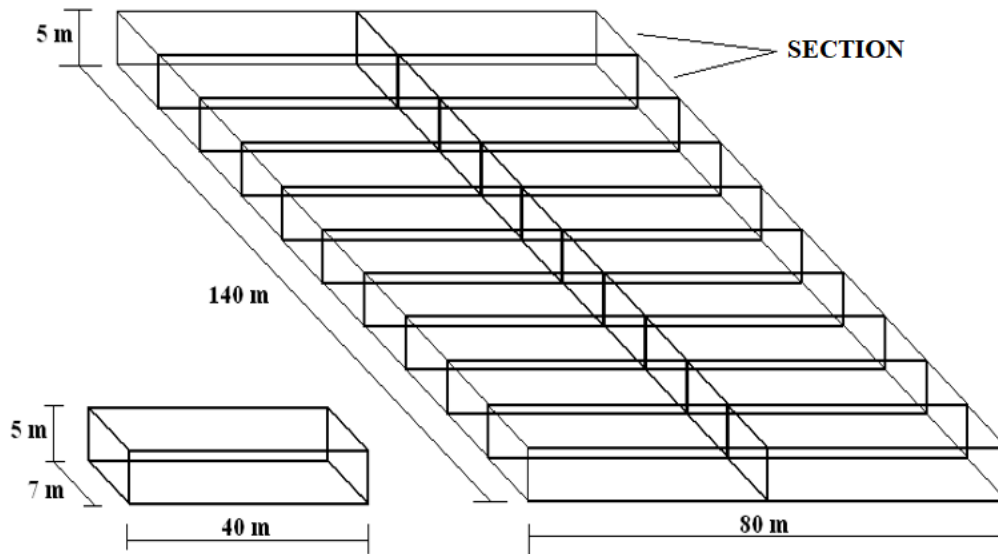
### 3.2. Method

Taking into account the fact that, in 25 years of activity at the National Radioactive Waste Repository, approximately 7000 refurbished containers were stored, occupying a volume of approximately 14000 m<sup>3</sup>, it follows that the space actually used for storage would be a 70 m long block, 20 m wide, and 10 m high (Figure 7). Taking into account the evolution of the amounts of waste generated in Romania and the rate at which it was deposited at the National Radioactive Waste Repository at Băița Bihor for a period of 100 years, a repository with a size four times larger would be necessary, as follows:

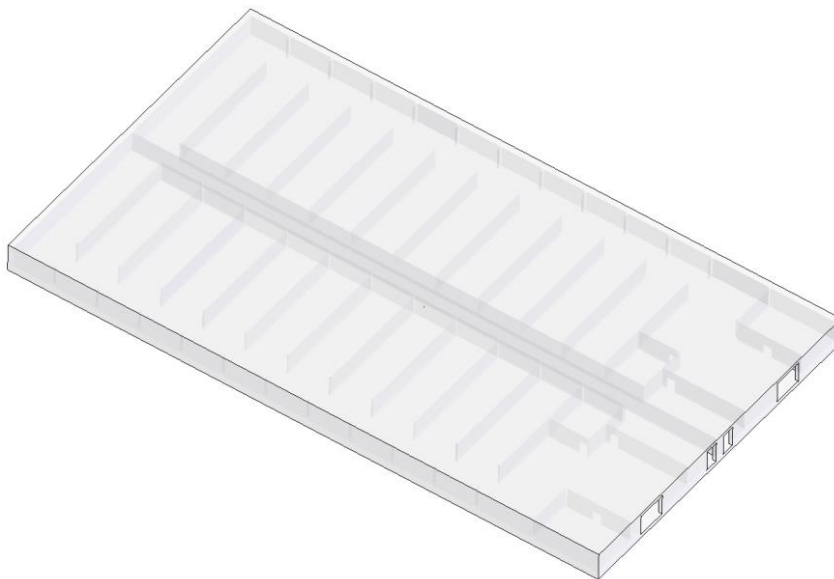


**Figure 7:** Estimation of the size of the deposit for 100 years of operation

In practice, it is easier in such cases that the devoting of the deposit is done horizontally rather than vertically (Figure 8). This makes it easier to store, load, and unload parcels. Handling from one floor to another, including ventilation of the warehouse, is difficult in the case of warehouses with several floors. Figure 9 shows an overview of the warehouse.

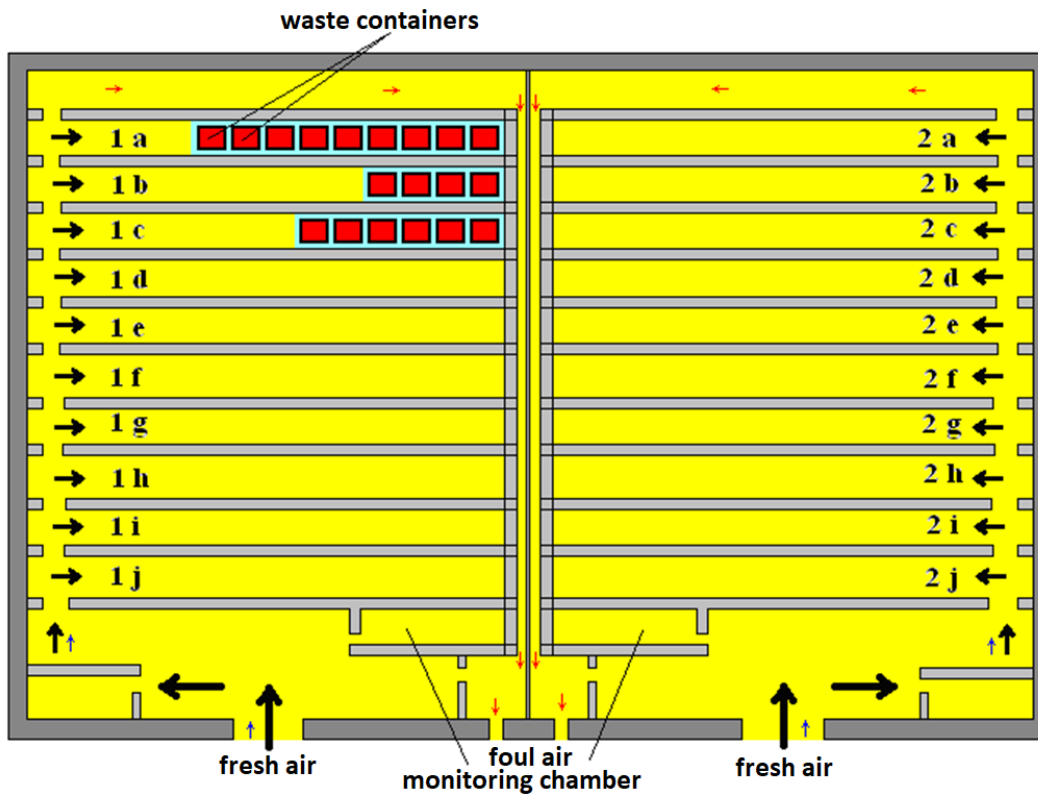


**Figure 8:** Optimal deposit size



**Figure 9:** Warehouse plan - overview

In the proposed study, the warehouse was designed in such a way that the storage is done in retreat by closing the sections in which the storage has already been carried out. Thus, at the end of storage, there is the possibility that the first stored sections have reached their half-life, and thus the radioactive waste that initially required special storage will reach the properties of ordinary waste (no longer require special storage) and be relocated to storages with a lower degree of security. This is shown in figure 10: the beginning of the storage is carried out on section 1a, and in time, after the filling of section 1j, the first section 1a should no longer constitute a danger.



**Figure 10:** Waste storage plan diagram

#### 4. Modelling the warehouse

The modelling of the warehouse for optimal and real dimensioning was done with the help of the Solid Edge software, and the analysis with finite elements was done with the COSMOS DesignSTAR software (figures 11–15). In order to dimension the structure of the warehouse and model the warehouse, the approximate total mass that will cover the warehouse in its completion phase was calculated. To find out the optimal size of the warehouse walls, forces equal to the load of the covering earth will be applied over the entire surface of the warehouse.

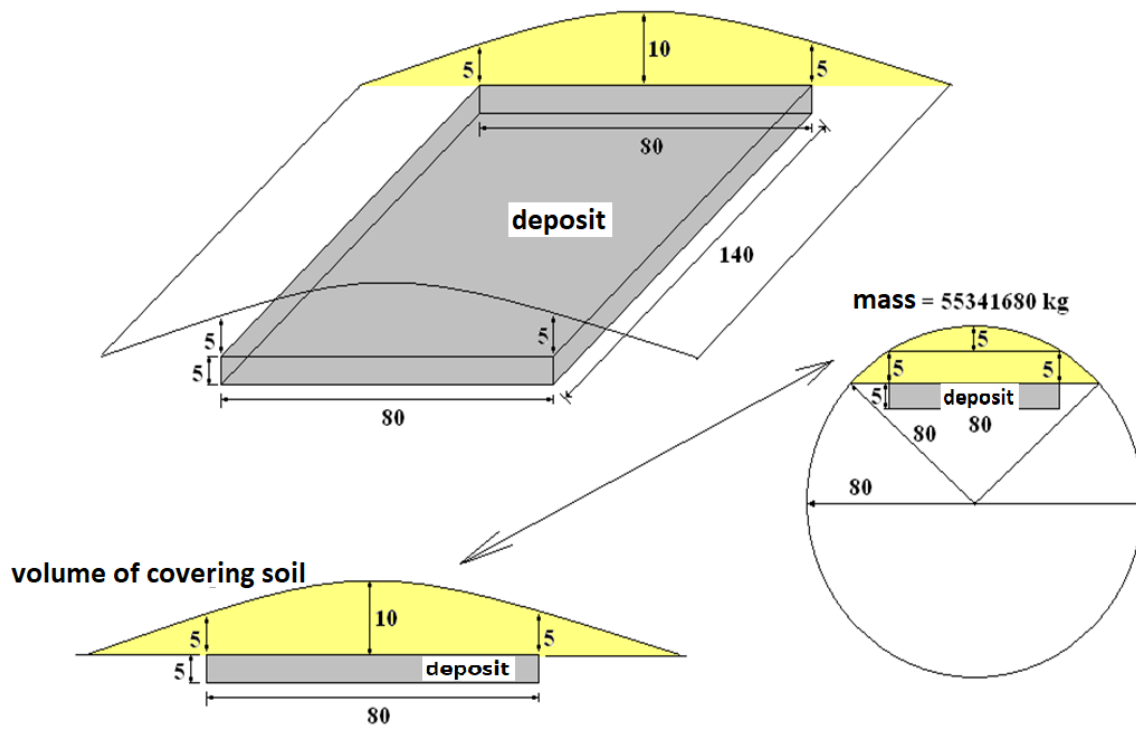
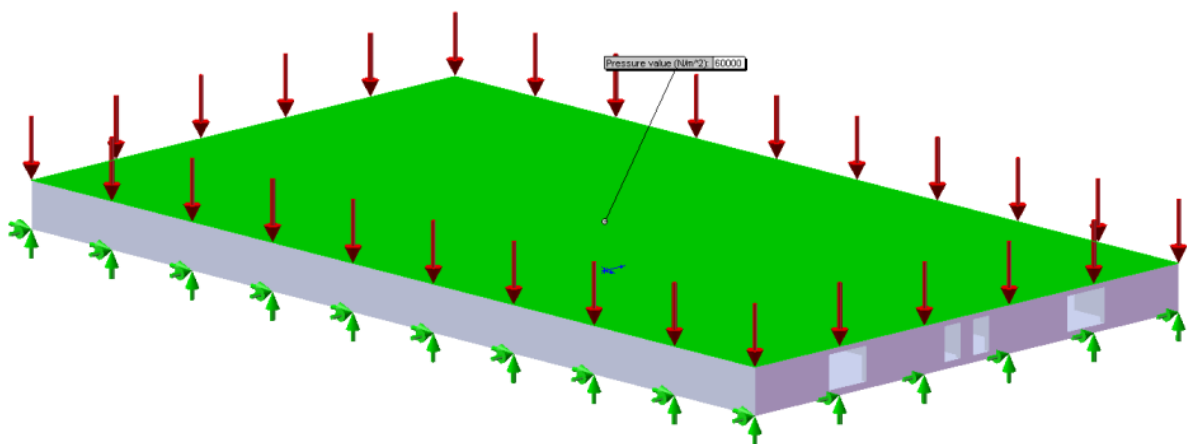


Figure 11: The waste deposit and covering soil mass



Figure 12: Deposit discretization



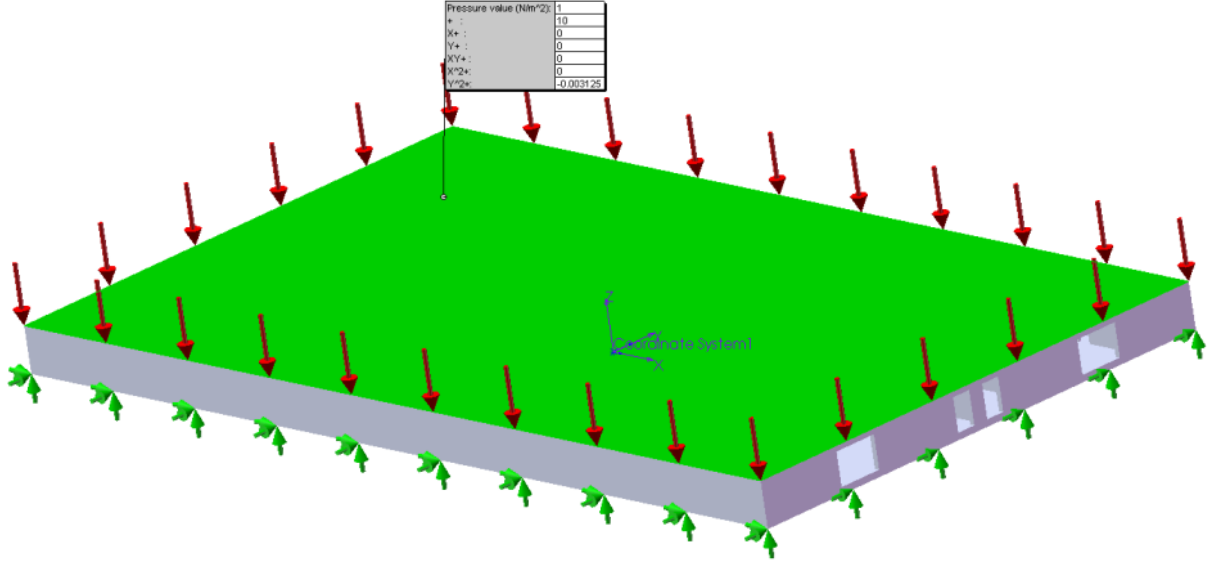
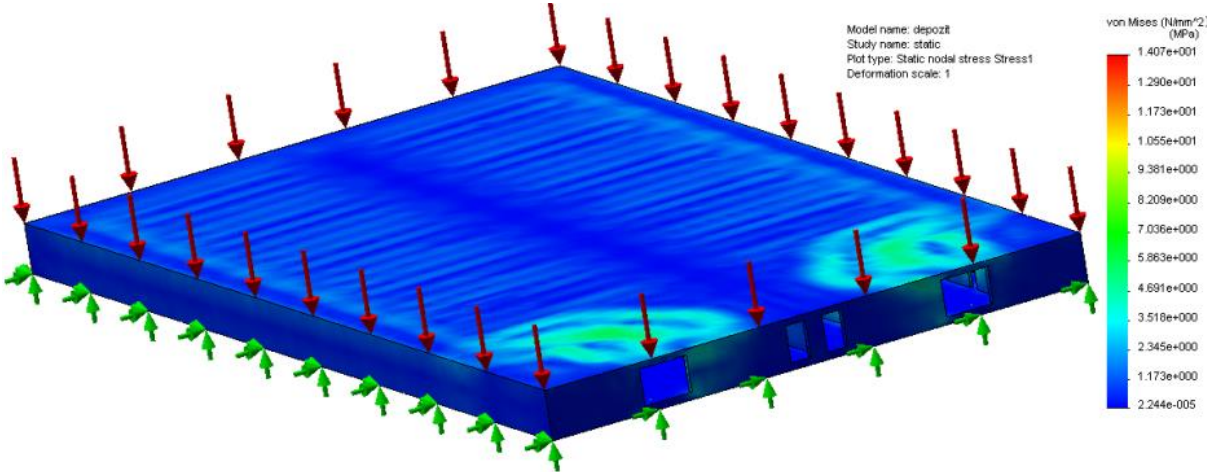
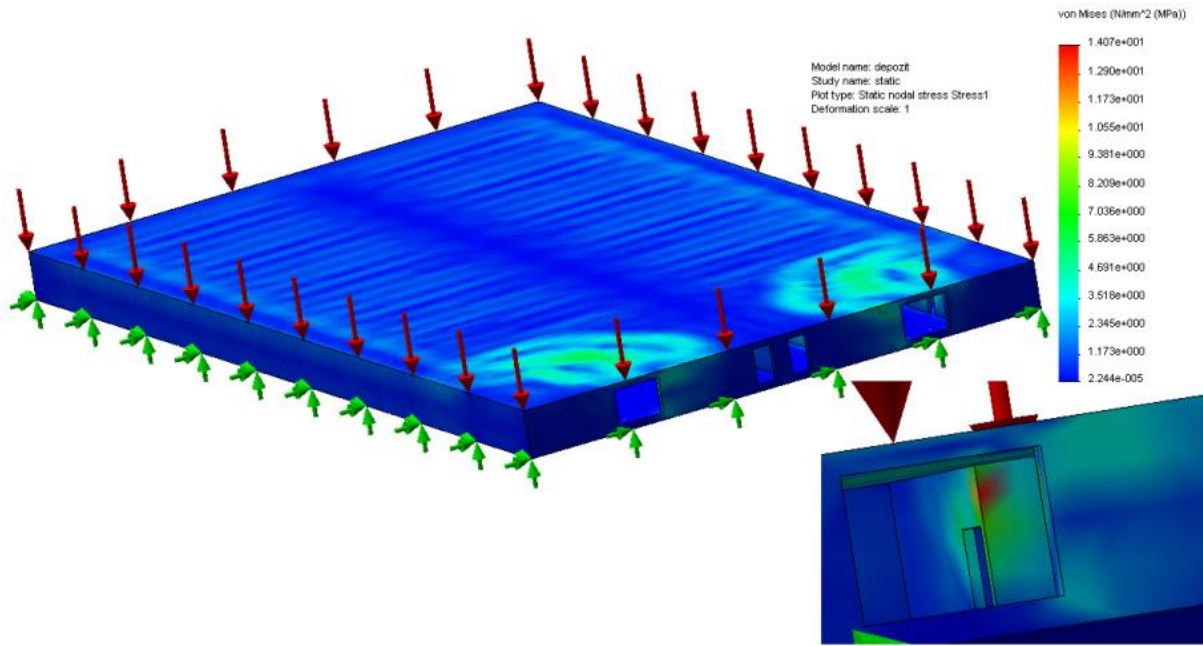
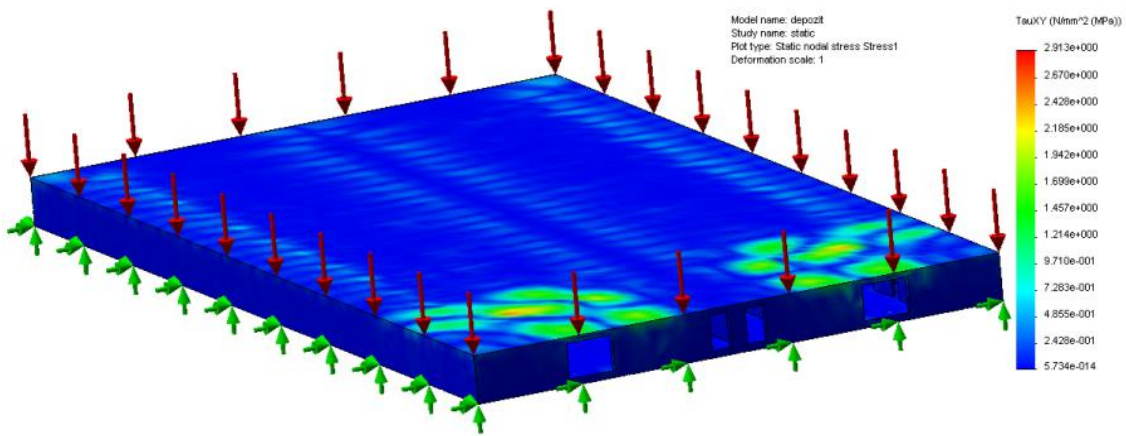


Figure 13: Applying forces

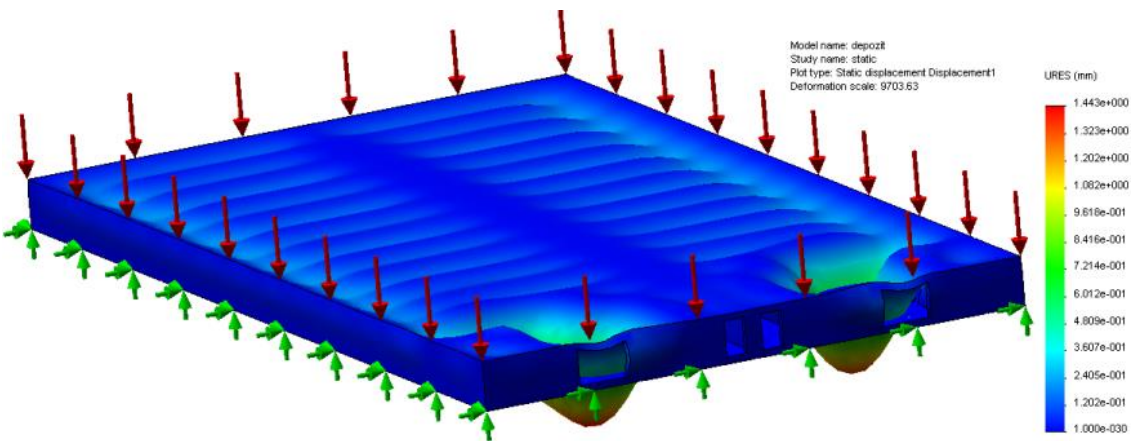




**Figure 14:** Maximum and minimum strength points

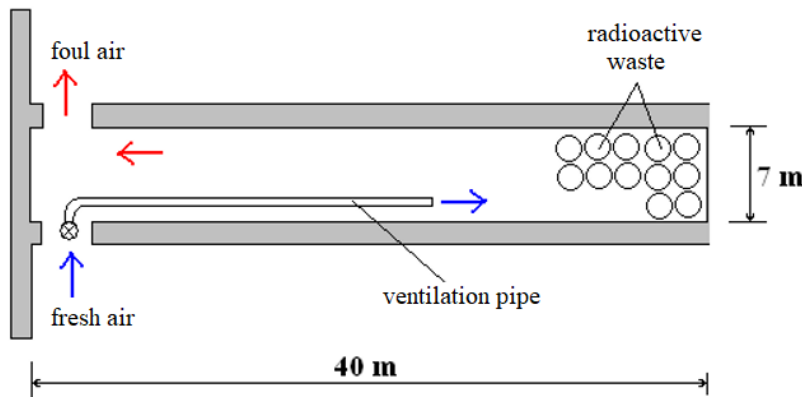


**Figure 15:** Displacements simulation



After simulating the displacements, a construction size of 40 cm for the inner walls and 80 cm for the outer walls was obtained.

In the construction of the warehouse, a very important thing that will be taken into account is the ventilation. As can be seen from figure 10, the fresh air enters the warehouse through the main access door, passes through the warehouse assisted in the storage phase by an aeration system, after which it is evacuated through the ventilation channel through the monitoring room to the outside. For waste storage on the section, ventilation is done airless dead-end (figure 16).

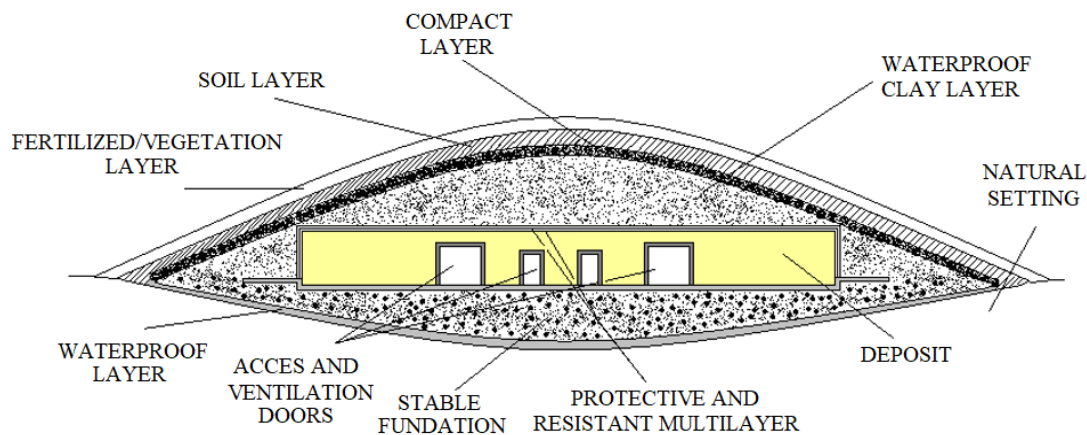


**Figure 16:** Ventilation related to a storage section

The warehouse is designed in such a way that ventilation is carried out only in the section where it is stored, the others being closed. Thus, the air that is discharged from a single section will be monitored without converging with the other sections. The criteria for calculating the required air flow in the section are established according to the main pollution factors (radioactive waste, handling equipment, etc.). Finally, the maximum flow resulting from one of the criteria is adopted, this flow being, of course, covering all sources of pollution.

### 5. Waste isolation through protective barriers

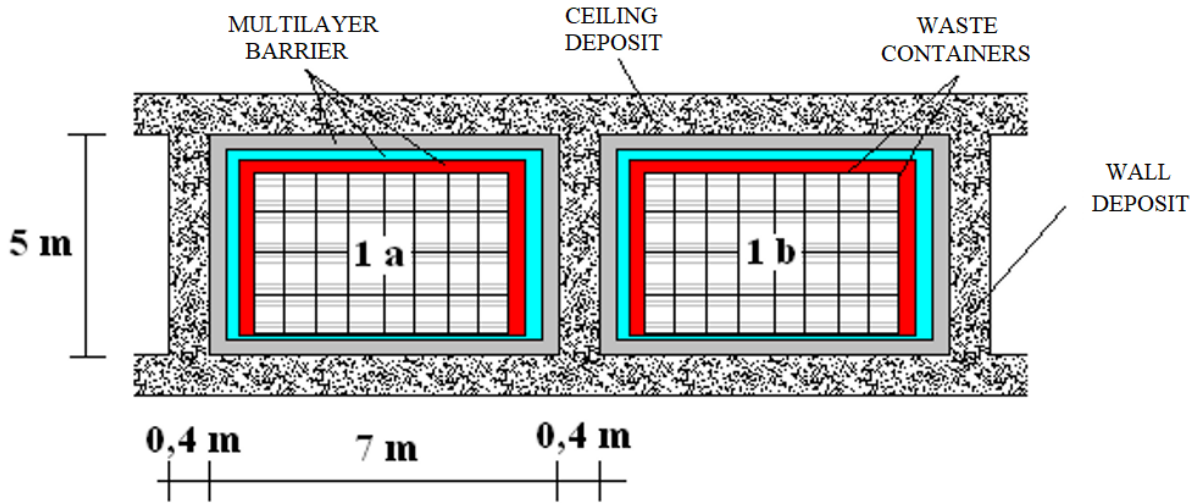
At the level of each section, the waste containers (barrels) are isolated from the construction walls by a multilayer barrier system (figure 17).



**Figure 17:** Deposit isolation

These waste filling and isolation materials must be chosen in such a way as to satisfy the radiological needs that are imposed (Figure 18). Thus, several types of materials with different properties can be used, and each of them fulfils a certain need from the point of view of the insulation of containers or barrels. The filling materials can be clays, tuffs, or bentonite rocks,

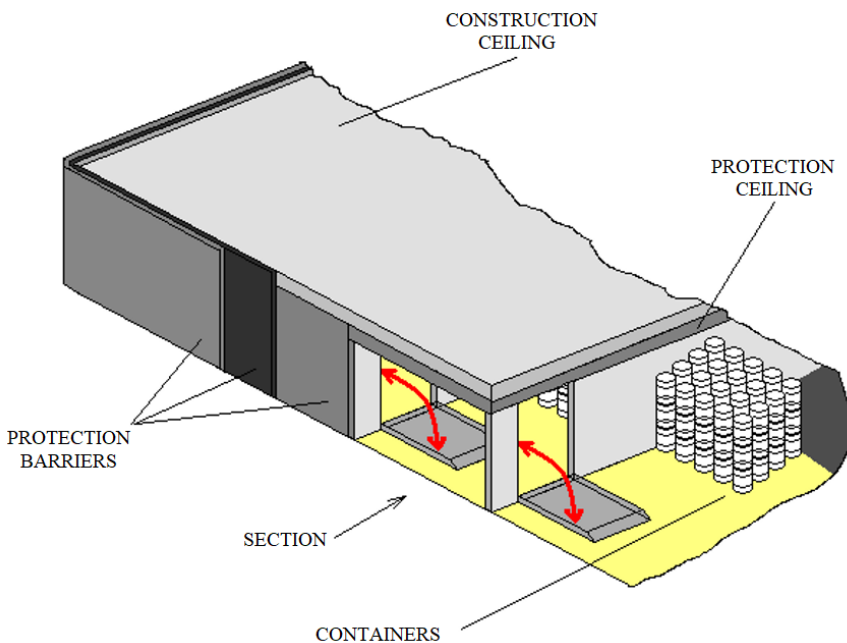
which are provided not only as a storage of ions having a negative effect but also as a waterproofing material to prevent the circulation of aqueous solutions.



**Figure 18:** Section in the storage section

If one opts for temporary storage on that section, it is preferable not to intervene with protective barriers of a definitive nature or barriers that are difficult to remove in the case of waste relocation. If, for example, concrete is poured, its removal will be difficult, and the removal technology may disrupt the integrity of the warehouse (impact shocks may cause cracks in containers and warehouse walls).

Dividing the warehouse into sections allows for more rigorous control of possible accidents or radiation leaks at any container. For the proposed warehouse, the sections can be closed and isolated manually or automatically (Figure 19), in the event of an accident being reported, after which special equipment will gradually be used to remove or remedy the incident.

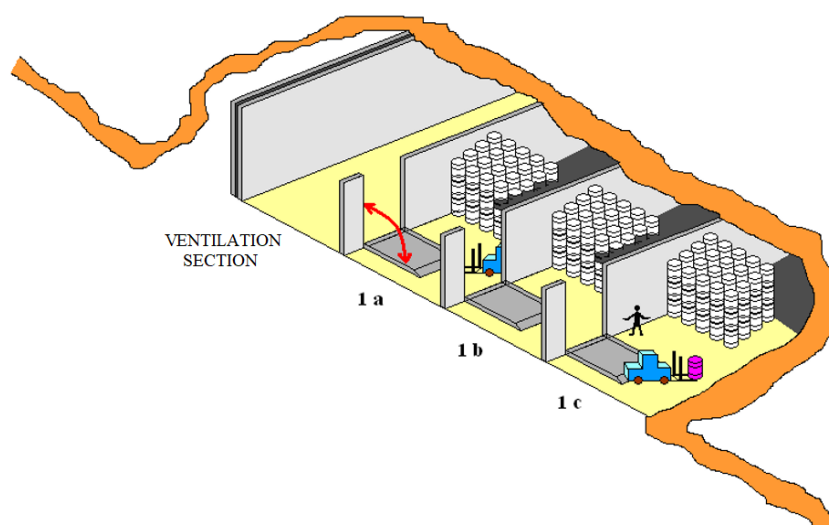


**Figure 19:** Securing the storage sections



## 6. Storage technology

Such a warehouse with a very long lifetime must be designed so that the storage technologies can be changed and, at the same time, be viable depending on the needs (Figure 20).



**Figure 20:** Depositing method

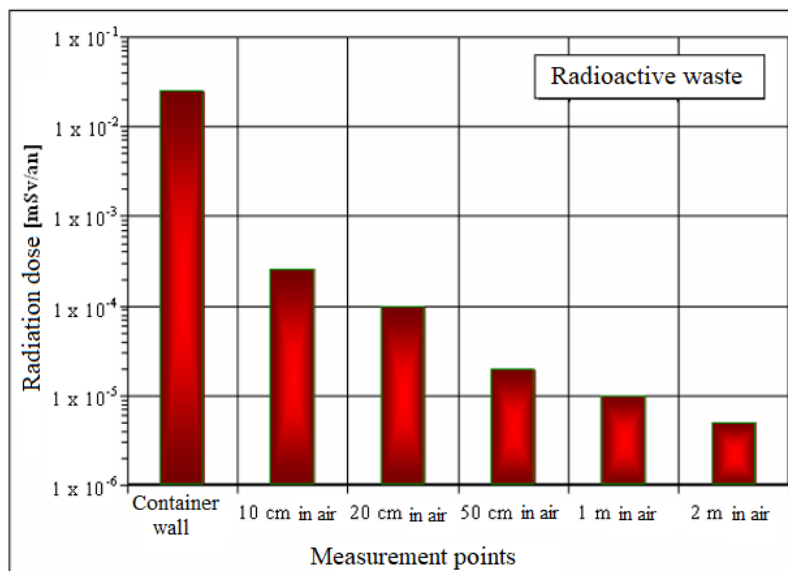
Handling machines and equipment should preferably not be embedded in the construction, in the walls or ceiling of the warehouse, because during such long periods of operating time, it is impossible not to have malfunctions.

In these cases, in order to change with new ones or of another generation, the structure of the construction or the anchoring of the equipment must be changed, something that can endanger the integrity of the warehouse construction (for example, to change a monorail transport installation, work must be carried out in the ceiling of the warehouse). Handling is preferable to be done with machines that can be easily replaced in case of failure or to have several such machines in the warehouse. At the same time, in cases of contamination or accident, such machines can be easily decontaminated or decommissioned.

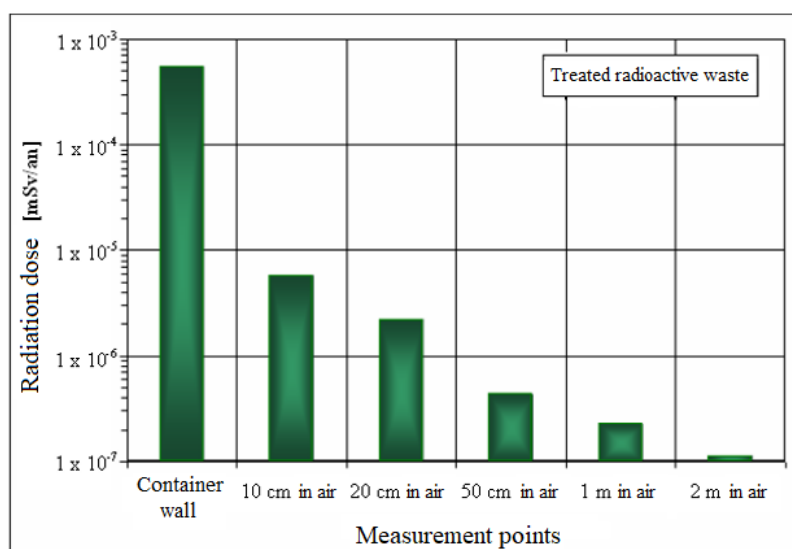
## 7. Materials and containers used

For the long-term storage of radioactive waste and various elements, various containers with one or more layers of protection have been proposed. They are made of different types of steel enhanced with elements such as titanium, zirconium, copper, and others. These containers are either expensive or not so corrosion-resistant. Radioactive waste has high concentrations of short-lived and long-lived radionuclides, so the degree of isolation from the environment must be high even in the very long term. The radioactive waste transport rules specify the level of radiation under normal transport conditions; it must not exceed 2 mSv/h at any point and 0.1 mSv/h at 2 m from the outer surface of the convoy. The container approved by CNCAN and produced in Romania for conditioning, transport, and storage is a metal barrel of 220 litres made of carbon steel and painted to prevent internal corrosion. The model of the waste package was made in accordance with the national regulations for the safety and transport of radioactive materials, the specific radioactivity being  $11.2 \times 10^{10} \text{ Bq/m}^3$ . The decommissioned radioactive sources are stored in 220-litre metal containers by cementing to reduce the radiation dose and to fall within the limits imposed by the legislation. Estimated tests were performed using the Monte Carlo MORSE-SGC method to highlight the radioactivity dose of a radioactive source before (Figure 21) and after treatment (Figure 22), a source containing the  $\text{Co}^{60}$  isotope.

Following these tests, it was observed that the dose of radioactivity decreased by an order of magnitude.



**Figure 21:** Radioactivity dose of a radioactive source containing Co<sup>60</sup>



**Figure 22:** Radioactivity dose of a treated radioactive source containing Co<sup>60</sup> (Margeanu, 2008)

**Source:** (Margeanu & Olteanu, Radiological Risk Assessment and Cask Materials Qualification for Disposed Sealed Radioactive Sources Transport, IX Radiation Physics & Protection Conference, 15-19 November 2008, Nasr City - Cairo, Egypt)

## 5. Conclusion

As a result of the experience and results obtained by various projects adopted at the international level, a proposal was made to solve the problem of radioactive waste storage, generally valid for Romania. This solution was based on the legislation, the history that Romania has in this field, and the need to solve this deficiency.

In this work, it was proposed to create a warehouse that can be placed in almost any location, given the fact that the safety of the warehouse is not based on the geological and natural factors

but, to a large extent, on the anthropogenic factors. The realised concept can be modified and adapted depending on the types of waste that will be stored and their quantity.

An advantage of surface storage is the ease of retrieving the material if it is decided to do so. The possibility of recovering the stored material is easier to achieve with surface installations than with underground ones. This solution avoids making decisions that have irreversible effects as a result, thus delaying to some extent the decision to lose the waste, allowing future generations more flexibility in making these decisions, but without the waste being a burden for them.

Isolation of the waste from the environment must be done at the source; that is, the radioactive waste must be embedded in an environment created by humans and not natural. The storage of radioactive waste in cavities dug in the ground without protection is risky due to the geological conditions in the country. Taking into account the time required for radioactive waste to no longer affect the environment or to fall within the imposed limits, its storage will be done for a very long period of time, during which there is no certainty that the natural environment can retain its initial characteristics. The management of radioactive waste must be done in a controlled manner, and continuous monitoring is needed, which cannot be easily achieved if the radioactive waste is stored geologically.

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# **Augmented Theory of Planned Behaviour, Tax Literacy and Tax Compliance in Developing Countries: A Conceptual Framework with Implications for Research**

Emmanuel Kojo Oseifuah<sup>1</sup>

## **Abstract**

Effective tax systems rely on tax literacy and tax compliance behaviour among taxpayers for government revenue mobilisation. However, the extant literature suggests that in sub-Saharan Africa, mobilizing tax revenue for funding public services and infrastructure development to achieve United Nation’s Millennium Development Goals (SDGs) remains a great challenge. According to the 2020 Revenue Statistics in Africa report, produced by the AUC, ATAF, and OECD, the average tax-to-GDP ratio was 17.2% in African countries in 2017, compared to 22.8% and 34.2% respectively for Latin America and Caribbean and OECD countries. Despite being recognised as a critical aspect of tax compliance, the role played by political legitimacy in taxpayer’s compliance behaviour remained an under-explored in developing countries.

This study proposes an augmented theory of planned compliance behaviour (ATPB) framework, based on Ajzen’s (1991) theory of planned behaviour (TPB) and both the deterrence and accommodation theories of compliance, to predict taxpayers’ compliance behaviour, especially in developing countries. The framework comprises four components: attitude, subjective norms, perceived behavioural control, and political legitimacy. The findings of this study have implications for policy makers and researchers as it will assist future research in providing a structured approach for assessing taxpayers’ compliance behaviour. Also, it will provide interested parties with a better understanding of the combined effects of individuals’ beliefs, attitudes, norms, and political legitimacy on tax compliance. Lastly, the study will assist governments in deciding the future course of action towards effective policy making for taxation and revenue mobilisation.

**Keywords:** political legitimacy, theory of planned behaviour, tax education, tax compliance, tax literacy

## **1. Introduction**

Effective tax systems rely on tax literacy and taxpayers’ compliance behaviour, which are essential for mobilising tax revenue for governments, especially in developing countries where tax revenue is estimated to be below the global benchmark of at least 15 percent of GDP (Gaspar, Jaramillo, and Wingender, 2016). The OECD (2015) defines taxes as compulsory, unrequited payments to government. Taxes are unrequited in the sense that benefits provided by government to taxpayers are not normally in relation to their payments. Essentially, taxation is the key source of revenue for governments to carry out their functions and provide essential services to the citizens. Thus, the approaches that strengthen tax awareness and increase tax compliance have become important for tax authorities.

One approach adopted in most countries is taxpayer education which focuses on tax literacy within the wider population (Alexander, Balavac, Mukherjee, Lymer, and Massey, 2018). In an earlier study, *Building Tax Culture, Compliance and Citizenship: A Global Source Book on Taxpayer Education* (2015), the OECD reported initiatives in taxpayer education from 28 developing countries in Africa. The results show that tax literacy is rapidly becoming a strategic business which tax authorities and governments worldwide have been exploring as an alternative approach to complementing the traditional enforcement-based techniques in order to enhance government revenue collection. Building on prior studies, De Creq (2021), used a qualitative approach coupled with a systematic literature review to expand on the current understanding of the competency areas of tax literacy. The study identified five tax literacy

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competency areas that form the foundation of taxpayer education. These are knowledge, skills, attitudes, transformative competencies, and foundational competencies. The knowledge domain refers to disciplinary and interdisciplinary knowledge, while the skills domain focuses on cognitive and meta-cognitive, social, as well as physical and practice skills. The third domain include personal and societal attitudes and values. The fourth area involves transformative competencies such as value creation, taking responsibility and reconciliation attributes. The fifth domain encompass core foundational skills such as numeracy and literacy. De Creq (2021) asserted that by mastering the above competencies, taxpayers will become more literate about their tax affairs. Other empirical studies have shown that education is a catalyst for change as it alters thoughts, beliefs, attitudes and ultimately, behaviours (Asch and Shore, 1975; Gralton, Sinclair, and Purnell, 2004). Tax education is therefore a necessary foundation for tax literacy and tax compliance.

It is generally acknowledged that taxpayers' behaviour is positively associated with tax compliance (Tayler 2006; Kirchler et al. 2008; Fauvelle-Aymar 1999). However, a historical and pervasive challenge confronting most revenue authorities worldwide is the problem of tax evasion. Tanzi (2017) opined that the term tax evasion dates back to late Middle Ages and is an illegitimate action on the part of taxpayers aimed at evading the payment of due taxes. Similar to whistle blowing in modern times, there is a carved stone at the entrance of the Ducal Palace in Piazza San Marco that, centuries ago, encouraged Venetian citizens to report those who were hiding corrupt or taxable activities from the Republic of Venice. In modern times, taxpayer non-compliance is pervasive and a growing global problem that is not readily addressed (McKherchar and Evans 2009). For instance, Cobham (2005) estimated that developing countries collectively lose approximately USD 285 billion per year due to tax evasion in the domestic shadow economy. In the case of the USA, the Internal Revenue Service (IRS) reported that the 'net tax gap' for 2014 through 2016 tax years was USD 428 billion. Furthermore, the HMRC (2019) noted that tax gap for 2017/18 in the UK was around £35 billion, or 5.6 per cent of total tax liabilities. Still, a recent World Bank (2022) study reported that, globally, revenue collection falls short of what is required for effective governance and service delivery. In an earlier study, Murphy (2005) asserted that, regulating taxpayer behaviour is a primary and continuous activity aimed at the long-term health of a country. Ultimately, the goal is to ensure long-term voluntary tax compliance among taxpayers. In this regard, Fjeldstad, Schulz-Herzenberg and Sjørusen (2012) asserted that a more systematic and coherent information on taxpayer attitudes is required for better analysis and more informed tax policy design in Africa. The question that arises is: How can governments/tax authorities deal with tax non-compliance in order to secure long-term voluntary compliance? This question is of interest to this study because previous studies on tax compliance have shown that sanctions that are perceived to be unfair lead to resistance towards government authority (Fehr and Rockenbach, 2003; Kagan and Scholz, 2004).

## **2. Theoretical Framework**

The study is underpinned by three primary theories, namely the theory of planned behaviour (TPB), the deterrence and accommodation theories of tax compliance.

### **The theory of planned behaviour (TPB)**

The theory of planned behaviour, developed by Arjen (1991), is a modified version of the theory of reasoned action (TRA; Fishbein and Ajzen, 1975). According to the TRA model, behaviour can be predicted using attitudes toward a specific behaviour and subjective norms to form a behavioural intention that determines the actual behaviour. Ajzen (1991) modified the TRA to create the TPB by adding a new behavioural antecedent, perceived behavioural control (PBC), to the model to address the issue of personal control that the original model was lacking. Arjen

(2008) stated that TPB ‘is open to the inclusion of additional predictors’, which must meet a number of criteria. The predictors: 1) should be behaviour-specific, 2) conceptually independent of the TPB’s existing predictors, and 3) should be a causal factor in the measured behavioural intention or actual behaviour. Also, Arjen (2008) recommended that the addition of any predictors should be empirically supported and should also be applicable to other topics studied by social scientists. This study proposes to augment TPB with political legitimacy as a predictor of taxpayers’ compliance behaviour. Related to TPB are the economic deterrence and accommodative theories of tax compliance which are discussed in Section 2.2 and Section 2.3 respectively.

### **Deterrence theory of tax compliance**

This theory assumes that fundamentally, taxpayers are unwilling to discharge their tax liability and that, it is the risk of detection and penalty that often “deter” them into compliance. Advocates of this theory contend that taxpayers will only comply with tax authorities’ rules and decisions when confronted with harsh sanctions and penalties. The results from empirical studies using this theory are mixed. While some studies support the view that deterrence measures can positively affect compliance behaviour (Allingham and Sandmo, 1972; Williams, 2001; Witte and Woodbury, 1985), others suggests that deterrence-based strategies can sometimes be counterproductive (Ayres and Braithwaite, 1992; Blumenthal, Christian, and Slemrod, 1998).

In fact, research into reactance has shown that the use of threat and legal authority, particularly when perceived as illegitimate, can produce the opposite behaviour from that sought; these actions are more likely to result in non-compliance, creative compliance (McBarne, 2003), criminal behaviour or overt opposition (Fehr and Rockenbach, 2003; Kagan and Scholz; 1984; Colvin, and Culle, 2004). Kagan and Scholz (1984) further argue that unreasonable behaviour by regulators generates resistance to compliance. They suggest that unreasonableness may involve disrespect for citizens, or arbitrary refusal to take their concerns into account in the enforcement process. They suggest that citizen response to such unreasonableness is likely to be weakened respect for compliance with the law.

### **Accommodative theory of tax compliance**

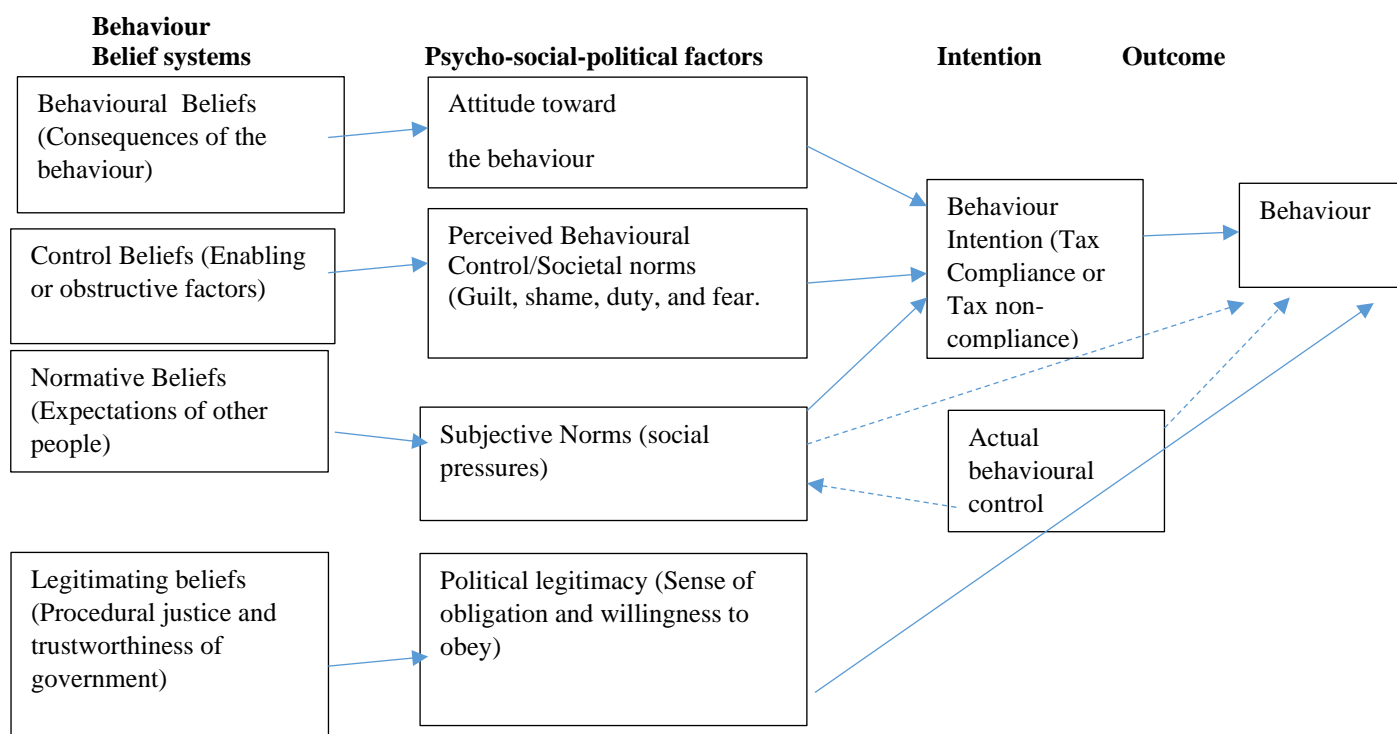
In response to findings of the deterrence theory a number of researchers (See for example, Braithwaite, 1992; Kagan and Scholz, 1984) argue that attitudes and moral obligations, in addition to economic calculations or fear of punishment, are important in explaining compliance behaviour and therefore need to be considered when managing non-compliance. The core motivations of the accommodative model, therefore, are not to punish an evil, but to repair the harm done and to secure future compliance. Related to the accommodative model of compliance behaviour is Tyler's (1990) theory on compliance. According to Tyler, people's compliance behaviour is strongly linked to views about justice and injustice. In particular, he suggests that procedural justice plays an important role in peoples' decision to comply with rules and regulations. Procedural justice concerns the perceived fairness of the procedures involved in decision-making and the perceived treatment one receives from a decision maker. The procedural justice literature demonstrates that people's reactions to their personal experiences with authorities are rooted in their evaluations of the fairness of procedures those agencies use to exercise their authority (Lind and Tyler, 1988; Tyler and Blader, 2000). In fact, there is empirical evidence to show that people who feel they have been treated in a procedurally fair manner by an organization will be more likely to trust that organization (Murphy, 2004) and will be more inclined to accept its decisions and follow its directions (Lind and Tyler, 1988; Kramer and Tyler, 1996). It has also been found that people are more likely to challenge a situation collectively when they believe that the procedures are unfair (Greenberg, 1987). The procedural justice literature specifically highlights the importance of an authority's



trustworthiness, interpersonal respect, and neutrality in its dealings with others (Tyler, 1997). Procedural justice is widely hypothesised to be an antecedent of legitimacy which has been defined as the belief by regulatees that authorities do their job well and are entitled to be obeyed (Tyler, 1997).

### Augmented theory of planned behaviour

In considering the factors in TPB and empirical findings relating to the Deterrence and Accommodative theories of tax compliance, political legitimacy meets all of Ajzen’s (2008) criteria for being added as a predictor of taxpayers’ compliance behaviour. This results in the new augmented theory of planned behaviour (see Figure 1).



**Figure 1:** Augmented Theory of Planned Behaviour (ATPB)

**Source:** Adapted from Ajzen, I. (2000). TPB Diagram. The theory of planned behaviour. <http://www-unix.oit.umass.edu/~ajzen/tpb.diag.html>

Barker (1990) defined political legitimacy as “the belief in the rightfulness of a state, in its authority to issue commands, so that those commands are obeyed not simply out of fear or self-interest, but because they are believed in some sense to have moral authority, because the subjects believe they ought to be obeyed.” In other words, political legitimacy can be viewed as popular approval of rulers by citizens and their compliance with government regulations and laws (Fauvelle-Aymar, 1999; Levi and Sacks, 2009; Levi, Sacks, and Tyler, 2009). This means that a legitimate government is one whose selection, the exercise of power and policies are widely accepted (Levi, 2019).

For the purposes of this study, it is important to discuss two key components of political legitimacy: procedural justice (fair and respective treatment of the citizenry), and trustworthiness of government (Levi, Sacks, and Tyler, 2009). According to Levi, Sacks and Tyler (2009), people’s behaviour is a function of the extent to which government ‘behaviour’ is consistent with the principles of the rule of law. The implication is that a government that abides by the rule of law is seen as good and worthy of respect and is more legitimate when its actions are viewed by citizens to be consistent with fair procedures and rules (Tyler, 2006; Tamanaha, 2012). The second pillar, trustworthiness, may be defined as a form of general social

capital associated with a society; this means holding a positive perception about the actions of an individual or an organization (OECD, 2013; Anderson, 2017). According to OECD (2013), trust in government matters because it is one of the most important foundations upon which the legitimacy and sustainability of political systems are built. Moreover, trust affects governments' ability to govern and enables them to act without having to resort to coercion.

A number of empirical studies have shown that political legitimacy is crucial for mobilizing government tax revenue for national development because taxpayers' perceptions of the government's legitimacy influence tax compliance attitudes and behaviours. (Fauvelle-Aymar, 1999; Tyler, 2006; Bird, Martinez-Vazquez, and Torgler, 2008; Berggren, Bjørnskov, and Lipka, 2015; Castañeda-Rodríguez, 2018). Another strand of the literature investigated how political legitimacy and civic identification are fostered. According to Persson (2008), African countries which emphasized building national over ethnic identity have been more successful than those that allowed ethnicity to become the main focus of politics. From the preceding discussion, it can be concluded that political legitimacy is an essential component of tax compliance behaviour. Thus, high perception of legitimacy of government will increase taxpayers' compliance attitudes and behaviours, and consequently increase in tax revenue. On the contrary, low legitimacy of government increases citizens' tax opposition and reduce tax revenue. That is, the less citizens believe that the government is legitimate, the less they will accept their obligation to be tax compliant (Fauvelle-Aymar, 1999). Several studies supported the assertion that there is a positive link between political legitimacy and tax compliance (Birskyte, 2014; Gobena and Dijke, 2016; Anderson, 2017; OECD, 2019; Adekoya, Agbetunde, and Lawal, 2022). According to OECD (2019), in Africa, trust in government positively influences tax moral and in turn voluntary tax compliance and tax revenues. However, Ali, Fjeldstad and Sjørnsen (2014), in their study of four sub-Saharan African (SSA) countries, found no significant link between political legitimacy and tax compliance. The Augmented theory of planned behaviour (ATPB) is shown Figure 1.

### **3. Tax Compliance and Related Terms**

This section presents a brief description of the underlying theory, together with the constructs used in the framework. The discussion includes the following terms: tax literacy, tax education, tax compliance, and political legitimacy.

#### **Tax literacy**

Bhushan, Medury (2013) defined tax literacy as the knowledge which an individual should possess in order to manage the issues concerning personal taxation effectively. To Bornman and Ramutumbu (2019), tax literacy is a process of increasing skills and understanding aspects that influence decisions in the field of taxation. Consequently, a person who understands the tax aspect in terms of definitions, obligations, rights, and other tax issues will be able to calculate the tax and monitor the use of taxes paid in general. This understanding will equip individuals with good morals and awareness to fulfil their tax obligations (Gerger, 2019). Wassermann and Bornman (2018) provides a comprehensive definition of tax literacy as ‘a dynamic process of developing skills and gaining the confidence to be aware of and understand the factors that influence the taxpayer's tax decision and of taxation consequences of the decision, to know where to get assistance on complicated tax issues and to use the knowledge to make informed choices and decisions with respect to various transactions.’ This definition suggest that tax literacy involves the development of requisite skills (knowledge), understanding of tax issues (awareness) and application of those skills in resolving tax issues (tax compliance decision-making).

## **Tax education**

There is no generally accepted definition of taxpayer education. However, there is consensus among researchers and experts that taxpayer education is a means of empowering taxpayers, giving them knowledge and tools to be able to better understand the tax system, increase their tax morale and finally, increase tax compliance. This study adopts OECD (2021) definition of taxpayer education as initiatives aimed at building a culture of tax compliance by teaching taxpayers, providing in-depth tuition, building new knowledge and skills; using communication tools to raise awareness in taxpayers of the different aspects of tax, including obligations, deadlines, taxpayer rights and how taxes are spent; and providing taxpayers with practical assistance in tax compliance. The definition suggest that the primary objective of taxpayer education is to ‘foster attitudes of commitment to the common good, emphasising the social value of tax and its link to public expenditure’ (OECD, 2015).

The OECD (2021) identified three common approaches of taxpayer education. These are teaching tax, communicating tax, and supporting tax compliance. First, teaching tax involves in-depth, often long-term engagement with all types of audiences (young people, adults, or entrepreneurs). Second, communicating tax focuses on providing tax knowledge through higher-level awareness-raising engagement with taxpayers through social media campaigns, tax fairs and TV shows. In addition, tax communication can be done through more scientific approaches drawing on behavioural economics to tailor communications to encourage positive responses. Third, supporting tax compliance means providing practical and direct assistance to taxpayers to facilitate the use of modern digital administration tools and to support taxpayers, especially vulnerable taxpayers, in their tax obligations, including reporting requirements.

There is now strong empirical evidence that lack of taxpayer knowledge leads to low levels of tax compliance. For instance, when taxpayers do not understand the tax system, they are likely to get confused, spend more time figuring out their obligations, and make mistakes that could lead to sanctions (Mascagni and Santoro, 2018). The costs of compliance, in terms of taxpayers’ time and financial costs, are proven to be large and highly regressive. Small taxpayers bear the largest burden (Smulders, Stiglingh, Franzsen and Fletcher, 2012; Coolidge, 2012; Hansford and Hasseldine, 2012). Sometimes compliance costs mean that taxpayers actually end up paying more tax than they should (Mascagni and Mengistu, 2018). This creates frustration and perceptions of unfairness, which in turn negatively affect compliance behaviour.

## **Tax compliance**

Allingham and Sandmo (1972) defined tax compliance as the decision to declare actual income to tax authorities under conditions of uncertainty. In other words, taxpayers may decide to declare their actual amount of tax liability or less than the actual amount; their decision depends on the probability of being caught and the penalty rate that will be imposed. According to Kirchler (2007), tax compliance is a taxpayer’s willingness to fulfil tax obligations in accordance with applicable regulations without the need for examinations, investigation, warnings and threats, and the application of sanctions both legal and administrative. Roth and Scholz (1989) defined tax compliance from a social and psychological perspective as “accurate reporting of tax liability”.

The extant literature suggest that tax compliance is determined by five broad factors: deterrence; norms (personal and social); fairness and trust in the tax administration; complexity of the tax system; and the role of government and the broader economic environment. Until recently, deterrence, the more traditional tool of tax administrations, was viewed as important but not sufficient to explain the level of tax compliance. In the light of this observation, a number of empirical studies have argued that tax compliance is part of behaviour that can be explored from various angles such as economic, psychological, and sociological factors (Cullis,

Jones, and Lewis., 2007, Hoelzl and Kirchle, 2008; Lewis, Carrera, Cullis and Jonnes, 2009; Bobek, Hageman, and Kelliher 2011; Alm and Torgler 2012; Cullis, Jones, and Savoia, 2012; Awang and Amran, 2014; Hofmann; and Jayawardane, 2015). This study extends the literature by arguing that tax compliance can be studied effectively from the psycho-social-political context.

On the contrary, tax non-compliance refers to tax avoidance or tax evasion. Tax avoidance involves the use of legal means to prevent or reduce a tax liability which would otherwise be incurred by taking advantage of some loopholes in the tax law (Webley et al., 1991; Wenzel, 2002; and Murphy, 2010). Tax evasion, on the other hand, is generally considered to be illegal and refers to acts of commission or omission (Webley et al., 1991; Sawyer, 1996; and Wenzel, 2002). Prior studies identified a number of characteristics associated with tax evasion. These include knowledge; deliberate act; illegal act; failure to comply with the tax law; element of concealment; recklessness; disregard for the tax system; and falsification of documents (Wu, 2012). According to Wu (2012), ‘knowledge’ and ‘deliberate act’ are the more important factors in describing tax evasion.

Tax non-compliance is a global phenomenon which poses a challenging problem for policymakers, tax authorities and ultimately for society, especially in light of the impacts of the COVID-19 pandemic (McKerchar, 2001, OECD, 2021). In fact, tax non-compliance deprives governments (especially developing countries) of critical tax revenues urgently needed to help achieve the United Nation’s Sustainable Development Goals (SDGs).

Marandu, Mbekomize, and Ifezue (2015) in an extensive review of tax compliance literature (from 1985 to 2012) concludes that TPB is the best framework for tax researchers to explore the determinants of tax compliance. However, Jayawardane (2015) strongly argued that to understand tax compliance behaviour more deeply, researchers should examine the socio-psychological determinants jointly with governmental factors (such as political legitimacy). Moreover, Fjeldstad, Schulz-Herzenberg and Sjursen (2012) argues that understanding how citizens perceive and experience taxation may provide an essential diagnostic of the political realities for tax reform. Yet still, Fjeldstad et al (2012) asserted that socio-psychological factors and political legitimacy are to some extent interconnected. In this regard, this study proposed extension of the TPB model by the addition of political legitimacy dimension for studying taxpayers’ compliance behaviour in developing countries.

#### **4. Literature Review**

The Theory of Planned Behaviour (TPB) posits that attitudes, subjective norms and perceived behavioural controls are key elements in determining a person’s intentions to engage in a target behaviour, and ultimately influences the performance of the behaviour (Fishbein and Ajzen, 1975; and Ajzen, 1991). TPB is one of the most widely used socio-psychological models in behavioural research to explain and predict behaviour (Armitage and Conner, 2001). The TPB has been used successfully to predict and explain a wide range of health behaviours and intentions including smoking, drinking, breastfeeding, and substance use. This review discusses the application of TPB framework in the study of taxation in general, and tax compliance, in particular. This will serve as a foundation for this study’s proposed framework.

Bobek, Hatfield, and Wentzel (2007) used TPB to investigate the underlying reasons why taxpayers in the US tend to make tax payments that ultimately result in a tax refund. The results from a sample of 140 respondents show that taxpayers' attitudes (e.g., desire to avoid uncertainty or to avoid any chance of underpayment) and subjective norms (e.g., perceptions of friends' likely advice) have an impact on tax compliance behaviour.

In an earlier study Efebera, Hayes, Hunton, and O’Neil (2004) used a modified TBP to examine the extent to which perceived tax equity, normative expectations, and legal sanctions affect tax compliance intentions. The results show that all components (equity perception, normative expectations, and legal sanctions) have a positive effect on tax compliance intentions. Similarly, Benk, Cakmak, and Budak (2011) replicated Efebera et. al. (2004) work and investigated taxpayers’ compliance intentions in Turkey. The findings in this study were different from that of Efebera et al. (2004). The authors reported that normative expectations and legal sanctions have a significant impact on tax compliance intention, but equity perception has no effect. In an earlier study, Trivedi et al. (2005) examined the efficacy of the TPB on tax compliance behaviour. The study tested the predictions of economic and psychological theories underlying the TPB on why taxpayers might comply or fail to comply. The results confirmed the predictions of the TPB and highlighted the important role of attitudes and intentions in tax compliance behaviour, over and above pure economic considerations.

Using TPB, Saad (2009; 2011) examined the effects of multiple dimensions of fairness, including tax knowledge and tax complexity, on Malaysian and New Zealand taxpayers’ behavioural intentions. The findings from both groups of taxpayers demonstrated the applicability of the TPB in predicting and explaining tax compliance behaviour. Gobena and Van Dijke (2015) used fairness heuristic theory and the slippery slope framework of tax compliance to examine the moderating roles of legitimate and coercive power held by the tax authority in the relationship between procedural justice, trust in the tax authority, and voluntary tax compliance among taxpayers in Ethiopia and US. The results confirmed that procedural justice fosters voluntary tax compliance, particularly when legitimate power of the tax authority is low and when coercive power of the authority is high. The study further shows that these interactive effects are mediated by trust. Finally, results revealed that coercive power of the tax authority is positively related with enforced tax compliance.

In a recent study, Robbins, and Kiser (2018) developed and tested a legitimacy-based model of tax compliance that accounts for why some citizens voluntarily comply with their tax obligations and others do not. They used a survey experiment of income tax evasion to a large random sample of undergraduate students to test the model. The results strongly support the standard economic model of deterrence and weakly support the legitimacy-based model of voluntary compliance. Lu, Huang and Lo (2010) used the Theory of Planned Behaviour (TPB) and the Technology Acceptance Model (TAM) to investigate the determinants influencing on-line tax filing behaviour for a sample of 422 online taxpayers in Taiwan. The results showed that attitude was the primary factor affecting on-line tax filing behaviour. Attitude in turn was influenced by five antecedents, namely, perceived usefulness, perceived ease of use, tax equity, social norm, and moral norm. The authors concluded that on-line tax filing intention is determined by attitudes, subjective norms, and perceived behavioural control (PBC), although attitude was found to have the strongest influence on individuals’ on-line tax filing decisions. The study therefore supports the use of the TPB jointly with TAM in examining on-line tax filing behaviour.

Using the Extended Theory of Planned Behaviour, Mintah (2020) explored the impact of Attitude, Subjective norms, Perceived behavioural control, Moral obligation, Perceived tax complexity and Antecedent-based intervention strategies on tax compliance intention of the self-employed in Ghana. The results are consistent with the PBT that trust, perceived tax complexity and antecedent-based intervention strategies are predictors of tax compliance intentions. Abdul and Wang’ombe (2018) used Structural Equation Model and survey data to test the validity and adequacy of the Theory of Planned Behaviour (TPB) and Procedural Justice Theory (PJT) in explaining tax compliance behaviour among medium and large corporate taxpayers in Kenya. The results indicate that tax compliance behaviour significantly improves

with increased perceived behavioural control but declines significantly with increase in tax compliance costs. In addition, tax compliance increases as firm size increases.

Bani-Khalid, Alshira'h and Alshirah (2022), used Partial-Least Squares-Structural Equation Modelling (PLS-SEM) and the extended theory of planned behaviour (TPB) to determine the intentions of owner-managers in SMEs towards engaging in sales tax compliance in Jordan. The results revealed that attitude towards behaviour, subjective norms, perceived behavioural control and patriotism were significant determinants of the intentions towards engaging in sales tax compliance. Yogo and Njib (2018), used dynamic panel data model with Blundell and Bond two-step System-general method of moments to explore the relationship between political competition and tax revenues using in a sample of 89 developing countries from 1988 to 2010. The study provided the following results: political competition positively and significantly affects total tax revenues. However, this general pattern slightly differs across the type of taxes; and the net effect of political competition on tax revenues is negative for countries that have adopted fiscal rules. Ouedraogo, Dianda and Ouedraogo (2021) examined the effect of political legitimacy on tax revenues in a sample of 41 SSA countries over the period 1996-2017 using used GMM. The result shows that tax revenue increases with political legitimacy. This result revealed that political legitimization in SSA remains crucial to mobilize more resources in order to adequately finance the development.

Hartner, Rechberger, Kirchler and Schabmann (2008), used group engagement model (Tyler and Blader, 2003) to investigate the relationship between taxpayers' treatment by tax authorities and non-compliance. The results revealed that procedural justice positively affects motivational postures of deference and negatively affects motivational postures of defiance. Additionally, this relationship was partly mediated by national identity judgments. Regarding the influence on actual tax behaviour, only a significant effect from motivational postures of defiance on non-compliance was obtained. An earlier study by Murphy (2003) demonstrated that sanctions or punishments used as strategy of first choice to obtain tax compliance can undermines tax authority's legitimacy when perceived as being procedurally unfair. In another study Murphy (2005) showed that those taxpayers, who were less satisfied with their tax authority's treatment, were more likely to question its legitimacy and hold resistant views towards the authority.

In summary, there is overwhelming evidence which clearly demonstrates the applicability of the TPB in predicting taxpayer compliance behaviour. Other studies have used diverse methodologies – modified TPB, GMM, Structural Equation Model, fairness heuristic theory and the slippery slope framework, among others to explore taxpayers' behaviour and tax compliance in various jurisdictions. Nevertheless, few studies on taxpayer compliance behaviour have examined the influence of political legitimacy on taxpayers' compliance behaviour (see for example, Wahlund, 1992; Sussman and Olivola, 2011; Kastlunger, Lozza, Tagliabue, Kirchler, 2013; Gobena and Van Dijke, 2015; Abdul and Wang'ombe, 2018; Bani-Khalid, Alshira'h and Alshirah, 2022). The present study argues that taxpayers' behaviour (as postulated by TPB) is influenced not only by socio-psychological factors but also by taxpayers' perception of political legitimacy of governments. One advantage of augmenting TPB with political legitimacy is to understand the extent to which tax non-compliance can be explained by procedural justice, which is an antecedent of political legitimacy. Therefore, future research can focus on examining the efficacy of the augmented framework of planned taxpayers' behaviour.

## **5. Conclusion**

This study presents evidence from previous studies which used the Theory of Planned Behaviour (TPB) that socio-psychological factors (attitudes, societal norms, and subjective norms) are positively correlated to tax compliance. TPB contends that it is possible to change

people’s behaviour by influencing one or more of the three determinants of behavioural intentions. It was also shown that political legitimacy is a relevant factor influencing taxpayers’ behaviour in three areas – tax compliance, tax reforms success, tax base expansion, and minimising tax evasion. This study argues that a modified Theory of Planned Behaviour (with inclusion of political legitimacy factor to TPB) can be useful for empirical studies exploring taxpayers’ compliance behaviour and tax compliance, especially in developing countries. The proposed framework has implications for policy makers and researchers as it will assist future research in providing a structured approach for assessing tax literacy as a factor influencing tax compliance. In addition, it will provide interested parties with a better understanding of the effects of individuals’ beliefs, attitudes, norms, and political legitimacy on tax compliance. Lastly, the study will assist governments in deciding the future course of action towards effective policy making for taxation and revenue mobilisation.

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# Who Visits Rural Areas? A Satisfaction-Based Segmentation: Perspective from Croatia

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## Abstract

Tourism in rural areas has been found an efficient factor of destination development which can be a potential solution for revitalization if it is properly managed. In that sense tourism can mitigate negative trends in rural areas. Therefore, the main purpose of the paper is to analyse tourism development in rural areas and to define different tourist segments visiting rural areas based on level of their satisfaction with numerous elements of tourism destination in order to improve the quality of tourism offer keeping authenticity and emphasising on sustainability.

In the study, empirical research was made using a convenience sample of 561 tourists through a highly structured questionnaire. The research was carried out in the period from June 2017 to January 2018 in rural areas. To achieve the main objective of the paper descriptive, inferential and multivariate statistics have been used. In this context, latent class analysis was applied and the seven-factor model was selected as an optimal solution. Findings can be useful to local tourism policymakers to develop appropriate marketing strategies for various tourism segments to avoid problems of urban tourism destinations.

**Keywords:** rural areas, depopulation, tourists' segmentation, Croatia, latent class analysis

## 1. Introduction

From the middle of the twentieth century, tourism has become global phenomenon due to its positive effect caused on economy of each tourism receptive country. Developing countries, particularly, have discovered its benefits and therefore tourism in these countries has become priority and dominant way of economic development. These facts have turned tourism into a key driver for economic but also for a social development. Economic benefits of different types of investment in the tourism in different areas have a positive effect where it can be applied. Benefits caused by tourism are mostly used from the local government of the urban places, while rural places are still fighting for their tourism market share. Tourism development in rural areas has different effects on economic development. Besides the income increasing and rational use of resources and facilities, the most important thing is the effect of preventing rural depopulation. Due to the competitive tourism market and continuing tourism development, rural tourism is passing excessive rejuvenation. Rural areas on the Mediterranean coast are facing negative trends such as economic decline and low quality of social services with the effect of depopulation despite the abundance of natural and cultural resources they possess. On the contrary, nearby urban areas have big problems with overpopulation, over tourism and uncontrolled environmental degradation. Nowadays, the differentiation in rural tourism offer is important element for rural tourism areas success. Diverse and authentic tourism offer contributes to a distinction from competitors all over the world. Focus on particular market segments and their satisfaction has become a priority. Adequate market segmentation strategies improve understanding of rural tourist behaviour. If the main determinants of behaviour can be recognised, this can enable future development. In addition to different urban and rural tourism destination and their offer, tourists seek an authentic experience. Therefore, rural tourism managers should be focused on various determinants to provide authentic and memorable tourist experience and to enhance their loyalty at the tourism market. The main goal is to analyse

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tourism development in certain Mediterranean rural destinations and to define the factors influencing satisfaction to identify and target tourists' segments.

The focus of this paper has been put on defining various tourists' segments, that is describing tourists in rural areas in accordance to their level of satisfaction with numerous elements of a tourism destination and to improve the quality of tourism offer emphasising on sustainability. In order to achieve this aim, phased approach has been used. In the first stage latent class analysis (LCA) model was applied. This model determines the smallest number of segments that is adequate to describe the associations observed between the manifest variables. Furthermore, their profile has been defined.

This paper is divided into five parts. After introduction overall literature background of the segmentation has been analysed. Third part includes methodology of the research. Results of data analysis are explained in depth in fourth part and the fifth part provides conclusions, limitations and implications of this research.

## **2. Literature Review**

Rural tourism in many countries has been recognized as an important and growing sector of overall tourism since 1960s (Sharpley, 2002) which presents valuable source of income particularly to rural economies. In today's world it can be seen as a potential solution to different problems arising in rural areas (Sharpley, 2002), but in certain rural destination including Mediterranean it hasn't been implemented yet. In order to mitigate depopulation and to stimulate economic development, rural destinations are trying to find their position on the market of rural tourism destinations (Fleischer & Felsenstein, 2000; Lane, 1994; Sharpley and Roberts, 2004). The development of rural tourism can directly impact economic, socio cultural and environmental positive impact (Fuller, 1990; Thibal 1988, Iorio & Orsale, 2010, Silva & Leal, 2015, Podovac et al. 2019). Brida et al. (2009) researched differences among stakeholders in their attitudes towards impacts of rural tourism. Iorio & Orsale (2010) determined the positive impacts of rural tourism on entrepreneurs. Kheiri & Nasihatkon, (2016) found out that rural tourism reduces vulnerability of residents by rising incomes and employment in the rural area, mitigating depopulation, deagrarisation and deruralisation. Brandth & Haugen (2010) researched potential influence of rural tourism in diversification and transformation of farms into tourism forms and they analysed its effect on social changes of farmers. Su (2011) analysed the impact of rural tourism in rural socio and economic regeneration. Despite positive effects, development of rural tourism has to consider negative impacts on natural and social environments such as great numbers of tourists, their activities in the destination, fragility of the natural environment and strength of the local culture (Butler & Hall, 1998; Roberts & Hall, 2001; Hall et al., 2005). Nepal (2008) analysed forms of energy consumption in rural areas. Therefore, rural tourism should protect the environment in a sustainable way of speaking, in the context of long-term positive effect of tourism on local community. Lane (1994) emphasized that rural tourism should be developed in areas which are rural in all aspects and he also proposed that rural tourism need to be consisted of small companies owned by local families and based on local agricultural production.

According Orsolya (2015) who analysed trends of rural tourism researches, researchers have been more focused to the supply side analysis of rural tourism, than on demand side but there are growing tendencies towards demand side due to the benefits of rural tourists. With the aim of minimizing negative impacts of tourism development in rural areas and in order to better valorise and preserve neglected natural and cultural resources, considering the fact that rural tourism does not offer only one attraction to potential tourists (Fernandez-Hernandez et al. 2016), tourist segmentation is noteworthy. Tourism segmentation importance was emphasised by numerous tourism researchers (Dolnicar, 2008; Landauer et al. 2012; Nickerson et al. 2016;

Sanchez-Fernandez et al. 2018; Simancas Cruz et al. 2022). Simancas Cruz et al. (2022) emphasized the importance of territorial segmentation as a valuable model for understanding tourists in the specific territory by integrating all the variables that mediate in a destination. The major benefit of market segmentation in tourism is that it provides urban and rural tourism destinations a review in depth of elements that increase level of satisfaction of tourism segments (Pulido-Fernandez & Sanchez-Rivero 2010).

Molera & Albaladejo (2007) emphasized the importance of understanding demand side through rural tourist segmentation. They determined five segments (family rural tourists, relax rural tourists, active rural tourists, rural life tourists and tourists of rural accommodation) of rural tourists in Spain who defined different benefits in rural destination. Segments were defined by socio-economics and travel behaviour applying multinomial logit analysis. Namely, four segments emphasized the importance of nature, environment and peacefulness, while one segment was motivated with spending time with friends. Albaladejo & Diaz Delfa (2005) pointed out the significance of rural tourists' profiles considering the different type of accommodation. Song (2005) determined clusters of rural tourists based on motivation (escape from everyday life, family togetherness and learning, self-actualization, accessibility, refreshment and activity), while Kim (2005) determined three distinctive segments based on motivation (rural centric tourists, passive rural tourists and visiting friends and relative tourists). Segmentation of tourists has also been functional for rural destinations (Sharpley, 1996; Kastenholz et al., 1999; Albaladejo & Diaz Delfa, 2005; Molera and Albaladejo, 2007; Park and Yoon, 2009). Kastenholz et al. (1999) obtained four rural tourists' segments (want it all ruralists, independent ruralists, environmental ruralists and traditional ruralists). Some researchers concluded that demand of rural tourism contains specific segments with various characteristics, preferences, needs, motives, satisfaction and aspirations (Lane, 1994; Sharpley and Sharpley, 1997; Roberts and Hall, 2001). Frochot (2005) defined four segments of rural tourists by diverse activities' preferences, holiday behaviour and socio-economic profiles (rellaxers, gazers, actives and rurals). Park & Yoon (2009) in order to understand better rural tourism in Korea segmented and profiled rural tourists based on the motivations. They found out, that market segmentation of rural tourism activities should be measured as part of an attractive combination of different tourism activities, as well as “sun & beach” activities. They determined four segments based on tourists' motivations using hierarchical cluster analysis (family togetherness, passive tourists, want-it-all, and learning and excitement). Pesonen & Komppula (2010) investigated whether rural tourism can be analysed as a form of wellbeing tourism based on motivation segmentation in order to find out are wellbeing tourist more specific that other segments. They defined four different segments using k-means clustering and among those segments they distinguished segment of wellbeing tourists with primary wellbeing motivating features (relaxing away from the ordinary, escape from a busy everyday life, hassle free vacation). Oh & Schuett (2010) explored rural tourists' segments based on expenditure patterns. Applying multiple regression analysis, they defined two subgroups (overnights stay visitors and short excursionists). Segmentation criterion was accommodation type. Sievanen et al. (2011) in their research of national park visitors in rural areas, have applied five dimensions of interest of tourists' services and have isolated five segments applying two step cluster method (countryside and outdoor friends, guided visitors, uninterested visitors, safari riders, room and rental seekers). Arnberger & Eder (2011) have conducted image-based stated choice survey in order to research the effects of different landscape change processes on the preferences of urban visitors using latent class segmentation. They have obtained four different segments, with diverse preferences regarding natural, managerial and social landscape attributes. Pesonen (2012) combined two studies of motivation and benefit segmentation and segmented online rural tourists in Finland by using k means cluster analysis. They identified four different segments (Social travellers, Wellbeing travellers, Home region travellers and

Family travellers) based on motivations, preferred destination characteristics, travel behaviour and sociodemographic attributes. Lima et al. (2012) explored rural tourist in Portuguese mountain destination. They made segmentation based on expenditure using cluster analysis and they have determined four segments (Lodging & activities oriented, Food & shopping oriented, Medium segment and Light segment). Dong et al. (2013) analysed rural tourists based on their travel motivations and characteristics in rural destination in order to better understand rural tourism in the United States. Their results showed that rural tourists who visited Potter County have heterogeneous profile due to their broad travel preferences. They have determined four dimensions (personal growth and escape, nature and rural exploration, relaxation, social bonding seekers and family fun) by applying k-means cluster analysis and have isolated three segments (experiential travellers, rural explorers and indifferent travellers), Rid, Pröbstl-Haider & Ezeuduji (2014) analysed the market possibilities for rural tourism activities in Gambia regarding their characteristics, motivations, and preferences. They determined four segments of rural tourists applying k-means clustering method (heritage & nature seekers, multi-experiences seekers, multi-experiences & beach seekers, and sun & beach seekers). Almeida et al. (2014) have segmented rural tourists in Madeira based on benefits sought by applying hierarchical cluster analysis and they have defined four clusters (Ruralist, Relaxers, Family oriented and Want-it-all).

Pesonen (2015) explored segmentation possibilities established on tourists' motivations and their activities by applying hierarchical cluster analysis. He found out that travel activities have higher impacts than motivations in determining different segmentation solutions. Author had determined four different segments (Family & nature tourists, Nature tourists, Couple tourists and Relaxation tourists). Fernandez-Hernandez et al. (2016) using hierarchical cluster analysis determined nine different segments (Sea lovers, Museum lovers, Relax, Fiesta lovers, Traditional culture, Gastronomy and entertainment, Stars lovers, Rural environment lovers and Trekking lovers). They found out that there are differences between different market segments in rural areas of Canary Islands and that traditional agritourism is only a small part of total tourism rural market. They pointed out that elements that have higher economic impact produce higher satisfaction among tourists for rural destinations whose festivals and events are small attractions. Polo Peña et al. (2014) tested the effect of online differentiation strategies applied by rural accommodation enterprises on three different rural tourists' segments considering the primary motivations (visiting the tourists' destination, enjoy the facilities at the rural accommodation enterprises and undertaken activities in rural environment). Eusébio et al. (2017) researched the heterogeneity of domestic tourists' expenditure in rural tourism destination using cluster analysis in Portugal and they determined four clusters based on activities (The Active Visitors, The Passive Nature Observers, The Inactives and The Summer Family Vacationers). Arminda & Martinho (2017) analysed the motivations behaviours, and images that rural tourists (from Portugal and abroad) connect with the Schist Village tourism destination in Portugal, and then they made segmentation using two step cluster analysis and defined three main segments. They also determined the differences between Portuguese and international rural visitors'/tourists' segments. Varmazyari et al. (2017) applied motive based segmentation in Iran and using factor-clustering method they have identified four different segments (self-actualized married women, married nostalgic men, young learning and nutrition-sensitive tourists and energetic and contact in nature young tourists). Mamoon & Shavanddasht (2017) researched rural geotourists' features, regarding the differences in their motivations on weekends and weekdays visitors. Applying factor-cluster market segmentation they determined three segments of weekend tourists (enjoyment and socialization seekers, geological attraction seekers and novelty seekers) and weekday tourists in four segments (Escape seekers, Multipurpose seekers, Novelty seekers and Historical and geological attraction seekers) based on pull and push motivations items. Varmazyari et al. (2018) predicted rural

tourists' segments applying factor-clustering method and combined approach and they have defined three different agritourists segments in Iran regarding to food safety concerns. Gu et al. (2018) applied factor-cluster analysis to define visitor segments in Changbai Mountain Biosphere Reserve (China) based on their motivations. They have determined four different segments (Nature travellers, Cultural landscape tourists, Food & shopping enthusiasts and Eclectic adventurers). Kastenholz et al. (2018) extended their previous research based on social interaction rural tourism and social marketing in Portugal rural areas. Using cluster analysis based on interaction patterns they have determined three segments (The introvert, The tourist-focused interactors and The residents-focused interactors). Lewis & D'Alessandro (2019) analysed the push-motives of senior tourists in domestic rural tourism in Australia. Trip segments were determined using k-means cluster analysis based on the trip pattern and two main segments were defined (Eastern Staters and Aussie Roundabouts). Bayat et al. (2019) made segmentation of rural tourists in Iran based on socio-demographic and travel attributes and favourite leisure activities. Using k-means cluster analysis they have determined three clusters based on motivational issues (Local attachment and peace, Rurality, relax and spirituality and Environment and outdoor recreation).

Wu & Wang (2019) explored rural tourist regarding their motivation in China. Applying k-means cluster analysis they have isolated three segments of rural tourists based on motivation (relaxation & excitement, business & socialization, and cultural). Lwoga & Maturo (2020) used motivation-based segmentation in African villages finding out that rural tourists are motivated by nostalgia for rural cultural life but also with relaxing with friends, learning about farming methods, enjoying nature and contributing the community. Applying combination of hierarchical and non-hierarchical (k-means) analysis, they have defined four segments (Multi-experiences, Authenticity-learners, Relaxing with friends and relatives, visiting farms and nature seekers and Passive segment). Kim et al. (2021) have segmented rural healing tourists using a two-stage cluster method regarding different level of their satisfaction. They have defined four segments based on the mean of their visit and involvement with rural healing tourism (high involvement, daily escape purpose type, high involvement, stress relief purpose type, low involvement, daily escape purpose type and high involvement, exotic experience purpose type). Gajić et al. (2021) explored the profiles of rural tourists, their motivational factors that have the most impact in the decision-making process of rural destination in Vojvodina, Serbia. They have defined a significant business segment, that is describing existing and potential tourist segment in rural areas in Serbia. An. & Alarcón (2021) analysed visitors' preferences heterogeneity for rural destinations in Spain using latent class analysis with best-worst choice. They have obtained five segments based on visitors' preferences and socio-demographic factors (all-around seeker, leisure activist, culture explorer, comfort-driven user, and basic value pursuer).

Some of the previous mentioned studies suggest that satisfaction plays an important role as a segmentation factor. Therefore, this paper strives to identify whether there are various segments of tourists visiting rural destinations depending on the level of satisfaction with different elements of rural tourism destination.

### 3. Data and Method

#### 3.1 Research area

island Korčula)<sup>3</sup> belonging to the Dubrovnik-Neretva County, Republic of Croatia, Europe. While Dubrovnik as a tourism destination has an increase in touristic numbers, rural areas around it are facing rapid depopulation and economic degradation and insignificant tourism market share in the County. In Dubrovnik littoral area tourists' arrivals have doubled in 2017 in compare to 2009 (28893), while the numbers of overnights have grown by average year rate of 4.4% (152613). It has the lowest population density (11 inhabitants per km<sup>2</sup>) and realises 1.5% of County tourism traffic.

The areas of research are rural destinations of Dubrovnik (Dubrovnik littoral, island Mljet and Population density in the Island Korčula is 56 inhabitants per km<sup>2</sup>. The numbers of tourism arrivals and overnights have increased from 2009 to 2017 (tourism arrivals from 32400 to 72178 and overnights from 335836 to 465543) by average year rate of 9.3% for arrivals and 3.7% for overnights<sup>4</sup>. It realises 3.8% of County arrivals and 6.0% of total County overnight stays in its rural areas (without settlement of Korčula). Island Mljet is very lightly populated with density of 10.5 inhabitants per km<sup>2</sup>. National park Mljet attracts lots of visitors. From 2009 to 2017 the number of tourism arrivals has increased from 15085 to 30637 by average year growth rate of 8%. The number of overnights stays has doubled in the same period by the average year growth rate of 7.5%. The island Mljet realises 1.6% of County arrivals and 1.7% in overnight stays (Croatia Bureau of Statistics, 2017).

#### 3.2 Sampling, questionnaire design and analytical procedure

Empirical research was made using convenience purposive sample of 600 tourists visiting rural destination areas around Dubrovnik, Croatia to achieve the main aim of the paper. The research was carried out from June 2017 to January 2018. Of the initial sample, 561 questionnaires were fulfilled correctly. The sample profile is shown in Table 1.

Data was collected through a highly structured questionnaire consisting of questions based on the literature review. The first part of the questionnaire consisted of the questions about socio-demographic characteristics of tourists and the items regarding travelling partners, length of stay, type of accommodation used and source of information used. The second part of the questionnaire included 29 statements were tourists have been asked to rate their level of satisfaction with each item on the five-point Likert scale (1=totally unsatisfied; 5=completely satisfied). The statements were taken and adjusted from previous researches (Echtner and Ritchie, 1993, Baloglu and Mangaloglu, 2001, Beerli and Martin 2004). The final question in the second part included a statement regarding overall satisfaction with destination on 5-point Likert scale (1= Disappointing; 5= Exceptional),

Descriptive statistics, factor analysis and latent class model have been applied to realize the main goal of the paper. Item-total correlation values and Cronbach's alpha coefficient have been used to test reliability of the items. For the verification of dimensionality of the construct defined by items, factor analysis was applied and scale evaluations were measured applying latent class analysis (criterion and construct validity).

Although latent class (LS) model was introduced by Lazarsfeld (1950), its implementation to market segmentation came from Green, Carmone and Wachspress (1976) in the late 1970es.

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<sup>3</sup> Area of research is the part of the project “Rural educational, cultural and ethnographic tourist attraction” coordinated by Ministry of regional development and EU funds related to operative programme “Competition and Cohesion 2014 – 2020”.

<sup>4</sup> In 2009 Čara, Pupnat and Račišće were considered as a part of town of Korčula and therefore couldn't be included in the total number of arrivals and overnights in rural areas

LC models are used to determine unobserved heterogeneity in a population with the purpose to discover meaningful groups of people with similar responses to measured variables based on probability (Nylund, Muthen, and Asparouhov, 2007; Hamka et al., 2014). LC models evaluate the parameters of the class membership model; clarify how an individual will behave and present estimates of the size of the segments (Sell, Mezei and Walden, 2014). In tourism latent class approach has been applied also for segmentation. Arnberger and Eder (2011) applied it for segmentation of tourism destinations in Austria, Alegre, Mateo and Pou (2011) for the length of stay in Balearic Islands. In 2015, Ramirez-Hurtado and Berbel-Pineda identified different segments of overseas tourists in Spain using latent class model and Sanchez-Fernandez et al. (2018) explored the concept of perceived sustainability at tourism destination. Notaro et al. (2019) used latent class in the process of exploring emotions on tourists' willingness to pay for the Alpine landscape.

Tourists' satisfaction with destination was investigated with respect to 29 statements using LatentGOLD 5.1 software.

#### 4. Results

Table 1 presents respondents profile. Regarding the age groups, one quarter of respondents is aged from 36 to 45 years and one fifth are between 46 and 55 years. Only 7.4% of respondents are aged 66 and older and more than one third are young respondents. In regards to gender structure, the results indicate almost equal structure. The education structure showed that almost 85% have higher education. More than 50% of respondents have personal income between 1501 and 3000 euros and one fifth has between 3001 and above while one quarter has less than 1500 euros. Regarding region of origin, 90% of respondents come from Europe, mostly from Central and Western part, 5.3% from Asia and 4.1% from Americas. Only 0.4% comes from Australia and Oceania.

**Table 1:** Respondents' profile

| Demographic characteristics | TOURISTS  |            |
|-----------------------------|-----------|------------|
|                             | Frequency | Percentage |
| <b>Age</b>                  |           |            |
| 18-25                       | 107       | 18,9       |
| 26-35                       | 108       | 19,1       |
| 36-45                       | 141       | 25,0       |
| 46-55                       | 114       | 20,2       |
| 56-65                       | 53        | 9,4        |
| 66 -                        | 42        | 7,4        |
| <b>Gender</b>               |           |            |
| Male                        | 290       | 51,3       |
| Female                      | 275       | 48,7       |
| <b>Education</b>            |           |            |
| Primary School              | 3         | 0,5        |
| Secondary school            | 87        | 15,4       |
| Undergraduate               | 200       | 35,4       |
| Graduate                    | 205       | 36,3       |
| Postgraduate                | 70        | 12,4       |



|   |     |      |
|---|-----|------|
| <b>Personal monthly income (in EUR)</b> |     |      |
| -500                                    | 53  | 9,4  |
| 501-1.500                               | 94  | 16,6 |
| 1.501-2.000                             | 117 | 20,7 |
| 2.001-2.500                             | 89  | 15,8 |
| 2.501-3.000                             | 95  | 16,8 |
| 3.001-3.500                             | 47  | 8,3  |
| 3.501-4..000                            | 35  | 6,2  |
| 4.001-                                  | 35  | 6,2  |
| <b>Region of origin</b>                 |     |      |
| Northern Europe                         | 33  | 5,8  |
| Western Europe                          | 144 | 25,5 |
| Central Europe                          | 185 | 32,7 |
| Southern Europe                         | 100 | 17,7 |
| Southeast Europe                        | 35  | 6,2  |
| Eastern Europe                          | 13  | 2,3  |
| North America                           | 14  | 2,5  |
| South America                           | 9   | 1,6  |
| Australia and Oceania                   | 2   | 0,4  |
| Asia                                    | 30  | 5,3  |

**Source:** Authors' research

Table 2 shows dimensions, inferential statistics and reliability analysis of the scale items. By applying reliability analysis four items were excluded from further analysis, namely “reasonable prices for cultural offer”, “reasonable prices in restaurants”, “the quality of accommodation” and “exciting atmosphere” lowering the number of items to twenty five for the further analysis.

**Table 2:** Dimensions, inferential statistics and reliability analysis of the scale items

|  | <b>Item total correlation</b> | <b>Mean</b> | <b>SD</b>   |
|--|-------------------------------|-------------|-------------|
| <b>(Cronbach alpha coefficient = 0,739; Cronbach alpha if deleted=0,795)</b> |                               | <b>4,24</b> |             |
| Good experiences with local culture  | ,612                          | 4,38        | ,723        |
| Cultural sites were accessible   | ,644                          | 4,28        | ,756        |
| <i>Reasonable prices for cultural offer</i>                                  | <i>,463</i>                   | <i>4,06</i> | <i>,893</i> |
| <b>(Cronbach alpha coefficient=0,781)</b>                                    |                               | <b>4,18</b> |             |
| Scenic and natural beauty  | ,515                          | 4,42        | ,821        |
| Environmental preservation   | ,652                          | 4,19        | ,901        |
| Cleanliness of the tourism destination                                       | ,674                          | 4,04        | ,917        |
| Good waste management  | ,515                          | 3,99        | ,919        |
| Security and safety  | ,432                          | 4,26        | ,901        |
| <b>(Cronbach alpha coefficient=0,847)</b>                                    |                               | <b>3,62</b> |             |
| Nightlife and entertainment  | ,597                          | 3,53        | 1,156       |
| Availability of recreational facilities                                      | ,663                          | 3,69        | 1,036       |
| Reasonable prices for the entertainment                                      | ,646                          | 3,64        | 1,034       |
| Possibilities for shopping   | ,717                          | 3,42        | 1,151       |
| Availability of good local souvenirs   | ,696                          | 3,66        | 1,044       |
| Reasonable prices in shops   | ,466                          | 3,88        | ,963        |
| <b>(Cronbach alpha coefficient = 0,699, Cronbach alpha if deleted=0,714)</b> |                               | <b>4,12</b> |             |
| Enjoying local cuisine   | ,474                          | 4,22        | ,810        |
| Good quality of services in restaurants                                      | ,651                          | 4,12        | ,841        |
| <i>Reasonable prices in restaurants</i>                                      | <i>,440</i>                   | <i>4,02</i> | <i>,942</i> |
| <b>(Cronbach alpha coefficient = 0,656; Cronbach alpha if deleted=0,808)</b> |                               | <b>4,15</b> |             |

|  |      |             |       |
|--|------|-------------|-------|
| <i>The quality of accommodation</i>  | ,363 | 4,29        | 1,542 |
| Services provided in accommodation   | ,613 | 4,14        | ,976  |
| Reasonable prices of accommodation   | ,524 | 4,05        | 1,017 |
| <b>(Cronbach alpha coefficient = 0,823)</b>                                  |      | <b>4,06</b> |       |
| Accessibility of this place  | ,605 | 4,03        | ,961  |
| Availability of the parking  | ,703 | 3,92        | 1,097 |
| Good signage for visitors  | ,715 | 4,07        | ,985  |
| Good value for money   | ,577 | 4,24        | ,891  |
| <b>(Cronbach alpha coefficient = 0,768; Cronbach alpha if deleted=0,781)</b> |      | <b>4,57</b> |       |
| Peaceful atmosphere  | ,481 | 4,51        | ,748  |
| Friendliness of local people   | ,637 | 4,59        | ,709  |
| Relaxing atmosphere  | ,581 | 4,67        | ,623  |
| <i>Exciting atmosphere</i>   | ,420 | 4,46        | ,843  |
| Pleasant atmosphere  | ,633 | 4,65        | ,630  |

Source: Authors' research

Factor analysis with Promax rotation was used to identify the underlying dimensions of twenty-five items resulting in seven different factors (Entertainment, Environment, Atmosphere, Accessibility, Accommodation, Culture, Gastronomy), as shown in Table 3. KMO was 0.756 and Bartlet test of sphericity was significant at 0.000 confidence level.

**Table 3:** Factor analysis

|   | Entertainment | Environment | Atmosphere | Accessibility | Accommodation | Culture | Gastronomy |
|---|---------------|-------------|------------|---------------|---------------|---------|------------|
| Good experience with local culture      |               |             |            |               |               | ,814    |            |
| Cultural sites were accessible          |               |             |            |               |               | ,818    |            |
| Scenic and natural beauty               |               | ,670        |            |               |               |         |            |
| Environmental preservation              |               | ,846        |            |               |               |         |            |
| Cleanliness of the tourism destination  |               | ,764        |            |               |               |         |            |
| Good waste management                   |               | ,444        |            |               |               |         |            |
| Security and safety                     |               | ,398        |            |               |               |         |            |
| Nightlife and entertainment             | ,748          |             |            |               |               |         |            |
| Availability of recreational facilities | ,765          |             |            |               |               |         |            |
| Reasonable prices for entertainment     | ,641          |             |            |               |               |         |            |
| Possibilities for shopping              | ,815          |             |            |               |               |         |            |
| Availability for good local souvenirs   | ,682          |             |            |               |               |         |            |
| Enjoying local cuisine                  |               |             |            |               |               |         | ,758       |
| Good quality of services in restaurants |               |             |            |               |               |         | ,699       |
| Services provided in accommodation      |               |             |            |               | ,719          |         |            |
| Reasonable prices of accommodation      |               |             |            |               | ,846          |         |            |
| Accessibility of the place              |               |             |            | ,526          |               |         |            |
| Availability of the parking             |               |             |            | ,723          |               |         |            |
| Good signage for visitors               |               |             |            | ,913          |               |         |            |
| Good value for money                    |               |             |            | ,545          |               |         |            |
| Peaceful atmosphere                     |               |             | ,573       |               |               |         |            |
| Friendliness of local people            |               |             | ,677       |               |               |         |            |
| Relaxing atmosphere                     |               |             | ,782       |               |               |         |            |

|                     |  |  |      |  |  |  |  |
|---------------------|--|--|------|--|--|--|--|
| Pleasant atmosphere |  |  | ,681 |  |  |  |  |
|---------------------|--|--|------|--|--|--|--|

Source: Authors’ research

The factor scores were used as indicators in the latent class model (Table 4). A set of latent class cluster models with a growing number of classes were estimated. According to p values associated with L2 statistic which shows the level of association between the variables that remain unexplained after the model estimation (Ramirez-Hurtado and Berbel-Pineda, 2014), two models fit better than others, eg. models with six and seven latent classes. L2 statistics is the lowest in the Model 7. Also, a seven-cluster model shows minimum BIC index (Vermunt and Magidson, 2005). Therefore, findings indicate an optimal solution of seven tourists’ segments that minimize the BIC index –36035,8. Wald test shows that all seven factors are significant for the model (p<0.05).

**Table 4:** Estimation of the model – selection of latent cluster

|               |                  | LL              | BIC(LL)        | AIC(LL)        | CAIC(LL)       | Npar       | L <sup>2</sup>  | df         | p-value      | Class.Err.    |
|---------------|------------------|-----------------|----------------|----------------|----------------|------------|-----------------|------------|--------------|---------------|
| Model1        | 1-Cluster        | -19664,3        | 40075,5        | 39564,6        | 40193,5        | 118        | 39057,47        | 443        | 0.000        | 0             |
| Model2        | 2-Cluster        | -18249,7        | 37480,6        | 36809,5        | 37635,6        | 155        | 36228,33        | 406        | 0.000        | 0,023         |
| Model3        | 3-Cluster        | -17810          | 36835,4        | 36004,1        | 37027,4        | 192        | 35348,91        | 369        | 0.007        | 0,0457        |
| Model4        | 4-Cluster        | -17514,5        | 36478,5        | 35487          | 36707,5        | 229        | 34757,85        | 332        | 0.022        | 0,0491        |
| Model5        | 5-Cluster        | -17267,2        | 36218,1        | 35066,4        | 36484,1        | 266        | 34263,27        | 295        | 0.036        | 0,0496        |
| Model6        | 6-Cluster        | -17086,3        | 36090,5        | 34778,6        | 36393,5        | 303        | 33901,42        | 258        | 0.056        | 0,0617        |
| <b>Model7</b> | <b>7-Cluster</b> | <b>-16941,8</b> | <b>36035,8</b> | <b>34563,7</b> | <b>36375,8</b> | <b>340</b> | <b>33612,55</b> | <b>221</b> | <b>0.062</b> | <b>0,0594</b> |
| Model8        | 8-Cluster        | -16845,4        | 36077,2        | 34444,9        | 36454,2        | 377        | 33719,75        | 184        | 0.042        | 0,0429        |

Source: Authors’ research

As a result of this analysis, the latent variable can be described by seven classes of tourists with different level of satisfaction. Each class is big enough to be considered as relevant for the purpose of analysis and with a profile of consumers belonging to them as different.

**Table 5:** Description of segments

|                      | Cluster1      | Cluster2     | Cluster3     | Cluster4      | Cluster5      | Cluster6      | Cluster7      |
|----------------------|---------------|--------------|--------------|---------------|---------------|---------------|---------------|
| <b>Cluster Size</b>  | <b>0.3057</b> | <b>0.197</b> | <b>0.179</b> | <b>0.1233</b> | <b>0.0822</b> | <b>0.0678</b> | <b>0.0449</b> |
| Indicators           |               |              |              |               |               |               |               |
| <b>Culture</b>       |               |              |              |               |               |               |               |
| Totally unsatisfied  |               |              |              |               |               |               |               |
| Medium unsatisfied   | 0.0078        | 0.0019       | 0.0001       | 0.03635       | 0             | 0.1161        | 0.00045       |
| Neutral              | 0.11105       | 0.05635      | 0.0077       | 0.2892        | 0.0007        | 0.47          | 0.02185       |
| Medium satisfied     | 0.51975       | 0.43955      | 0.20445      | 0.5303        | 0.06555       | 0.3699        | 0.31595       |
| Totally satisfied    | 0.36135       | 0.50225      | 0.7877       | 0.14415       | 0.93375       | 0.044         | 0.66175       |
| Mean                 | 4.23465       | 4.4422       | 4.7798       | 3.7824        | 4.93305       | 3.34175       | 4.639         |
| <b>Nature</b>        |               |              |              |               |               |               |               |
| Totally unsatisfied  | 0.002825      | 0.0019       | 0.000075     | 0.028975      | 0             | 0.000975      | 0.010175      |
| Medium unsatisfied   | 0.03356       | 0.0397       | 0.00188      | 0.19164       | 0.0001        | 0.013         | 0.09172       |
| Neutral              | 0.1855        | 0.20148      | 0.03136      | 0.37284       | 0.00444       | 0.09726       | 0.2884        |
| Medium satisfied     | 0.40566       | 0.41464      | 0.22246      | 0.29704       | 0.0852        | 0.28156       | 0.37578       |
| Totally satisfied    | 0.37306       | 0.34266      | 0.74424      | 0.11532       | 0.91026       | 0.60732       | 0.2359        |
| Mean                 | 4.1137        | 4.05724      | 4.70892      | 3.28972       | 4.9056        | 4.48168       | 3.73952       |
| <b>Entertainment</b> |               |              |              |               |               |               |               |
| Totally unsatisfied  | 0.01135       | 0.00075      | 0.011283     | 0.076633      | 0             | 0.145         | 0.219383      |
| Medium unsatisfied   | 0.08915       | 0.013417     | 0.083067     | 0.290217      | 3.33E-05      | 0.358033      | 0.351683      |

|                         |          |          |          |          |          |          |          |
|-------------------------|----------|----------|----------|----------|----------|----------|----------|
| Neutral                 | 0.319367 | 0.12805  | 0.27755  | 0.390117 | 0.002167 | 0.319267 | 0.296883 |
| Medium satisfied        | 0.4362   | 0.4587   | 0.440533 | 0.212433 | 0.079533 | 0.148    | 0.1159   |
| Totally satisfied       | 0.143983 | 0.399067 | 0.187583 | 0.030633 | 0.918217 | 0.029717 | 0.01615  |
| Mean                    | 3.6123   | 4.241867 | 3.710033 | 2.830217 | 4.915967 | 2.559467 | 2.3578   |
| <b>Gastronomy</b>       |          |          |          |          |          |          |          |
| Totally unsatisfied     | 0.0041   | 0.00135  | 0.0001   | 0.03975  | 0        | 0.0091   | 0.00165  |
| Medium unsatisfied      | 0.01645  | 0.0079   | 0.0018   | 0.07265  | 0        | 0.02285  | 0.00925  |
| Neutral                 | 0.2073   | 0.1407   | 0.0591   | 0.39575  | 0        | 0.229    | 0.15375  |
| Medium satisfied        | 0.4734   | 0.45195  | 0.35325  | 0.3868   | 0.00325  | 0.4575   | 0.4592   |
| Totally satisfied       | 0.29875  | 0.3981   | 0.58575  | 0.10505  | 0.99675  | 0.28145  | 0.3761   |
| Mean                    | 4.0464   | 4.2376   | 4.52265  | 3.44485  | 4.99675  | 3.97935  | 4.19875  |
| <b>Accommodation</b>    |          |          |          |          |          |          |          |
| Totally unsatisfied     | 0.00685  | 0.001    | 0.0004   | 0.06775  | 0        | 0.01235  | 0.0007   |
| Medium unsatisfied      | 0.0471   | 0.0101   | 0.0043   | 0.19035  | 0.0001   | 0.0407   | 0.0061   |
| Neutral                 | 0.23945  | 0.1053   | 0.05505  | 0.3835   | 0.0037   | 0.16775  | 0.06655  |
| Medium satisfied        | 0.4665   | 0.41905  | 0.2823   | 0.2974   | 0.08265  | 0.317    | 0.293    |
| Totally satisfied       | 0.24005  | 0.4646   | 0.65435  | 0.061    | 0.912    | 0.46225  | 0.63075  |
| Mean                    | 3.88585  | 4.33625  | 4.6948   | 3.0935   | 4.95635  | 4.1761   | 4.6368   |
| <b>Access</b>           |          |          |          |          |          |          |          |
| Totally unsatisfied     | 0.01844  | 0.00128  | 0.00004  | 0.28568  | 0        | 0.00968  | 0.04736  |
| Medium unsatisfied      | 0.06302  | 0.21044  | 0.00092  | 0.1537   | 0        | 0.04052  | 0.08584  |
| Neutral                 | 0.4286   | 0.07928  | 0.0223   | 0.28322  | 0.00026  | 0.3601   | 0.22294  |
| Medium satisfied        | 0.34966  | 0.33296  | 0.41498  | 0.22948  | 0.22232  | 0.3459   | 0.13416  |
| Totally satisfied       | 0.14026  | 0.37602  | 0.56174  | 0.0479   | 0.77742  | 0.24374  | 0.4097   |
| Mean                    | 2.93028  | 3.47196  | 3.73746  | 2.4002   | 3.9772   | 3.17346  | 3.17298  |
| <b>Atmosphere</b>       |          |          |          |          |          |          |          |
| Totally unsatisfied     | 0.005875 | 0.00165  | 0        | 0.054125 | 0        | 0.016575 | 0.04705  |
| Medium unsatisfied      | 0.022375 | 0.00745  | 0.000075 | 0.0977   | 0        | 0.0445   | 0.0546   |
| Neutral                 | 0.144975 | 0.06475  | 0.004775 | 0.282    | 0.0001   | 0.18995  | 0.149275 |
| Medium satisfied        | 0.417175 | 0.320225 | 0.11235  | 0.36955  | 0.0166   | 0.408225 | 0.314275 |
| Totally satisfied       | 0.4096   | 0.6059   | 0.882825 | 0.1966   | 0.9833   | 0.340725 | 0.434825 |
| Mean                    | 4.202225 | 4.521175 | 4.87785  | 3.55685  | 4.983225 | 4.01195  | 4.0353   |
| <b>Covariates</b>       |          |          |          |          |          |          |          |
| <b>Region of origin</b> |          |          |          |          |          |          |          |
| Northern Europe         | 0.0902   | 0.0745   | 0.0894   | 0.0459   | 0.0541   | 0.0804   | 0.0687   |
| Western Europe          | 0.2328   | 0.2295   | 0.2713   | 0.3859   | 0.1894   | 0.2572   | 0.2216   |
| Central Europe          | 0.3093   | 0.2738   | 0.2184   | 0.2056   | 0.3914   | 0.1895   | 0.1418   |
| Southern Europe         | 0.0958   | 0.1345   | 0.1526   | 0.1116   | 0.1547   | 0.2814   | 0.1147   |
| Southeast Europe        | 0.0968   | 0.054    | 0.0783   | 0.1022   | 0.102    | 0.0951   | 0.3168   |
| Eastern Europe          | 0.0412   | 0.0654   | 0.0204   | 0.0214   | 0.0564   | 0.0312   | 0.0843   |
| North America           | 0.0427   | 0.0598   | 0.0841   | 0.0612   | 0.0213   | 0.0321   | 0.0198   |
| South America           | 0.0125   | 0.025    | 0.0185   | 0.0154   | 0.0012   | 0.0014   | 0.0087   |
| Australia and Oceania   | 0.0062   | 0.0183   | 0.0128   | 0.0056   | 0.0081   | 0.0084   | 0.0047   |
| Asia                    | 0.0725   | 0.0652   | 0.0542   | 0.0452   | 0.0214   | 0.0233   | 0.0189   |
|                         |          |          |          |          |          |          |          |
| Mean                    | 3.3291   | 3.4403   | 3.8152   | 3.0679   | 4.065    | 3.6775   | 3.3761   |
| <b>Gender</b>           |          |          |          |          |          |          |          |
| Male                    | 0.5566   | 0.4433   | 0.4706   | 0.5637   | 0.5422   | 0.6312   | 0.3675   |
| Female                  | 0.4434   | 0.5567   | 0.5294   | 0.4363   | 0.4578   | 0.3688   | 0.6325   |

|                        |        |        |        |        |        |        |        |
|------------------------|--------|--------|--------|--------|--------|--------|--------|
| Mean                   | 1.4434 | 1.5567 | 1.5294 | 1.4363 | 1.4578 | 1.3688 | 1.6325 |
| <b>Age</b>             |        |        |        |        |        |        |        |
| 18-25                  | 0.1286 | 0.1381 | 0.1265 | 0.303  | 0.1967 | 0.3663 | 0.4393 |
| 26-35                  | 0.2046 | 0.1097 | 0.2287 | 0.2347 | 0.2652 | 0.1606 | 0.0484 |
| 36-45                  | 0.288  | 0.3285 | 0.2146 | 0.2075 | 0.2562 | 0.0945 | 0.1567 |
| 46-55                  | 0.208  | 0.2578 | 0.2422 | 0.1129 | 0.1297 | 0.1454 | 0.2454 |
| 56-65                  | 0.0954 | 0.0849 | 0.0926 | 0.0858 | 0.0889 | 0.1354 | 0.0703 |
| 66-                    | 0.0754 | 0.081  | 0.0954 | 0.0561 | 0.0633 | 0.0978 | 0.0399 |
| Mean                   | 3.166  | 3.2558 | 3.2231 | 2.6488 | 2.8187 | 2.8226 | 2.6087 |
| <b>Monthly income</b>  |        |        |        |        |        |        |        |
| -500                   | 0.0587 | 0.0926 | 0.1528 | 0.1655 | 0.1278 | 0.1494 | 0.1445 |
| 501-1000               | 0.0867 | 0.1256 | 0.1255 | 0.2036 | 0.2047 | 0.1758 | 0.2158 |
| 1001-1500              | 0.1092 | 0.1186 | 0.067  | 0.145  | 0.0943 | 0.1892 | 0.1033 |
| 2001-2500              | 0.1259 | 0.0926 | 0.0864 | 0.0827 | 0.0789 | 0.1754 | 0.0973 |
| 2500-3000              | 0.0519 | 0.0876 | 0.11   | 0.0723 | 0.043  | 0.073  | 0.0358 |
| 3001-3500              | 0.0896 | 0.0965 | 0.1025 | 0.0845 | 0.0432 | 0.058  | 0.0522 |
| 3501-4000              | 0.174  | 0.2832 | 0.1138 | 0.1522 | 0.0832 | 0.0848 | 0.1913 |
| 4001+                  | 0.304  | 0.1033 | 0.242  | 0.0942 | 0.3249 | 0.0944 | 0.1598 |
| Mean                   | 4.5383 | 3.8311 | 3.9973 | 3.2765 | 4.0825 | 3.1327 | 3.3092 |
| <b>Number of visit</b> |        |        |        |        |        |        |        |
| First visit            | 0.5913 | 0.3536 | 0.6155 | 0.7146 | 0.6147 | 0.4687 | 0.5999 |
| Second visit           | 0.1808 | 0.2498 | 0.1654 | 0.1309 | 0.1294 | 0.1756 | 0.3195 |
| 3-5 visits             | 0.1351 | 0.2474 | 0.1709 | 0.1132 | 0.0868 | 0.3013 | 0.0113 |
| More than 5 visits     | 0.0928 | 0.1492 | 0.0482 | 0.0413 | 0.1691 | 0.0544 | 0.0693 |
| Mean                   | 1.7295 | 2.1923 | 1.652  | 1.4812 | 1.8103 | 1.9414 | 2.1581 |
| <b>Type of</b>         |        |        |        |        |        |        |        |
| Hotel                  | 0.2411 | 0.1483 | 0.2104 | 0.2746 | 0.0868 | 0.1885 | 0.077  |
| Private accommodation  | 0.5726 | 0.6116 | 0.5883 | 0.4067 | 0.5013 | 0.0809 | 0.6019 |
| Camp                   | 0.0345 | 0.0636 | 0.0399 | 0.2598 | 0.0217 | 0.6758 | 0.1197 |
| Hostel                 | 0.0705 | 0.0925 | 0.0677 | 0.025  | 0.141  | 0.0195 | 0.078  |
| Nautical boat          | 0.0325 | 0.0471 | 0.0366 | 0.0216 | 0.1464 | 0.0209 | 0.0511 |
| Nothing of the above   | 0.0488 | 0.0369 | 0.0571 | 0.0123 | 0.1028 | 0.0144 | 0.0723 |
| Mean                   | 4.849  | 5.2749 | 5.0281 | 4.8072 | 6.2572 | 4.6795 | 5.9671 |

**Source:** Authors' research

Cluster 1 is the largest one with 30.5% of respondents belonging to it. These respondents show high level of satisfaction with culture (mean = 4.23), atmosphere (mean =4.20) nature (mean =4.11) and gastronomy (mean =4.04) and don't have an attitude regarding the access to destination (mean=2.93). They are also satisfied with accommodation (mean= 3.88) and entertainment (mean =3.61). Most of the respondents come from Central (30.0%) and Western Europe (23.2%), are males (55.6%) between 46 and 55 years of age (20.8%) and 26 to 35 years (20.4%) with monthly income above 4001 euros (30.4%) or from 3501 to 4000 euros (17.4%). Almost 60% of them are in the first visit to destination and stay in private accommodation (57.2%) while 24.1% stay in hotels. Members of this cluster are named “Hedonists” for their

social status and the level of enjoyment with given elements (culture, nature, gastronomy and atmosphere).

Second cluster is comprised of 19.7% of respondents and is called “Perceptuals”. Perceptuals are people who enjoy rural atmosphere more than tangible elements of destination. These respondents show the highest level of satisfaction with atmosphere in destination (mean =4.52) and are satisfied with culture (mean =4.44), entertainment (mean =4.24) and gastronomy (mean =4.23). The lowest level of satisfaction for respondents is expressed with the access to destination (mean =3.47). They come from Central (mean=27.3%) and Western Europe (22.9%), are mostly female (55.6%) aged between 36 and 45 years (32.8%) and 46 to 55 years (25.7%) with monthly income from 3501 to 4000 euros (28.3%). More than third of respondents are in the first visit to destination (35.3%) although a quarter of them is visiting for second time (24.9%) or have been in destination 3 to 5 times (24.7%). These respondents mostly use private accommodation for their stay (61.6%).

Cluster number 3 called “Appreciatives” has 17.9% of respondents who are very satisfied with atmosphere (mean =4.87), culture (mean = 4.77), nature (mean =4.70), accommodation (mean =4.69) and gastronomy (mean=4.52) and are satisfied with access (mean=3.73) and entertainment (mean=3.71). 48.9% of them come from Central and Western Europe, are females (52.9%) between 26 and 55 years of age (68.4%) with monthly income above 4001 euros (24.2%). They are visiting destination for the first time (61.5%) and stay in private accommodation (58.3%) although one fifth of them choose hotels for their stay (21%).

Cluster 4 has 12.3% of respondents who in general, express the lowest level of satisfaction with all elements. They are satisfied with culture (mean =3.78) and atmosphere (mean =3.55) and do not express their satisfaction or dissatisfaction with gastronomy (mean =3.44), nature (mean = 3.28), accommodation (mean =3.09) or entertainment (mean =2.83). The lowest level of satisfaction is expressed with access to destination (mean=2.40). These respondents are mostly coming from Central and Western Europe (59%), are males (56.3%), young (53.7% are aged between 18 and 35) with monthly income from 501 to 1000 euros (20.6%) or less than 500 euros (16.5%). They are in the first visit to destination (71.4%) and stay in private accommodation (40.6%) and hotels (27.4%) while one quarter chooses camp as accommodation facility (25.9%). This cluster is called “Modests” according their social status and desires.

8.22% of respondents make Cluster 5 who in general express the highest level of satisfaction with given elements. Gastronomy is the element showing the highest mean (mean =4.99), following by atmosphere (mean =4.98), accommodation (mean =4.95), culture (mean =4.93), entertainment (mean =4.91) and nature (mean =4.90). The lowest level of satisfaction, which is still high level the respondents express with access to destination (mean =3.97). Almost 40% of respondents come from Central Europe (39.1%) followed by Western (18.9%) and Southern Europe (15.4%), are mostly males (54.2%), aged between 26 and 45 years (52.1%) with monthly income above 4001 euros (32.4%) or between 501 and 1000 euros (20.4%), who are visiting destination for the first time (61.4%) although 16.9% of them have been in destination more than five times. Half of them use private accommodation for their stay (50.1%) while 14.6% use nautical boats and 14.1% hostel. Members of this cluster are called “Enthusiastics” for their expression of satisfaction with all elements of destination offer.

Sixth cluster is comprised of 6.78% respondents. These respondents are called “Loyal naturalists”. Respondents are satisfied the most with nature (mean =4.48), accommodation (mean =4.17), atmosphere in destination (mean =4.01) and gastronomy (mean =3.97). These respondents show neutral attitude regarding culture (mean =3.34), access (mean =3.17) and especially with entertainment (mean =2.55). They come from Southern (28.1%) or from

Western Europe (25.7%), almost two thirds of them are males (63.1%) aged between 18 and 35 years (52.6%) with income between 501 and 2500 euros (54.0%). Almost half of them are in the first visit to destination (46.8%) or have visited destination 3 to 5 times (30.1%) usually staying in camps (67.5%) or hotels (18.8%).

The last cluster, Cluster 7 has 4.49% of respondents. These respondents are equally very satisfied with culture and accommodation (mean =4.63), are satisfied with gastronomy (mean =4.19), atmosphere (mean =4.03) and nature (mean =3.73). They are neutral regarding access to destination (mean =3.17) and are not satisfied with entertainment in destination (mean =2.35). Almost third of them come from Southern East Europe (31.6%) and 22.1% from Western Europe, are mostly females (63.2%), aged between 18 and 25 years (43.9%) or between 46 and 55 years (24.5%). Their monthly income is from 501 and 1000 euros (21.5%) or between 3501 and 4000 euros (19.1%). Three fifth of them are visiting for the first time (59.9%) while almost one third has visited destination for second time (31.9%). Large majority of them stays in private accommodation (60.1%) although 11.9% uses camp as accommodation facility. These respondents are called “Partiers” because they are usually enjoying parties which are lacking in rural destinations.

## 5. Conclusion

Depopulation and economic decline are the reality of rural areas on Mediterranean coast. In order to improve living conditions and to stop the abandonment of rural areas sustainable tourism is emerging as a possible solution of economic and social revitalization of these areas. Considering the problems that nearby urban destinations are facing, the adequate tourism development of rural destinations can be a win-win situation for both sides especially in terms of spatial and temporal dispersion of tourists. The need for creation of special tourism offer based on segmentation at rural tourism market takes on growing significance given that the market trends have caused great fragmentation and constant changes in tourists’ needs and wants. This means clearly defining a particular market segment of tourists towards whom the supply should be directed. This is a systematic approach that requires selecting the most attractive market segments and shaping advertisement, accordingly, including the product to be offered, its price and channel of distribution.

The results of research determined the existence of seven different clusters “Hedonists”, “Perceptuals”, “Appreciatives”, “Modests”, “Enthusiastics”, “Loyal naturalists” and “Partiers” with different sociodemographics which are explained in depth. As it can be seen from results the element of destination offer for which tourists show indifference in general is access to destination which includes statements about accessibility of the place, availability of the parking, good signage for visitors and good value for money. These elements represent the area where further improvements are necessary in order to increase overall level of satisfaction with rural destination. All of the above implies that, based on the results, the local authorities should define a strategic direction for the development of the rural destination, in which they will focus on priority segments with regard to the resources they have and development opportunities in order to stop the negative trends of economic and social development.

This paper should be seen in the lights of its limitations. First, since purposive sample has been used the results should be treated with caution and cannot be generalised to the whole population. Also, the results of research could be different in regards to the time frame in which the research was conducted. Further research should try to use different sample technique that would allow generalising the results and should include separate researches in different parts of season to capture possible differences of opinions and attitudes. The contribution of this paper can be found in increasing awareness of the possibilities of developing sustainable rural

tourism by adapting and directing their authentic offer to the particular tourist segments which could, if managed properly, result in stopping the negative trends rural destinations are facing.

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# Evaluation of Financial Literacy in University Students

Gamze Sart<sup>1</sup>

## Abstract

All individuals make many big or small financial decisions throughout their lives and these decisions have a significant impact on their lifestyles. The inadequate level of financial knowledge of the young generation, which is faced with the financial world that is becoming more complex day by day, causes the authorities to increase their concerns about financial literacy. The low level of financial knowledge makes it difficult for individuals to make financial decisions. While finance or accounting managers make financial decisions in enterprises, these decisions are usually made by parents in households. For students living with their parents, these decisions are not faced until certain points in their lives. For many students, university represents their freedom for the first time in their lives. This freedom also means making financial decisions on their own. The aim of this study is to determine whether there is a significant difference in the level of financial literacy in terms of gender, age, field of study and income perception of students from different fields of education studying at Istanbul University-Cerrahpaşa. As a result of the analysis, financial literacy levels of female students, students studying in the field of social sciences, students whose family income perception was income equals expenditure and students aged 27 and over were found to be significantly different.

**Keywords:** financial decisions, financial literacy, university students, statistical analysis

## 1. Introduction

The increasing complexity of the financial world and the insufficient financial knowledge levels of the younger generation are causing growing concerns among authorities regarding financial literacy. A low level of financial knowledge makes it challenging for individuals to make financial decisions. In businesses, financial or accounting managers make financial decisions, whereas in households, these decisions are generally taken by parents (Falahati and Paim, 2011; Bhushan and Medury, 2013). For students living with their parents, these decisions do not become a concern until a certain point in their lives. For many students, university represents the first time they experience freedom in their lives. This freedom also translates to making financial decisions on their own to a certain extent. Having adequate financial literacy knowledge is crucial at this juncture (Mavlutova et al., 2015).

Enhancing individuals' financial competencies is gaining importance, both for improving current living standards and for ensuring future wealth accumulation. The learning process related to financial concepts generally begins when a person leaves their parents' home and starts living independently or takes on responsibilities during their university years. From this perspective, researching the financial literacy rates of university students becomes significant (Titko et al., 2015). The knowledge and understanding levels of university students about financial concepts are fundamental elements of their money management and ability to cope with financial challenges. Potential financial difficulties can lead to financial stress at some stage in their educational life. Financial stress can negatively impact students' academic performance, cause physical and emotional wear and tear, lead to health issues, and create difficulties in finding a job after graduation (Xiao et al., 2007; Nidar and Bestari, 2012).

Students experiencing financial stress negatively impact the universities they attend. Due to the lower academic performance and higher dropout rates among students under stress, they can

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affect the university's reputation and graduation rates in the long term (Lyons, 2007). Therefore, it can be argued that universities emphasizing financial literacy will see an increase in their students' academic achievements, a more effective and productive educational life, better job prospects, and even more successful alumni. Additionally, since financially literate individuals contribute to a financially healthy society, financial literacy gains importance not only as an individual but also as a societal phenomenon (Lusardi et al., 2010).

## **2. Literature**

Measuring the financial literacy of university students has become a widely studied topic in recent literature. In studies aimed at assessing financial literacy levels, not only is the general knowledge level of individuals in finance measured, but differences in literacy levels are also investigated according to certain demographic characteristics (such as gender, educational status, age, etc.).

Studies conducted on individuals with varying infrastructures across different geographies have concluded that financial literacy levels are generally low (Beal and Delpachitra, 2003; Louw et al., 2013: 447). There are numerous studies proving that financial literacy levels vary according to gender (Chen and Volpe, 2002; Worthington, 2006; Furtuna, 2007; Dvorak and Hanley, 2010). A significant portion of these studies have found that women's financial literacy levels are lower compared to men. However, some studies have found no correlation between gender and financial literacy levels (Jorgensen and Savla, 2010; Adeleke, 2013). The variation of financial literacy levels according to education level is a common finding in the literature (Worthington, 2006; Dvorak and Hanley, 2010; Adeleke, 2013). According to these studies, individuals with lower education levels tend to have lower financial literacy levels. However, there are also studies in the literature that indicate no significant relationship between education level and financial literacy levels.

Jorgensen and Savla (2010) investigated the influence of family on the financial literacy levels of young people. Their findings indicated that families directly affect financial attitudes, indirectly influence financial behaviors through these attitudes, but do not have an impact on financial knowledge. Shim et al. (2010) explored the relationship between first-year college students' financial learning, attitudes, and behaviors and their family, work, and educational backgrounds, emphasizing the significant impact of family influence.

Cowart et al. (2012) conducted a study on university students in the USA and found that 70% of the students had one credit card, while 36% had more than one. However, less than 10% of these students were knowledgeable about credit card interest, late fees, and similar topics. They discovered that upperclassmen, students taking certain courses, those who invested in stocks, employed students, and married students were more knowledgeable, with gender not creating a significant difference. Starobin and others (2013) researched the financial status and academic success of transfer and non-transfer students in the USA. They found a significant relationship between financial status and gender, transfer status, and family influence, noting that women and non-transfer students had higher financial status ratings.

Xiao et al. (2014), found that both subjective and objective knowledge levels reduce the risk associated with credit card usage and payment habits. Luksander et al. (2014) examined the financial knowledge levels of 38,000 students aged between 18-25 through a survey, focusing on how these levels differ among high school students with varying demographic and educational characteristics. They concluded that young people's financial knowledge levels showed significant variations depending on the measurement criteria used, but also found that financial-economic knowledge gained in high school education beneficially impacted young individuals' financial knowledge levels.

Luksander et al. (2014) also conducted a study on 1,743 university students in Hungary within the 18-25 age range, investigating the impact of demographic and educational characteristics on financial literacy. They identified that gender, age, and family background significantly influenced financial literacy. Lovsin and Ponikvar (2015) in their study with 259 students from the Economics and Education faculties at the University of Ljubljana, Slovenia, researched the impact of variables such as gender, age, parental education level, scholarship status, and education on students' financial management skills and confidence in their knowledge. They found that students who had not studied economics and female students had lower confidence levels in their financial management skills and knowledge. Razafimahasolo et al. (2016) discovered that students with above-average financial literacy experienced lower stress levels and achieved satisfactory academic success, noting that these findings were independent of age, gender, and family income. Students proficient in cash management were found to have lower stress and higher academic success, whereas in cases of low financial literacy, increased stress and reduced academic performance were observed.

To investigate the impact of high school background on the financial literacy levels of university students, Wright (2016) studied the financial literacy levels and financial behaviors of university students who graduated from high schools with different characteristics. While a significant relationship was found between financial literacy levels and financial behavior, no difference was noted based on the type of high school attended.

Apra et al. (2016) highlight the significance of financial literacy for today's adolescents and youth, noting that they face more financial decision-making challenges compared to their parents' generation. Additionally, Bolognesi et al., (2020) found that while 62% of millennials rate their financial knowledge as high or very high, only 19% could accurately answer three basic financial literacy questions. This suggests a gap in actual financial understanding among young adults, indicating the need for targeted financial education in this demographic. Furthermore, Artavanis and Karra (2020) reveal a concerning lack of financial literacy among undergraduate students. They particularly emphasize that students lacking financial knowledge are more prone to significantly underestimate their future loan repayments. This miscalculation can lead to difficulties in repaying student loans due to unexpectedly high debt-to-income ratios after graduation.

### **3. Statistical Analysis**

#### **3.1. Purpose and Importance of the Study**

The aim of this study is to determine the differences in the financial literacy levels of university students from different faculties studying at Istanbul University-Cerrahpaşa.

#### **3.2. Population and Sample of the Study**

In the study, analyzes were carried out for 1500 students from different faculties studying at Istanbul University-Cerrahpaşa. According to the statistical results of the Council of Higher Education, 43,610 students were enrolled in İstanbul University Cerrahpaşa Campus in the year 2022-2023. According to the sample size table developed by Yazıcıoğlu and Erdoğan (2004), a sample size of 384 individuals is determined when using  $p=0.50$  and  $q=0.50$ , with a sampling error of 0.05. In this case, a sample size of 1500 students who willingly took part in the study is statistically sufficient and appropriate. Random sampling method was applied in the research. The research design employed in this study is a non-experimental quantitative approach, utilizing a survey model as the chosen methodology.

### 3.3. Research Hypothesis

The main hypothesis of this research is that there exists a noteworthy difference in the dimensions of financial knowledge, financial attitude, and financial behavior concerning gender, age, income perception and education area.

### 3.4. Data Collection Tool

The study employed the Financial Literacy Scale, developed by Potrich et al. (2022). Youth Financial Literacy Short Scale contains 12 questions with three dimensions: financial knowledge, financial attitude, and financial behavior. The sub-dimensions and item distribution for the scale are as follows;

**Financial knowledge:** Item1, Item4, Item6, Item7 and Item8 (right or wrong questions), For the correct answer = value 1; For incorrect answers = value 0

**Financial behavior:** Item13, Item14, Item15, Item16 and Item17 (Likert scale), Never = value 1; Almost never = value 2; Sometimes = value 3; Almost always = value 4; Always = value 5

**Financial attitude:** Item20 and Item21 (Likert scale) Strongly agree = value 1; Agree = value 2; Indifferent = value 3; Disagree = value 4; Strongly disagree = value 5

### 4. Empirical Results

Reliability tests, including Cronbach's Alpha, Split-Half, Parallel, Absolute Strict Parallel, and Parallel tests, were conducted to assess the reliability of the data obtained from the survey study. A Cronbach Alpha value above 70% indicates that the survey was successful. Some researchers, on the other hand, take exceeding 75% as a basis. The results of the reliability analysis of the survey in this study were Cronbach-Alpha = 0.895, Parallel = 0.896, Split = 0.891-0.899 and Strict = 0.895.

52.1% of the students were female and 47.9% were male. 24.2% of the students were educated in social sciences, 24.7% in health sciences, 25.8% in educational sciences and 25.3% in engineering sciences. 30.3% of the students were 18-20 years old, 29.0% were 21-23 years old, 25.2% were 24-26 years old and 15.5% were 27 years old and above. 36.5% of the students had a family income perception of income less than expenses, 25.3% had a family income perception of income more than expenses and 38.2% had a family income perception of income equal to expenses.

**Table 1:** Comparison of Students' Socio-Demographic Characteristics for Financial Knowledge

|                       |                          | $\bar{x} \pm sd$ | t/F                | p      | Post Hoc                |
|-----------------------|--------------------------|------------------|--------------------|--------|-------------------------|
| <b>Gender</b>         | (1) Female               | 0.67 ± 0.09      | 6.584 <sup>t</sup> | 0.000* | 1>2                     |
|                       | (2) Male                 | 0.55 ± 0.08      |                    |        |                         |
| <b>Age</b>            | (1) 18-20 age            | 0.56 ± 0.02      | 8.541 <sup>F</sup> | 0.000* | 4>1,4>2,4>3<br>2>1, 3>1 |
|                       | (2) 21-23 age            | 0.80 ± 0.07      |                    |        |                         |
|                       | (3) 24-26 age            | 0.82 ± 0.06      |                    |        |                         |
|                       | (4) 27+ age              | 0.91 ± 0.09      |                    |        |                         |
| <b>Education area</b> | (1) Social sciences      | 0.92 ± 0.05      | 9.556 <sup>F</sup> | 0.000* | 1>2, 1>3, 1>4,<br>4>2   |
|                       | (2) Health sciences      | 0.78 ± 0.07      |                    |        |                         |
|                       | (3) Educational sciences | 0.79 ± 0.08      |                    |        |                         |



|                          |                                  |             |                    |        |              |
|--------------------------|----------------------------------|-------------|--------------------|--------|--------------|
|                          | (4) Engineering science          | 0.90 ± 0.05 |                    |        |              |
| <b>Income perception</b> | (1) Income Less Than Expenditure | 0.79 ± 0.04 | 7.094 <sup>F</sup> | 0.000* | 3>1, 3>2,1>2 |
|                          | (2) Income More Than Expenditure | 0.70 ± 0.05 |                    |        |              |
|                          | (3) Income Equals Expenditure    | 0.85 ± 0.06 |                    |        |              |

\*Significant difference for 0.05

The comparison of the mean score of the Financial Knowledge and the socio-demographic characteristics of the participants is presented in Table 1. Statistically significant differences were determined using the mean Financial Knowledge for gender (t=6.584, p=0.000), age level (F=8.541, p=0.000), education area (F=9.556, p=0.000) and income perception (F= 7.094, p=0.000).

Financial knowledge levels of female students, students studying in the field of social sciences, students whose family income perception was income equals expenditure and students aged 27 and over were found to be significantly different.

**Table 2:** Comparison of Students' Socio-Demographic Characteristics for Financial Attitude

|                          |                                  | $\bar{x} \pm sd$ | t/F                 | p      | Post Hoc                   |
|--------------------------|----------------------------------|------------------|---------------------|--------|----------------------------|
| <b>Gender</b>            | (1) Female                       | 4.20 ± 0.12      | 8.013 <sup>t</sup>  | 0.000* | 1>2                        |
|                          | (2) Male                         | 3.56 ± 0.24      |                     |        |                            |
| <b>Age</b>               | (1) 18-20 age                    | 3.90 ± 0.28      | 6.459 <sup>F</sup>  | 0.000* | 4>1,4>2,4>3<br>2>1, 3>1    |
|                          | (2) 21-23 age                    | 3.95 ± 0.20      |                     |        |                            |
|                          | (3) 24-26 age                    | 3.98 ± 0.37      |                     |        |                            |
|                          | (4) 27+ age                      | 4.01 ± 0.30      |                     |        |                            |
| <b>Education area</b>    | (1) Social sciences              | 4.06 ± 0.28      | 10.100 <sup>F</sup> | 0.000* | 1>2, 1>3, 1>4,<br>4>2, 4>3 |
|                          | (2) Health sciences              | 3.76 ± 0.21      |                     |        |                            |
|                          | (3) Educational sciences         | 3.34 ± 0.33      |                     |        |                            |
|                          | (4) Engineering science          | 3.98 ± 0.42      |                     |        |                            |
| <b>Income perception</b> | (1) Income Less Than Expenditure | 3.77 ± 0.18      | 9.778 <sup>F</sup>  | 0.000* | 3>1, 3>2,1>2               |
|                          | (2) Income More Than Expenditure | 3.97 ± 0.29      |                     |        |                            |
|                          | (3) Income Equals Expenditure    | 4.02 ± 0.21      |                     |        |                            |

\*Significant difference for 0.05

The comparison of the mean score of the financial attitude and the socio-demographic characteristics of the participants is presented in Table 2. Statistically significant differences were determined using the mean financial attitude for gender (t=8.013, p=0.000), age level (F=6.459, p=0.000), education area (F=10.100, p=0.000) and income perception (F= 9.778, p=0.000).

Financial attitude levels of female students, students studying in the field of social sciences, students whose family income perception was income equals expenditure and students aged 27 and over were found to be significantly different.

**Table 3:** Comparison of Students' Socio-Demographic Characteristics for Financial Behavior

|                          |                                  | $\bar{x} \pm sd$ | t/F                | p      | Post Hoc                   |
|--------------------------|----------------------------------|------------------|--------------------|--------|----------------------------|
| <b>Gender</b>            | (1) Female                       | 4.04 ± 0.21      | 8.707 <sup>t</sup> | 0.000* | 1>2                        |
|                          | (2) Male                         | 3.80 ± 0.28      |                    |        |                            |
| <b>Age</b>               | (1) 18-20 age                    | 3.79 ± 0.25      | 8.911 <sup>F</sup> | 0.000* | 4>1,4>2,4>3<br>2>1, 3>1    |
|                          | (2) 21-23 age                    | 3.82 ± 0.19      |                    |        |                            |
|                          | (3) 24-26 age                    | 3.90 ± 0.22      |                    |        |                            |
|                          | (4) 27+ age                      | 4.11 ± 0.38      |                    |        |                            |
| <b>Education area</b>    | (1) Social sciences              | 4.14 ± 0.31      | 7.694 <sup>F</sup> | 0.000* | 1>2, 1>3, 1>4,<br>4>2, 4>3 |
|                          | (2) Health sciences              | 3.78 ± 0.36      |                    |        |                            |
|                          | (3) Educational sciences         | 3.83 ± 0.25      |                    |        |                            |
|                          | (4) Engineering science          | 4.02 ± 0.27      |                    |        |                            |
| <b>Income perception</b> | (1) Income Less Than Expenditure | 3.66 ± 0.13      | 9.225 <sup>F</sup> | 0.000* | 3>1, 3>2,1>2               |
|                          | (2) Income More Than Expenditure | 3.75 ± 0.23      |                    |        |                            |
|                          | (3) Income Equals Expenditure    | 3.99 ± 0.31      |                    |        |                            |

\*Significant difference for 0.05

The comparison of the mean score of the financial behavior and the socio-demographic characteristics of the participants is presented in Table 3. Statistically significant differences were determined using the mean financial behavior for gender (t=8.707, p=0.000), age level (F=8.911, p=0.000), education area (F=7.694, p=0.000) and income perception (F= 9.225, p=0.000).

Financial behavior levels of female students, students studying in the field of social sciences, students whose family income perception was income equals expenditure and students aged 27 and over were found to be significantly different.

## 5. Conclusions

In terms of financial decisions of university students, which we can express as basic financial actions for students, there are basically two titles as using student loans or financial aid and credit card usage. It is important to manage their personal budgets, to be informed about the processes and contents of student loans and other repayable financial supports, and to determine their credit card usage habits. On the other hand, ensuring the financial security of individuals for their future and making the best financial choices for themselves depend on their financial knowledge and equipment. Financial education has a very important place in terms of establishing a minimum financial culture and raising the financial literacy level of individuals. With financial education, individuals learn about saving, investment, debt and credit management, as well as how to protect themselves from financial fraud, what kind of path they

can follow in case of legal problems they may encounter, the rights granted to them and the ways to use them.

The aim of this study is to determine whether there is a significant difference in the level of financial literacy in terms of gender, age, field of study and income perception of students from different fields of education studying at Istanbul University-Cerrahpaşa. As a result of group difference analyses, the financial knowledge levels of female students, students studying in the field of social sciences, students whose family income perception is income equals expenditure and students aged 27 and over were found to be significantly different. The financial attitude levels of female students, students studying in the field of social sciences, students whose family income perception is income equals expenditure and students aged 27 and over were found to be significantly different. The financial behaviour levels of female students, students studying in the field of social sciences, students whose family income perception is income equals expenditure and students aged 27 and over were found to be significantly different.

In the light of these results, our recommendations are as follows;

Financial capacity should be developed and financial education should be provided, organised and improved in a fair and impartial manner. Financial education programmes should include basic financial mathematics and economics, as well as information on important aspects of financial life planning, such as basic savings, private debt management or insurance. Financial education should be seen as a tool to promote economic confidence and stability, in addition to the regulation of financial institutions and consumer protection, and should be embedded in the regulatory and administrative framework. Financial education programmes should be designed to meet the needs of their target audiences and reflect their preferences for the way they receive financial information, and should be seen as a continuous lifelong process. Individuals should be introduced to financial issues as early as possible in their lives, and financial education should start at school. Care should be taken to ensure that financial education is part of government assistance programmes. The development of methods for the measurement and evaluation of existing financial education programmes should be encouraged, and financial education programmes that meet the relevant criteria should be taken into account.

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# Statistical Evaluation of Ecological Footprint Awareness in University Students

Gamze Sart<sup>1</sup>

## Abstract

The fact that ecosystems and natural resources are increasingly under threat makes it necessary to address environmental education in a more inclusive manner. Within the framework of this idea, the concept of ecological footprint is addressed in many disciplines such as engineering, science, education and business science. Considering the position of students in their future lives, it is important to raise individuals who have gained environmental awareness from an early age. In order to understand how much there is a need for the introduction of courses aiming to teach the concept of ecological footprint in higher education programmes, it is first necessary to reveal the level of ecological footprint awareness of the students in these programmes and which factors affect these awareness levels. This research aims to determine the ecological footprint awareness levels of undergraduate students studying at Istanbul University-Cerrahpaşa. As a result of the Paired sample t test applied for the pre-test and post-test for the awareness scores of 250 students participating in the ecological footprint training seminar, a statistically significant difference was obtained. It was determined that the ecological footprint awareness obtained after the training was significantly higher.

**Keywords:** ecological footprint, ecological footprint awareness, university students, statistical analysis

## 1. Introduction

With the rapid increase in the world population day by day, people's demand for natural resources is increasing in this direction. While meeting the increasing demand, the Ecological Footprint of people is increasing as the capacity of the universe is exceeded. In addition to population growth, human beings have started to negatively affect the environment due to the rapid progress of industrialisation after the 19th century and have started to consume more natural resources than their needs (Galli et al.,2012). Natural resources, which are spent thinking that they will never be exhausted due to the multiple harvesting of soils with technology, uncontrolled fishing of fish before the hunting time, consumption of food products out of season, waste of energy resources such as water and electricity, will not offer the same opportunities for future generations. Therefore, it becomes a necessity to live in an environmentally friendly way without exceeding the biological capacity of the universe and by adopting that natural resources are limited (Lambrechts and Van Liedekerke, 2014).

In recent years, with the pressure of rapid population growth and industrialisation, people have started to worry about the future for the future periods of their lives and to show more tendency towards ecological issues. The understanding that natural resources will be depleted over time has led to an increase in the awareness of scientists and societies about the environment in the ecological sense (Medina and Toledo, 2016). As a result of these concerns, the concept of Ecological Footprint emerged and played an important role in increasing awareness on this issue. By calculating the Ecological Footprint of each individual or society and being conscious

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about this issue, it can be ensured that future generations can consume healthier and sufficient natural resources (San-Francisco et al. 2020).

It will be beneficial to prevent the rate at which people consume natural resources by adopting these reduction methods by each individual so that the universe is consumed without exceeding the rate of renewal of these resources. It will not be difficult to predict that future generations will not be as lucky as they are now if people think that they will never run out while using the unique resources given by nature in a wasteful way and act accordingly. In this case, acting in a way that will not jeopardise ecological integrity throughout life will be beneficial for current and future generations (Petrović et al., 2011). Although taking these measures for individuals is more costly and challenging in the short term, it will provide more benefits in the long term. Studies should be carried out to determine the Ecological Footprint of those with low education levels and attention should be drawn through social media and other media tools, which are very popular (Sonu et al.,2011).

## **2.Ecological Footprint and its components**

The main emphasis in the ecological footprint is the concept of sustainability, which includes the idea of leaving a protected environment to future generations. Sustainability; It envisages increasing biological production areas, renewing these areas and maintaining their renewal capacity. In order for life to be sustainable, people should organise their economic activities and living conditions according to the carrying capacity of the planet (Cabrera et al., 2014). The ecological footprint is based on the concept of "carrying capacity of the planet". Humans, as a part of nature, meet their needs from nature, but while meeting these needs, attention is not paid to the effects on nature, ecological carrying capacity and the extent to which the pressure created is exceeded. The ecological footprint method has been developed to measure this excess and is of great importance (Li and Lang, 2015).

The concept of Ecological Footprint is defined as the area of fertile soil and water required to renew the natural resources consumed by an individual, community or activity and to eliminate the wastes it creates (Genta et al., 2019). The tool that calculates the biological area used by people while meeting all their needs and the disposal of waste is defined as Ecological Footprint (Baabou et al., 2017). People use natural resources and produce waste in order to meet their needs from the beginning of breathing until the end of their lives. It is defined as the fertile land and water area required for the reproduction of the resources used by individuals and the disposal of wastes (Lambert and Cushing, 2017). It is one of the indicators of environmental sustainability that allows us to reveal the effects of production-consumption activities of individuals or societies on nature with quantitative data (Sumargo,2018).

In other words, ecological footprint is a tool that is effective in changing the undesirable effects that people create in the world throughout their lives and their attitudes and behaviours towards the environment as they should be, and aims to ensure the production of the resources used and the destruction of the wastes produced. By raising awareness of individuals or societies, it tries to spread the idea of leaving a protected environment to future generations by living in a more sustainable lifestyle (Xiao and McCright, 2012). Because people act as if the universe has natural resources as if it will never run out, and the uncertainty of how long mankind will have these opportunities by leaving the wastes to nature reveals the importance of the Ecological Footprint. It also emphasises the importance of ecological footprint awareness. With the awareness of ecological footprint, individuals can have a livable environment by minimising

the damage to nature while fulfilling their duties and responsibilities and not consuming more than they can produce. For this situation, it is possible to increase the Ecological Footprint awareness and sensitivity of individuals (Otto and Pensini, 2017).

The ecological footprint consists of grassland and forest area, fishing ground, agricultural land, built-up area and carbon footprint components. It can be expressed as the sum of these six separate components (footprintnetwork.org 2019).

**Grazing Land Footprint** There are approximately 3.5 billion hectares of natural and semi-natural grazing land on Earth. It covers the total grazing area of livestock raised to produce meat, milk, leather and wool. Grazing land use in Turkey accounts for 3% of the national footprint. As a food and beverage sector, the grassland footprint can be reduced by using less animal foods and using organically produced local products (WWF, 2022).

**Forest Area Footprint** It covers the area needed to meet the amount of wood consumed for wood materials, pulp and heating. According to the latest FAO survey, there are 3.9 billion hectares of forest worldwide. Turkey's demand for forest products accounts for 11% of the national footprint. Between 1961 and 2007, the lowest growth occurred in the Forest Footprint. Reducing the forest footprint can be achieved by ensuring that wood products used in food and beverage establishments are used without waste and recycling paper products (footprintnetwork.org, 2019).

**Agricultural Land Footprint** refers to the area required for the growth of plants needed for food, fibre, oil and rubber production and animal feed to meet human consumption. The biologically productive agricultural land area and agricultural land footprint per capita worldwide were determined as 0.53 kha/capita for both calculations as of 2016 (footprintnetwork.org, 2019). In Turkey, 35% of the Ecological Footprint originates from agricultural areas. In this area, most of the footprint (83%) is related to food. The other parts of the agricultural footprint are mostly due to tobacco production and government expenditures (WWF, 2022). One of the areas where the food and beverage sector has the most impact is the agricultural land footprint. Over the years, food wastage in this sector has been increasing day by day.

**Fishing Ground Footprint** is defined as the area of sea and fresh water needed to supply fish and seafood consumed. In the Ecological Footprint of Turkey report, it is stated that solving economic and ecological problems such as pollution rates of the seas, overfishing pressure on fish stocks, decrease in marine biodiversity and uncertainties in the return of fished products can be achieved by implementing appropriate policies related to the aquaculture sector. It was emphasised that this could protect fishing grounds by improving domestic market standards (enerjiportali.com, 2019).

**Built Area Footprint** refers to the infrastructure and superstructures required for housing construction, transport, industrial production and water supply. The area required to accommodate housing, transport, industrial production and hydropower infrastructure covers a significant 27 portion of the world's bio-productive land. It constitutes 0.3 billion global hectares of land area (WWF, 2019). The built-up area footprint can be reduced by encouraging people to use public transport, by institutions paying attention to productive areas when issuing building licences and creating urban plans, by bioenergy consumption and good waste management (Rees, 2000).



**Carbon Footprint** People have a great impact on nature every day without realising it. It aims to measure the damage that people cause to the environment with the products they use and what they do. The carbon footprint is the calculation of the carbon dioxide emission captured by the seas, as well as the calculation of the forest area required due to fossil fuel consumption, land use changes and chemical processes. Carbon footprint refers to the biologically productive area required to absorb the carbon emissions caused by all activities that cause global warming (WWF, 2019). In other words, the concept of carbon footprint is a measure of CO<sub>2</sub> emissions at each stage of the product life cycle (production, transport, use and disposal).

There are two main issues in Ecological Footprint calculations: The first is the monitoring of the resources used and the resulting wastes, and the second is the calculation of the biological productive area needed to dispose of the wastes. Ecological Footprints, which are reached with these two main issues, reflect how much biological productive area people use in production and consumption. The Ecological Footprint national scale calculation formula is expressed as shown below. Ecological Footprint is expressed in global hectares (gha). Global hectare represents the production capacity of 1 hectare of land over the average productivity of the world (Rees, 2000; Cordero et al., 2008). Ecological footprint national scale calculation formula:

Ecological Footprint (ha) = Consumption x Production Area x Population Consumption= is considered as a measure of the use of goods.

Production area= the area where products are grown (for example: if 1200 kg of beetroot is grown on one acre of land, the production area for beetroot is 1200 kg/acre) It reflects the amount of biological productive area required for the renewal of the resources used by humans (Gottlieb et al.,2012).

### 3. Ways to Reduce Ecological Footprint

The limited resources of the world are gradually decreasing and depleting. Both as an individual and as a society, we should take action and take measures by providing awareness of this as soon as possible. As individuals or societies aware of the Ecological Footprint, ecological awareness should be created and sustainability should be ensured by balancing consumption and biological capacity and quantifying how much ecological deficit countries have. It should create a way of life within the capacity of nature. In order to prevent and reduce the growth of the Ecological Footprint, it can be listed as follows (McNichol et al., 2011; O’Gorman and Davis, 2013; Schill et al., 2020):

- Giving up the use of natural resources as if they are unlimited and will never be exhausted,
- Providing the necessary trainings for ecological awareness,
- Drive less and buy a vehicle that consumes less fuel and pollutes the air less,
- Using technological advances to ensure more efficient energy consumption in our homes and workplaces, encouraging the use of public transport by being more careful in issuing construction licences and making urban plans in order not to destroy biological productive areas,
- Preferring environmentally friendly, recyclable and non-disposable products instead of consuming materials that nature cannot transform,
- Increasing the productivity of biological productive areas,

- Controlling the population,
- Consume less animal foods and use more local products,
- Various mass media (books, magazines, radio, television, internet, etc.) should be used to raise awareness of all humanity on this issue.
- Water should be saved, rain water should be collected and used,
- Pay attention to waste management,
- Consume seasonal foods,
- By giving importance to domestic products instead of foreign resources, by consuming less animal foods.

### **3.Literature**

Wright and Drossman (2002) aimed to reveal the ecological footprint in a study conducted at the University of Colorado. In this study, electricity consumption, natural gas consumption, fuel consumption, water consumption and food consumption were calculated. As a result of the study, it was determined that electricity consumption constituted the largest footprint. Dawe et al., (2004) conducted an audit of Holme Lacy College in terms of sustainability. In the study, a "triple bottom line" approach (an environmental impact assessment based on ecological footprint and a social and economic impact assessment) was adopted by comparing multiple key concepts. As a result of the research, it was found that the faculty has many features that are not sustainable,

Meyer (2009) stated that ecological footprint indirectly changes the attitudes and behaviours of learners towards the environment. It was revealed that the concept of ecological footprint created a positive change in students' attitudes towards the environment by creating a change in knowledge. Ryu and Broody (2006), in their study, aimed to show how interdisciplinary education at the postgraduate level facilitates learning, perceptions and changing participants' behaviours by using an ecological footprint analysis on sustainable development. The research consists of pre-test and post-test control groups. At the end of the study, it was observed that students' sustainable behaviours measured by ecological footprints increased. It was seen that the behaviours and perceptions of the people who received training on sustainable development by using ecological footprint calculation were changed.

Kernel and Naglic (2009) compared the environmental literacy levels of students who received environmental education during regular class hours and students who took part in an eco-school project in Slovenia. No significant difference was found between students' awareness and responsible environmental behaviours. However, it was observed that the knowledge levels of the students in the eco-school project were higher. In addition, it was found that the increase in environmental knowledge did not increase students' awareness and responsible environmental behaviours.

Vackar (2012), "Ecological Footprint, environmental performance and biodiversity: A cross-country comparison", Ecological Footprint and biological capacity were compared with several widely used environmental indices that measure various aspects of ecological sustainability and biodiversity. They investigated the correlation between ecological footprint, ecosystem and threatened biodiversity ratios. As a result of the analysis, this study provides evidence that the Ecological Footprint is a meaningful ecological indicator that can be compared with equivalent measures of ecosystem productive capacity and compensation for land use pressures.

Almeida (2013) conducted a study with tourism undergraduate students and restaurant managers to investigate environmental management in tourism and to reveal gender-based differences. In this study, it is emphasised that among both groups, female participants are more sensitive to environmental management than male participants and that business employees should be trained in environmental management and saving strategies should be implemented.

The aim of this study by Mancini et al. (2016) is to increase the clarity and transparency of the Ecological Footprint by reviewing the logic and methodology behind the Carbon Footprint component and updating a key factor of the AFCS in its calculation. Carbon emissions related to forest fires and trees felled for wood products are included for the first time in this update of the AFCS calculation. Four calculation options were used to account for the various parameters affecting the AFCS. Multiple calculation options calculated different rates of carbon sequestration for all three types of forests (primary forests, other naturally regenerated forests and planted forests). The result of this research confirms that the ecosystem services demanded by humans are beyond the capacity of the biosphere to provide them.

Galli et al., (2016), "Questioning the Ecological Footprint" is based on 10 questions answered from critical and supportive perspectives for a critical discussion about the concept of Ecological Footprint. These questions address the comparison with similar concepts, the methodology and accuracy of quantification, the characteristics of observed flows, the role of scale and decisions, the implementation of food security, the utility of the ecological footprint for society, the political importance of the concept and its differences from other international indicator systems, and the research objectives underlying this approach.

Camargo and Gretzel (2017), as a result of their study to determine the level of knowledge of tourism undergraduate students about sustainability and sustainable tourism, found that students had more knowledge about the environmental dimension of sustainability and that 90% of the students' source of information on this subject was the undergraduate programme they studied.

## **4. Statistical Analysis**

### **4.1. Purpose And Importance**

When the ecological footprint is reviewed scientifically, it helps students to understand the negative effects on the environment holistically with problem solving and critical thinking skills. From this point of view, it is thought that university students can comprehend the concept of ecological footprint better than other age groups, maximise their critical thinking skills in activities based on production and consumption, and fulfil their duties in raising environmental awareness.

Considering the position of students in their future lives, it is important to raise individuals who have gained environmental awareness from an early age. For this reason, this study aims to create sustainable environmental awareness in university students by using ecological footprint as an educational tool in environmental education. The behaviours that these students, who are the guarantee of our future and who will have a say in the future of the country, will reflect are important in terms of not consuming resources unconsciously and creating a livable world awareness. The aim of this study is to reveal the statistical evaluation of pre-training and post-training score values as a result of providing ecological footprint awareness training to university students. In addition to the activities that require ecological footprint calculations for Istanbul University-Cerrahpaşa students who voluntarily participated in the training,

activities that will raise environmental awareness were prepared and the experimental process was designed by integrating the activities with the courses.

#### **4.2.Research Model**

In this study, one group "pretest-posttest design", one of the "true experimental design" models, which is one of the quantitative research methods, was used. In this design, the effect of the experimental procedure is tested with a single group study. The measurements of the subjects regarding the dependent variable are obtained as pre-test before the application and post-test afterwards by using the same subjects and the same measurement tools (Büyüköztürk et al., 2012).

#### **4.3.Data Collection Tool**

In this study, "Ecological Footprint Awareness Scale" developed by Coşkun and Sarıkaya (2014) was used as a data collection tool. The scale consists of 5 sub-dimensions as food (items 1 - 8), transport and shelter (items 9 - 15), energy (items 16 - 27), waste (items 28 - 35) and water consumption (items 36 - 40) and a total of 40 items. The scale developed to determine the tendency levels of the participants is a five-point Likert-type scale consisting of options such as "Strongly Agree", "Agree", "Partially Agree", "Disagree" and "Strongly Disagree". In the study conducted by Coşkun and Sarıkaya (2014), when the reliability results for the items and sub-dimensions of the Ecological Footprint Awareness Scale were examined; food 0.70, transport and housing 0.76, energy 0.86, waste 0.81 and water consumption 0.68 were calculated to be sufficiently reliable.

#### **4.4.Analysing the Data**

In the analysis of the data, paired sample t test was used to test the pre- and post-training differences in ecological footprint awareness score. In order to determine whether the scores obtained from the responses of the students participating in the "Ecological Footprint Awareness Scale" were normally distributed, the results of the Kolmogorov Smirnov test were examined, and the histogram, normal Q-Q graph and box-plots were examined. Skewness value was calculated as -0.894, Kurtosis value as 2.683 and Kolmogorov-Smirnov value as  $p = 0.437$ . According to these results, it was determined that the tendency scores of the participants showed a normal distribution and the assumptions for parametric tests were met.

#### **4.5.Findings**

53% of the participants were female and 47% were male. 64.8% of the participants were between the ages of 18-23, 26% were between the ages of 24-29, and 9.1% were 30 years and above. 19.3% of the participants were in the 1st grade, 19.9% in the 2nd grade, 21.5% in the 3rd grade, 30.9% in the 4th grade, and 8.5% in the 5th grade and above. The economic status of 31.4% of the participants is less than income and expenditure, 54% is equal to income and expenditure, 14.6% is more than income and expenditure.

**Tablo 1:** Paired t Test Results

| Dimensions                         | Before training |      |                  | After training |      |                  | p      |
|------------------------------------|-----------------|------|------------------|----------------|------|------------------|--------|
|                                    | min             | max  | $\bar{x} \pm sd$ | min            | max  | $\bar{x} \pm sd$ |        |
| Food                               | 1.12            | 4.87 | 2.99±0.98        | 1.89           | 4.98 | 3.68±0.98        | 0.000* |
| Transport and accommodation        | 1.09            | 4.90 | 3.02±0.87        | 2.14           | 4.96 | 3.55±0.81        | 0.000* |
| Energy                             | 1.23            | 4.76 | 3.05±0.66        | 2.20           | 5.00 | 3.60±0.90        | 0.001* |
| Waste                              | 1.34            | 4.82 | 3.08±1.01        | 1.99           | 4.94 | 3.57±0.85        | 0.002* |
| Water consumption                  | 1.39            | 4.91 | 3.15±0.95        | 1.78           | 4.97 | 3.60±1.02        | 0.000* |
| Ecological awareness overall score | 1.26            | 4.90 | 3.19±0.88        | 2.13           | 5.00 | 3.56±0.65        | 0.000* |

\*Significant difference for 0.05

## 5. Conclusion

One of the widely used measurement methods today is "ecological footprint". The effects of human beings on nature, which occur during consumption as well as production and often go unnoticed, constitute the ecological footprint. The concept of "Ecological Footprint", which makes environmental sustainability measurable, addresses the relationship between nature and human beings from a new perspective and reveals the amount of pressure on natural resources and the factors that cause this.

In order for students to become environmentally friendly individuals in their future lives, it is important to raise individuals who have gained environmental awareness from an early age. In order to understand how much there is a need for the introduction of courses aiming to teach the concept of ecological footprint in higher education programmes, it is first necessary to reveal the level of ecological footprint awareness of the students in these programmes and which factors affect these awareness levels. This research aims to determine the ecological footprint awareness levels of undergraduate students studying at Istanbul University-Cerrahpaşa. As a result of the Paired sample t test applied for the pre-test-post-test for the awareness scores of 250 students participating in the ecological footprint training seminar, a statistically significant difference was obtained. It was determined that the ecological footprint awareness obtained after the training was significantly higher.

In order to increase ecological footprint awareness and environmentally friendly behaviours, it may be suggested to add a compulsory elective environmental education course to each grade level and to review and restructure the curricula in this regard. Trainings can be given to students by the university in order to make them feel competent in ecological footprint awareness and environmentally friendly behaviours. It can be aimed to provide these trainings routinely both theoretically and practically. Seminars can be organised to increase the ecological footprint awareness and environmentally friendly behaviours of parents, and families can be educated about the environment. It is recommended to give more importance to environmental education in primary and secondary education. University lecturers can also be attracted to this issue, and it can be ensured that they mention informative themes about the environment in their courses and provide trainings and projects that increase awareness and environmentally friendly behaviours. In particular, municipalities and non-governmental

organisations can organise seminars, publish papers, organise social and visual activities or projects to increase recycling behaviours in a way to raise public awareness.

Suggestions for new studies and researchers; In this study, ecological footprint awareness of university students was investigated. It is recommended to study with different sample groups. This study was conducted with quantitative research methods. By conducting the same study with qualitative or quantitative-qualitative research method, the opinions of the participants can be taken personally and these opinions can be subjected to an in-depth analysis. A similar study can be conducted by sampling families. Studies can be carried out on determining, eliminating and informing families about the environment.

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# Economic Globalization and Tax Revenues: A Causality Analysis for G-7 Countries

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## Abstract

Tax revenues are an important income source for the governments to cover the public investments and other expenditures. This study examines the causal relation between economic globalization and tax revenues in G-7 countries between 2000 and 2020 by way of causality analysis. The results of panel causality test reveal a feedback interaction between economic globalization and total tax revenues. However, the county-level results of the causality test indicate that there exists a bilateral causal interaction between economic globalization and tax revenues in the United States, a unilateral causal relation from economic globalization to the tax revenues in Germany, and a unilateral causal relation from tax revenues to the economic globalization in France and Japan.

**Keywords:** Economic globalization, tax revenue, panel causality analysis, G-7 countries

## 1. Introduction

Globalization has increased the mobility of production factors and the share of multinational companies in the global economy. The competition among multinational companies has also increased together with the globalization. As a result, The development of more global strategies by multinational companies has become important (Kargı and Karayılmazlar, 2009). Globalization has also caused the increases in the competition among countries, because countries have carried out various institutional, regulatory, and financial policies to attract foreign capital. Tax policies and practices constitute one of these policies. As a matter of fact, tax competition has also increased among countries aiming to accelerate foreign capital inflows because the tax systems of the countries are a critical factor in terms of profitability for multinational companies while making investment decisions (Önder, 2003, Ceran et. al., 2007). In this context, developing countries try to attract more foreign capital through methods such as tax incentives and tax reductions considering employment and growth effects of foreign capital. However, tax types, rates and tax burdens are affected by the globalization process (Doğan and Kabayel, 2016).

Globalization can affect the fiscal policies, tax structures and in turn tax revenues of the countries. Many countries have difficulty in creating and implementing their own independent tax policies under the pressure of multinational companies, other competing countries and supranational organizations during the globalization process. As a result, the tax policies of the countries are mainly made and implemented in accordance with global developments and the expectations of the actors in question (Tanzi, 1980). In this context, the main purpose of this study is to empirically analyze the interplay between economic globalization and and tax revenues.

The next part outlines the related literature and data and method are explained immediately afterwards. The empirical analyses are performed in Section 4 and the paper is concluded with the Section 5.

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## 2. Literature Review

The relationship between globalization indicators and tax revenues have been investigated in the related empirical literature for different countries and country groups, but the researchers have documented mixed findings. In this context, Bretschger and Hettich (2005) investigated the impact of globalization on capital tax rates and labor taxes in 12 OECD countries for the period of 1967-1996 through panel data analysis and found that globalization negatively affected the capital tax rates because tax competition caused the countries to decrease the tax rates on mobile assets in the globalized world. On the other hand, Dreher (2006) analyzed the impact of globalization on tax rates on labor, consumption and capital in OECD countries for the period of 1970-2000 via regression approach and revealed that globalization only increased the tax revenues on capital, but did not have a significant influence on tax revenues from labor and consumption.

Overesch and Rincke (2011) explored the relationship between globalization and corporation tax rates in 32 European countries over the period of 1983-2006 by panel data analysis and discovered that globalization decreased the corporation tax rates through tax competition. Onaran et al. (2012) examined the impact of globalization over the implicit tax rates on labor income, consumption, and capital income in EU-15 members and the new EU members for the period of 1970-2007 and found that globalization increased the implicit tax rate on labor income in the EU-15 countries, but did not have a significant impact on the implicit tax rate on capital income.

Onaran and Boesch (2014) examined the impact of globalization over taxes on labor, consumption, and capital in EU-15 members and 13 Central and Eastern European (CEE) countries over the period of 1970-2007 and found an insignificant interaction between globalization and taxes on capital and consumption taxes in the EU-15 countries, but revealed a positive relationship between globalization and labor taxes. However, they found a positive relation between globalization and capital income taxes in 13 CEE countries, but a negative relation between globalization and consumption taxes and an insignificant relationship between globalization and labor taxes.

Mourmans (2016) researched the determinants of corporation and corporation tax rates in 34 OECD countries via panel data analysis and found a negative relationship between globalization proxied by openness and both tax rates. Ünver and Koyuncu (2021) examined the long run relationship between globalization and tax revenues in Turkiye for the period of 1972-2018 by ARDL method and discovered a positive relation between globalization and tax revenues in the long run.

Nacar and Karabacak (2023) explored the effect of globalization on tax policies in Turkiye for the period of 1998-2020 and uncovered asymmetric effects of globalization on tax policies. Furthermore, they revealed that globalization positively affected the taxes on capital income, but negatively influenced the taxes on labor and there did not exist a significant interaction between globalization and consumption taxes. Çalcalı and Altınar (2019) researched the determinants of tax revenues in 16 OECD countries over the period of 1991-2015 via panel AMG and found that inflation had a negative effect on tax revenues, but economic globalization had a positive effect on tax revenues in most of the countries. Lastly, Sevinç et al. (2019) investigated the effect of globalization on corporation tax in 33 countries for the period of 1998-2016 and discovered a negative relationship between globalization and corporation taxes.

## 3. Data and Method

This study investigates the causal relation between economic globalization and tax revenues in the G-7 states for the period of 2000-2020. The tax revenues (TAXREV) is proxied by total tax

revenues (% of GDP) and obtained from OECD (2023). On the other hand, economic globalization (EG) is proxied by economic globalization index including trade and financial globalization indices of KOF Swiss Economic Institute (2023). The study covers the period of 2000-2020, because tax revenues data is available for the G-7 states as of 2020 and the series of tax revenues and economic globalization end in 2020.

The econometric analyses are performed through Stata 15.0 and Eviews 12.0 statistical programs. The causal relationship between human capital and economic growth is investigated by Emirmahmutoglu and Kose (2011) causality test taking notice of cross-sectional dependence and heterogeneity.

The summary statistics of tax revenues and economic globalization are shown in Table 1. The mean of tax revenues and economic globalization index are respectively 34.225% of GDP and 70.881. But, both variables seem highly volatile for the period of 2000-2020.

**Table 1:** Summary statistics of the series

| Summary statistics | TAXREV | EG      |
|--------------------|--------|---------|
| Mean               | 34.225 | 70.881  |
| Std. Dev.          | 6.453  | 8.034   |
| Maximum            | 46.07  | 81.7237 |
| Minimum            | 22.91  | 46.344  |
| Observations       | 147    | 147     |

#### 4. Econometric Analysis

In the econometric analysis, cross-sectional dependency between human capital and economic growth is examined with tests of LM, LM<sub>adj.</sub>, and LM CD, and the test results are reported in Table 2. The null hypothesis of cross-sectional independency is abnegated given the probability values of three tests and the subsistence of cross-sectional dependency is disclosed between two variables.

**Table 2:** Cross-sectional dependence tests' results

| Test                           | Test statistic | Prob.  |
|--------------------------------|----------------|--------|
| LM (Breusch and Pagan, 1980)   | 65.95          | 0.0000 |
| LM adj* (Pesaran et al., 2008) | 16.9           | 0.0000 |
| LM CD* (Pesaran, 2004)         | 0.9081         | 0.0638 |

The homogeneity is examined with delta tilde tests of Pesaran and Yamagata (2008) and their results are reported in Table 3. The homogeneity is abnegated given the probability values of two tests and subsistence of heterogeneity is disclosed.

**Table 3.** Homogeneity tests' results.

| Test                    | Test statistic | Prob. |
|-------------------------|----------------|-------|
| $\tilde{\Delta}$        | 1.795          | 0.073 |
| $\tilde{\Delta}_{adj.}$ | 1.939          | 0.052 |

The stationarity of TAXREV and EG is examined by Pesaran (2007) CIPS unit root test because of the cross-sectional dependency between two series and its results are shown in Table 4. The test results identify that TAXREV and EG are I(1).

**Table 4:** Unit root test’s results

| Variables | Constant  | Constant +Trend |
|-----------|-----------|-----------------|
| TAXREV    | 0.427     | -1.125          |
| D(TAXREV) | -5.796*** | -4.923***       |
| EG        | -0.578    | -1.434          |
| d(EG)     | -3.707*** | -2.658***       |

\*\*\* and \*\* are respectively significant at 1% and 5% level.

The causal relationship between tax revenues and economic globalization is examined with Emirmahmutoğlu and Kose (2011) causality test and its results are shown in Table 5. The panel level results denote a bilateral causal relation between economic globalization and tax revenues. In other word, a feedback relation between economic globalization and economic globalization subsists for the G-7 countries. However, the county level results of the causality test indicate that there exists a bilateral causal interaction between economic globalization and tax revenues in the United States, a unilateral causal relation from economic globalization to the tax revenues in Germany, and a unilateral causal relation from tax revenues to the economic globalization in France and Japan.

**Table 5:** Emirmahmutoğlu and Kose (2011) causality test results

| Countries      | EG → TAXREV     |              | TAXREV → EG     |              |
|----------------|-----------------|--------------|-----------------|--------------|
|                | Test statistics | P Values     | Test statistics | P Values     |
| Canada         | 4.969           | 0.174        | 4.314           | 0.230        |
| France         | 0.059           | 0.808        | <b>3.446</b>    | <b>0.063</b> |
| Germany        | <b>9.362</b>    | <b>0.025</b> | 0.350           | 0.950        |
| Italy          | 2.280           | 0.516        | 1.028           | 0.794        |
| Japan          | 1.676           | 0.642        | <b>7.166</b>    | <b>0.067</b> |
| United Kingdom | 0.560           | 0.756        | 2.667           | 0.264        |
| United States  | <b>10.824</b>   | <b>0.013</b> | <b>6.697</b>    | <b>0.082</b> |
| Panel          | <b>22.810</b>   | <b>0.063</b> | <b>22.098</b>   | <b>0.077</b> |

## 5. Conclusion

Globalization provides more efficient transfer of goods and services, technology and capital. Thus, labor productivity increases, which is the main source of long-term per capita income growth. However, global integration makes a country more dependent on its partners and therefore requires institutional development that will increase its competitiveness. The countries may change their tax policies and institutions to comply with international integration and these changes can also lead changes in the tax revenues. In this context, this study examines the causal relationship between economic globalization and tax revenues in G-7 countries between 2000 and 2020 by way of causality analysis. The results of causality test reveal a feedback interaction between economic globalization and total tax revenues.

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# Strategic Management in the Conditions of Global Crises and the New Social Leaders

Venelin Terziev<sup>1</sup>

## Abstract

In this publication we set an objectively complicated task to analyse the opportunities of strategic decision-making during crisis by attempting to make a partial analysis of the ongoing crisis caused by the COVID 19 pandemic and the emerged military conflict between the Russian Federation and Ukraine. Crisis circumstances require societies to quickly rethink and develop adequate strategies and respectively to formulate strategic goals and plan processes. In many cases preliminary analysis and assessment are practically impossible /especially when it comes to natural disasters or crises/ and this requires a different operational order of problem solving, which includes formulating new unconventional goals and then implementing planning not objectified by a particular and accurate analysis. All this puts whole systems and societies to the test, and those who are empowered to manage the process – under high pressure from unforeseen circumstances and not always objective judgments. Which, in turn, creates a number of subsequent critical issues in the management process. The role of socially dominant leaders is of particular importance in societies, as well as in making various decisions. Their role in strategic decision-making is also examined.

**Keywords:** Strategic management, global crisis, strategies, management process

## 1. Introduction

Setting goals and planning process actions in process management, and on a larger scale – strategic management during crisis is even more challenging. In accordance with the definitions of “crisis”, in the broadest sense, crisis management is of strategic importance, as it is always a matter of rescuing and surviving of people, territories, sites, etc. On the one hand, crisis management corresponds to the principles of general management, but on the other hand, it is complex enough, which derives from the fact of rapidly and dynamically changing environment – both national and international. This is most often and clearly observed during crisis circumstances that affect a very large part of the population of a country, region, continent or even the whole world. Crises have a diverse nature, both in scope and in nature, and their management is correlated with this. Different options are considered for the development of strategies in crisis situations, depending on whether they relate to one administrative area, country, group of countries or cover the world.

## 2. Strategic Management in Times of Global Crisis

Global crises are usually large-scale, both in terms of territory and their nature, and challenge many countries, existing alliances of different nature –political, economic, military or others. In every crisis, people are most affected, i.e. the individual, regardless of which of the above structures they belong to and what their obligations are.

Linus Carl Pauling, an American chemist born in German, winner of the Nobel Prize in Chemistry and Nobel Peace Prize winner, said: “Nations keep agreements, keep their treaties so long as they continue to do them good”. Unfortunately, however, when crises emerge, especially global ones, keeping certain contractual relations is not always doing good. Crises are characterized as risks with a high degree of uncertainty, disruption of the interaction between the factors of each system and high dynamics. Violation of the values of all social

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groups is also an important part of the development of the crisis. The development of any crisis does not begin from the moment of the violation of the respective balances, but from the moment when the society prepares for it in its organizational structure. The principles that are followed in crisis management are related to speed, risk assessment, analysis, planning and impact.

The implementation of all strategies and the achievement of all goals must definitely pursue the preservation of maximum values for the good existence of the people. The assessment of actions and possible perspectives is objectified by certain criteria and indicators. The fairness and accuracy of each assessment may be different, as well as different in accuracy and correctness for different groups of people, even for a particular individual.

This questions or at least creates discomfort in the formation and implementation of each step of the strategy, regardless of whether it is implemented on a limited scale without significant fluctuations in the internal or external environment or in a situation of general and active dynamics.

In every case or in any specific situation, the use of objective, measurable and realistic goals in the implementation of strategic management is of paramount importance and a task with a high degree of complexity. This directly corresponds to the planning of certain actions and activities in order to be able to meet the strategic goals to the maximum extent.

Crisis circumstances require societies to quickly rethink and develop adequate strategies and respectively to formulate strategic goals and plan processes. In many cases preliminary analysis and assessment are practically impossible /especially when it comes to natural disasters or crises/ and this requires a different operational order of problem solving, which includes formulating new unconventional goals and then implementing planning not objectified by a concrete and accurate analysis. All this puts whole systems and societies to the test, and those who are empowered to manage the process – under high pressure from unforeseen circumstances and not always objective judgments. Which, in turn, creates a number of subsequent critical issues in the management process.

All this definitely does not define this process as non-strategic, but puts it in a different environment. The strategic nature is determined at least by the fact that it directly or indirectly concerns a very large group of people, and that it determines the actions of one or more systems.

In the last few years, such global crisis has become the pandemic caused by COVID-19. It has forced societies to make certain decisions of strategic nature to overcome the situation that threatens the lives and health of people around the world. It is more than obvious that the applied strategic approach includes many factors that change in the different periods of the crisis and seems to decompose the crisis itself into smaller elements in nature and scope. This does not change the strategic goal that is protecting human life and health.

Undoubtedly, each country has its own crisis response programmes and plans, but it is important whether those states with power to govern societies are able to quickly and accurately assess the changing environment, to implement these programmes and plans adequately, and last but not least to reformulate their strategic goals and plans and put them at the service of the respective community.

The implementation of any crisis management strategy is directly dependent on the capacity of its managers, both administratively and financially. The realities of the last few years have shown that not everyone can cope with this critical governance process in a relatively complex and difficult situation.



Everyone determines their actions for the benefit of their community, but not everyone has the financial and material ability, and last but not least, the intellectual scientific capacity to achieve all this. Imbalances, even without using the specific statistics, are present and show significant differences. Even in global crises, some societies cope faster with the specific crisis circumstances, while others more slowly. For some societies the consequences are quite severe, and for others – relatively acceptable. All of them have faced certain consequences, which must be assessed after the crisis situation in order to take appropriate corrective actions.

It would be difficult to explain the speed of corrective action in different societies. This, in turn, corresponds to the ability to reformulate certain goals, as well as the ability to achieve them effectively.

Linus Carl Pauling said: “If you want to have good ideas you must have many ideas. Most of them will be wrong, and what you have to learn is which ones to throw away”. The world-famous chemist drew his conclusions based on the accumulated knowledge, experience and sufficient information, which helped him define the problem that the lack of a sufficiently large set of ideas from which to select those worth implementing leads to significant difficulties. The transfer of ideas, algorithms or the copying of entire processes from one society to another has historically shown that it does not always or at least in most cases does not mean good outcome. Scientifically based approbation of something or a process is too complicated when we talk about strategic management of social processes. Social processes practically include all management systems and their management has its high complexity at almost all stages, as well as a very complicated mechanism of influence. The second example of a high scale crisis that is currently taking place is the situation in Ukraine. By its nature, it is political, but accompanied by economic and social issues. It is regional in scope, but with signs of becoming global.

The complexity of the political situation because of the military conflict between Russia and Ukraine puts societies in another crisis situation. Again, it cannot be defined as normal, so the existing crisis management plans cannot be implemented or even if it is possible – only partially.

This places certain restrictions on societies when reformulating their strategic decisions and implementing effective strategic management. Analyses of this crisis are divergent and at this stage do not allow to develop a unified strategy for resolving it, precisely because political and military crises are among the most complex in the world. In addition, this crisis is multipolar and besides the two countries directly involved, it effects many other countries, alliances, each with its own strategic goals, inconsistent with the others or without any diplomatic rapprochement so far.

I would like to draw attention to an analysis of the Bulgarian professor Marusya Lyubcheva dated February 25, 2022, published on the Internet portal Pogled.info, which describes a certain chronology of this conflict and tracks the change of certain relations from strategic partnership to military conflict (2023a).

"In the years when Bulgaria joined the European Union, the European Union was developing documents for a strategic partnership with Russia. Until 2009, the Strategic Partnership Report with Russia went through discussions in the European Parliament and was structured on trade, economy, energy, climate change, research, education, culture, security, including the fight against terrorism, non-proliferation of nuclear weapons and conflict resolution in the Middle East.

Discussions covered Russia's accession to the World Trade Organization, which took place several years later. Russia was part of the Black Sea Synergy, the comprehensive report that placed not only the six Black Sea countries but also the wider Black Sea region in an important

region for the European Union. Until the moment the European Union made a reorientation towards the Eastern Dimension or Partnership. The Black Sea region was forgotten and until 2018 it remained with only one report after the Synergy, delayed in its implementation. Everyone had high hopes for the Eastern Partnership. The signing of declarations of closer cooperation between the European Union and Ukraine, Belarus, the Republic of Moldova, Georgia, Armenia and Azerbaijan organized their relations. It was also part of the neighborhood policy, defined by J.M. Barroso as “forming a circle of friends” and was implemented for the purpose of mutually beneficial economic and political relations between the European Union and the neighboring countries. The discussion also covered the South Caucasus region. The Eastern Partnership together with the Strategic Partnership between the European Union and the Russian Federation, offered a new approach to East-West relations, based on cooperation and mutual support for building a more secure and sustainable world order. Until it became clear that the idea was not purely European. The limit was in 2013 - Ukraine. When the aspirations of the Eastern Partnership countries for NATO membership began to dominate and displace the principles of the original idea. Many of the iconic politicians in the European Union at the time began to talk about modifying the Eastern Partnership. However, the events in Ukraine took place. Today we call them a “revolution”, but in 2013 they were not named that. Only a few MEPs waved the Ukrainian flag in plenary and set out on a revolution in that country. There were also different opinions. And no one has the right to forget that. Personal archives also speak. Artificial and one-sided support of these events, without trying to solve the arisen problems through diplomacy. One conflict always involves at least two sides. And this conflict involved many countries. So, resolutions to impose sanctions were issued, one after the other, negotiations took place, certain pawn candidates were imposed in the elections in Ukraine, the government was financed without proper control as to what for and how the funds are used, funding of foreign NGOs that pursue policies not typical even for Ukrainians. Surely these backstage schemes will come to light one day, because the documents proving it are still there. Tension that has transformed the strategic partnership into a constantly evolving sanctions regime, in which the European Union has participated more and more. Economic crisis, energy security strategies that went wrong, difficult negotiations on climate change, not very successful foreign policy, complicated negotiations on the migrant crisis, etc.

Despite attempts to come to an agreement, incl. Minsk agreements (which Ukraine has long refused to fulfill), the European Union has not done everything necessary to save itself. Surely, not all countries are democratic, according to officials in the European Union or the United States, but nowhere can democracy be imposed by force or behind the scenes. If it is necessary to force it, the risk of identity destruction or removal of dissidents is particularly high. Many people today are contemplating and looking for the ones to blame.

For years, Europe, including Ukraine, has been guided by various desires, incl. the desire to bring back the attitudes to certain groups of people characteristic for the years of fascism. Who condemned or sanctioned them? Who condemned the so-called Maidan? Did the truth about the so-called Maidan come out? It turns out that we, Europeans, have not only supported the imposition of democracy and freedom. We imposed someone's interests, along with other external forces.

The situation required a lot of strategic vision and assessment, which was the possible outcome. It required leadership devoid of the black and white thinking. There are at least two sides in a conflict, but this conflict involved more than two countries. We are all in this conflict. Now no one has the right to just blame”.

The complexity of this situation is determined by the special dynamics, as well as by the fact that societies and countries have different assessments of what is happening. Making quick

decisions in this case is necessary, although there is a high risk that they would be ineffective. The strategic goals for overcoming this crisis are inconsistent due to the fact that the societies determine their strategic policy first of all in terms of national interests and then their belonging to certain political unions. The development of the crisis seems to be on parallel axes, and the complexity of the development of the economic and information component changes the attitudes and interests of the respective societies, as well as the consequences of certain strategic decisions.

The restriction of certain freedoms related to access to reliable information is reminiscent of the Cold War. And this is an element of implementing the strategies of all participating countries. This objectively dooms the people from the respective community to the one-sidedness of the received information and the lack of at least partial objectivity for its comparison. Probably such deep military crises create conditions for shifting the democratic conditionality and applying the elements of the tactical military art. Whether they give the appropriate result is difficult to predict when you are part of a crisis situation.

All political leaders who are called to govern societies carefully determine or rather justify good or bad decisions and strategies they prepare for crisis management, with the national security of their societies. In any case, this has the greatest weight in determining the relevant strategic decisions, but they are not always adequate to the respective realities inside and outside the respective societies. Last but not least, the preparedness of the various levels of government is a response to the crisis.

According to Linus Carl Pauling, “Science is the search for truth, the effort to understand the world: it involves the rejection of bias, of dogma, of revelation, but not the rejection of morality.”(2023b).

Do scientists play a part in crisis management and what is their role? They definitely do! The role and mission of scientists is not only to support this process, but to be part of the process of developing such strategic decisions in management, which would as much as possible and as quickly as possible meet the expectations of societies. This raises expectations about whether scientists are able to generate good enough ideas to convince societies about their usefulness and to suggest ways to effectively implement them. Due to the knowledge of the processes, the analytics with which scientists work and the ability to analyze databases, as well as the facts about each crisis, scientists can be at the forefront of the crisis management model. Another question is whether management elites rely on scientists or crisis management is done with other tools that do not involve scientists that much. It is a question of relevance, of conformity assessment, of systematicity, of justification and of the application of two principles which are applied in the technological sciences, namely the “principle of reasonable sufficiency” and the “principle of synergy”. Their implementation can “alleviate” evolving crisis situations, even the one we quoted above (2023b).

All this is a task of paramount importance and it must be carried out constantly, especially in times of crisis. Today, when societies are divided and set precedents for public judgement of one party or another, give certain qualifications, I believe that international scientific forums are the time and place for such discussion to suggest solutions and proposals. Restricting the participation of both (depending on who organizes the scientific forum) is unacceptable and rather offensive and does not create opportunities for the best prepared and most informed environment to fulfill its mission as an innovator (2023b).

And because I am a chemist, I will still use the words of Linus Carl Pauling, who said: “I recognize that many physicists are smarter than I am — most of them theoretical physicists. A lot of smart people have gone into theoretical physics, therefore the field is extremely

competitive. I console myself with the thought that although they may be smarter and may be deeper thinkers than I am, I have broader interests than they have”.

Objectively good strategic decision-making requires, above all, good preparation of the people whose responsibility is to make them, and especially of the teams that provide essential scientific and intellectual resources for making the same.

### **3. The Role of Socially Dominant Leaders in the Emergence of Crises**

The fear of happening realities turns out not to be exaggerated not only in our realities but also in our accompanying being. The confusion of conflicting and ambiguous messages that put us in a state of disarray as people who have clear and coherent logical thinking increasingly feeds our fears. Although we are used to the half-baked and even sometimes lyrical political messages that are thrown as messages on the political market in Bulgaria and Europe, lately we feel more and more a strong concern from the more balanced and more diplomatic political leaders. Their personal and political prudence has put us in the extremely unattractive position of waiting a long time for something to happen, and this against the background of their becoming public knowledge of their wanderings in search of certain solutions for which they have proved to be quite unprepared.

Personal and collective living in yet another political system has exhausted its significance both for those who consume it and for those who observe it from the outside. The inability to self-preservation and to react to the changing world is an unequivocal answer that she is looking for her new and completely different transformation. These periods of transformation are usually accompanied by severe and painful transitional states, which are accompanied by many and varied conflicts. No matter how simplistic all this sounds, it has a definite and strong logical, and not only, basis - we should not underestimate our historical memory in this direction, which would prove these statements of ours with a high degree of relativity.

The immediate question would be - how and what happens to the political reality? The next one is not at all useless - but what happens to ourselves? And if the answer to the second question is relatively easier, then the answer to the first is of a much more complex nature, both in substance and process nature. Eventually, we will have to go through periods of active transformations of our entire social system in one way or another, which will also include a change in political models of existence. If by a social system, we understand the whole set of relations, it would be practically more grounded and more realistic.

The failures and ups and downs of existing political realities are many and have their essential differences. Comparing and explaining them is important, as it can bring some benefits in our movement forward, as well as explaining the new processes taking place. These processes will bring elements that we know well and even read and explain well, but also elements that will surprise us and will be new with their high sensitivity.

The defective political reality will try to preserve some of its elements, which it will successfully carry over into future periods. This is of course quite uncertain, even unlikely, because these elements exist in one relationship with all others, and even if some of them survive in one form or another, they will have a different relationship with others that are now created.

If we are in the position that the defects in these political realities have already passed the possibility of being repaired or tamed in the sense of the accumulated grievances of the people, then their destruction will occur at an avalanche speed. The consequences of the defective political reality will be felt with different strengths and to different degrees. This is quite reasonable because they will be at different distances from the source of these processes. These

influences will have a set of fluctuations that will be misunderstood by those involved because they are new and unpredictable in nature and consequences.

Giving organic examples of these processes in specific concreteness as signals of what is happening can be found even now. We have built up a certain sensitive tolerance to different processes because we do not know them, and we do not have enough time to explore them.

All of this comes against a background of numerous emerging signals from different places. Their power is increased by the ability of those who create them and those who transmit them. Certainly, those with the best array of active elements are the best and fastest at creating and transmitting these signals. Their creators are in a process of struggle not for survival, but for dominance. This process will form groups that will try to create new dependencies that will define the new social reality. Determining the zones of influence will also give rise to the social importance of those who are contenders for certain leadership in this environment. More important will be how these new socially dominant leaders will determine or create the system of social relations that will determine the creation of new social systems. Political realities or systems will be the consequence of these new social relations.

Turbulences in these formed new social systems will last from a historical point of view for a very short time and from the point of view of the participants in them - for a very long time.

These processes have a high complexity and are almost unpredictable as a final result. Even if we have information and sufficient data about their progress, the power of influence of certain elements cannot be accurately and faithfully defined and measured, which will generate frequent and unpredictable changes.

That the social system is changing under the pressure of the multitude of social defects is almost visible to all, and is felt in certain and varying degrees. Much more interesting is how we will manage to pass through this long and sufficiently unpredictably difficult period, which we can unequivocally define as a process. It is unlikely that we will be able to have the kind of preparedness that would put us in a sufficiently favorable position so that everything happens in a certain acceptability for all participants. Anxiety grows with the constant multi-directionality of signals and with the succession of emerging social defects in the system.

We know that a system - whatever it may be - must have a certain efficiency, which is also associated with a particular financial significance. Whether those trying to be the leading elements in the creation of the new social system have the knowledge and willingness to accept the dependencies that have existed so far is difficult to predict. It is obvious that this system of social efficiency also creates problems in its existence. The problems that can be defined are behavioral. As unacceptable as all this may sound, all too often the behavioral patterns of a particular individual have so altered a particular social system that it has been preserved long enough without interest in any effective relationships. It is possible that certain behavioral elements again sensitively influence the already started process and bring it to a certain stage in which the new realities will have a different meaning.

The easiest conclusion would be to wait and see what happens in the end. But whether and how we will have this opportunity and whether as direct participants we will be able to evaluate this process? It is best to make some effort to ensure some preparedness for all of this. Even if we appreciate and realize that the signals that we will create and transmit will be relatively small in strength, perhaps we should consider that it would be much greater if there is an essential content that is a response to these ongoing processes.

Historians with a dose of authoritative academic conviction argue that history always moves forward. There is a certain timidity in their current messages, combined with an unintended sense that history may be repeating itself in one form or another. If you answer at least part of

the questions asked, or at least think deeply and unprejudiced about them, it can protect us from those repetitions that we would not like to happen (Terziev, 2022a; 2022b; Terziev & Lyubcheva, 2022c; Terziev, 2022d; 2022e; Terziev & Solovev, 2022f; Terziev, 2022g).

#### 4. Conclusion

Crisis management is too complex in today's dynamic and rapidly changing environment. In the last few years, we have lived in an environment of uncertainty and many ongoing processes that have a significant impact on the environment. The presence of these processes requires serious attention to the decision-making process in severe crises. This turns out to be a particular challenge both for the people who are empowered to make these management decisions and for the experts who study these processes. The certain social importance of the consequences of making the relevant decisions places them with a high priority of importance. All this implies new preparation and qualitatively different expertise. That leads to the creation of new technology for making such decisions. Scientists, researchers, managers, and policymakers must make additional and focused efforts to create such technology and a set of related procedures (Terziev, Georgiev & Ivanov, 2022h; Terziev, 2022i; 2022j; 2023c; Terziev & Georgiev, 2023d; 2023e).

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# The Societal Transformation Framework-For Middle East Area’s Polymathic Intelligent City’s Concept (MEA-PICC)

Antoine Trad<sup>1</sup>

## Abstract

This article presents a Polymathic and holistic concept for intelligent cities’ transformation projects and initiatives, which can use design, architecture and also a natural language for Intelligent City’s (IC) development and simulation. Such complex Polymathic environment that can be adopted by any type of transformation project and for that goal the author proposes the use the Polymathic and holistic intelligent cities design concept (Myers, Pane, Ko. 2004; Neumann, 2002). This concept can be applied to Middle East Area (MEA) countries, because of their unstable conflictual, geopolitical and geoeconomical situations. These various types of instabilities can be reflected in the case of the City-State (CS) of Byrut, Lebanon’s capital which has a tremendous to continuously to rebuild and restructure; at the same time, it stays as the region’s most prosperous city. Such CSs that face brutal, destructive, and frequent transformations. For such types of transformations, the author, proposes, the MEA-PICC (simply the Concept) that can be based on historical facts, construction legacy, civilizational affinities, and not only on immediate profit, buzz technologies and fictive business models.

**Keywords:** Intelligent cities, MEA, Byrut, Business transformation projects, Enterprise architecture, Mathematical model, Artificial Intelligence, Critical success factors/areas, Performance indicators and (re)engineering

## 1. Introduction

In this article is related to ICs and the author presents the Applied Holistic Mathematical Model for IC (AHMM4IC) based Concept for interconnected business and urban transformations, and also the possibilities to assess related risks of their failure. The AHMM4IC is based on Critical Success Factors (CSFs) (Trad, & Kalpić, 2018, 2022), which can be used in the context of intelligent (or smart adaptable) cities’ urban design/architecture. This article is based on a unique mixed research method that is supported by a mainly qualitative research module (Trad, Kalpić, 2017a, 2017b, 2017c, 2017d; Phoenicia, 2017). The AHMM4IC for intelligent urban Transformation Projects (or simply Projects) uses a Natural Language Environment (NLE) that can be adopted by any Project and for that goal the author proposes to use the Concept (Myers, Pane, Ko. 2004; Neumann, 2002). The Concept is supported by a central Decision-Making System for IC (DMS4IC) and Enterprise Architecture (sub)Projects (EAP). The Proof of Concept (PoC) is based on the resources collected on the CS of Byrut, Capital of Lebanon; where the central point is the transformation process of a war-torn CS into a modern, agile, (relatively, in respect to the MEA) civilized, urbanized, and automated intelligent CS. Such Projects are managed by IC Transformation Managers (simply Manager), who are supported with a methodology and a framework that can support and estimate the risks of implementation of such Projects. The Manager is responsible for the implementation of complex and unpredictable Projects, and the Concept supports the Manager in a just-in-time manner (Trad, & Kalpić, 2016, 2020). The used “i” prefix does not stand just for the common intelligent and agile environments, but for a distributed and holistic urban system’s approach that identifies this article’s background. This article, like all the author’s articles carry the same structure that is based on the author’s framework and some parts are inserted and readapted, that can give the reader an impression of redundancy, but the goal is to make each article totally independent and present the capacities of the an Inhouse-House (IH) Framework (IHF) in IC related subjects. To include a Concept and its holistic/distributed urban architecture subproject(s) in a CS and a

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region like the Byrut metropolitan region, with evolution prospects to become a (relatively) smart CS with an urbanized business and financial strategic planning process that will be needed to be thoroughly prepared to meet the current and future needs. A priority for this intelligent reorganization makes Byrut CS and region ready to integrate the local, regional and global smart economies and smart cities in a sustainable and multicultural way (Trad, 2018c, Trad, & Kalpić, 2018b). Such an integration needs national-cultural, civic, financial engineering related urban planning, domotics (DOMus infOrmaTICS), risk mitigation and legal conforming basis and are even fundamental for its long-term strategy, multi-culture and business longevity. Actually, and probably because of the geopolitical context, religious (ethnic), financial and political regional crisis, Concept’s financial related risk and legal standards cannot be implemented easily. The presented facts can damage the urban transformation project and its urban architecture subprojects and that may disable the traditional urban environments to become a part of a more global one and to compete with the networked global exchange. An important factor in frequent urban transformation projects’ changes and iterations are the roles of the Concept, politicians, factional leaders, finance analysts and urban architects, who should be supported by the optimal urban transformation framework that should include a global urban strategy model. This strategy model should be also capable of supporting the urban environment’s executive/government leaders, legal control and integration in a complex block-chained globalized world.

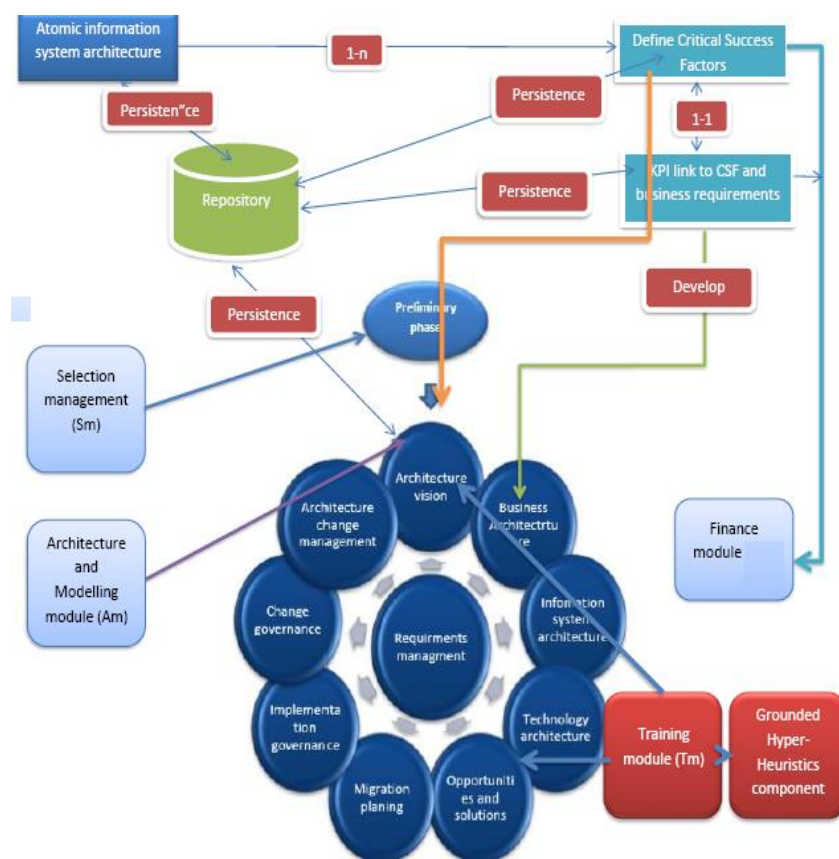
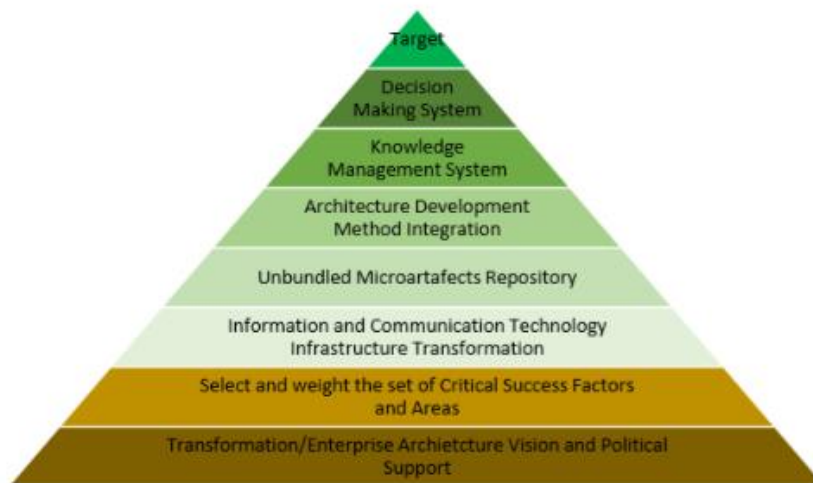


Figure 1: The research framework’s concept (Trad, & Kalpić, 2020).

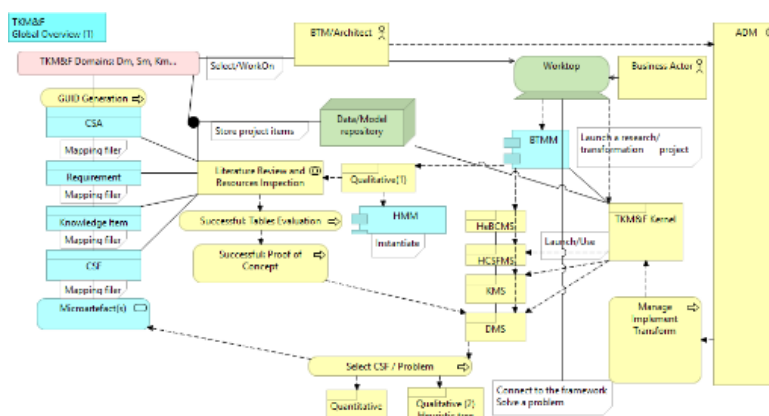
To achieve this urban, cultural, financial and logistics integration strategy, Critical Success Areas (CSA) and CSFs must be used to evaluate possible pitfalls and risks, to audit, assert, govern, automate, trace, monitor and control the Concept’s budget and status. The Concept and its urban architecture subproject CSFs can be configured to manage the complexities in asynchronous event flows from local and international environments. Transformed urban environments’ strategy model must have support of a built-in automated controls capable of

recognizing major changes and events. Projects involve the complete digitization of urban processes, where automation enables new intelligent CS models to optimize its finance. This research is considered as a pioneering one and actually or even unfortunately, there is not any adaptable risk concept for Projects. The Concept can be used for Projects in design and maintenance phases which comes after the finalization of the implementation phase. This research phase’s background is related to risk evaluation of Projects using CSFs that are managed by the Transformation, Research, Architecture and Development framework (TRADf), as shown in Fig. 1 (Trad, & Kalpić, 2018c). CSFs are selected from various intelligent CS areas like urban processes, traffic, cultural, pollution, technology, human behavior .... In this article the author presents a set of Concept managerial recommendations and this article combines various fields, like, Knowledge Management, AHMM, urban and Enterprise Architecture (EA), information technology management, business transformation and other (e)engineering fields. Integrating a Concept should be a fundamental strategic goal for Projects (Trad, & Kalpić, 2018, 2020, 2022; Cearley, Walker, & Burke, 2017), where Fig. 2 is fundamental for the whole research project and it is used in the whole book; where Dm stands for Decision making.



**Figure 2:** The research framework’s interaction/flow (Trad, 2018a).

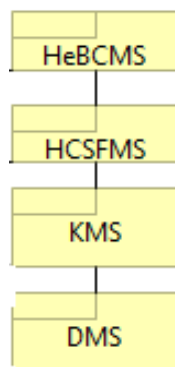
The proposed Concept integration concept: 1) is holistic; 2) uses a risk management engine; 3) interfaces various Project fields; 4) uses the *Concept* and 4) provides that the TRADf can be used by Projects.



**Figure 3:** The RDP4IC’s architecture method’s interface (The Open Group, 2011a, 2011b).

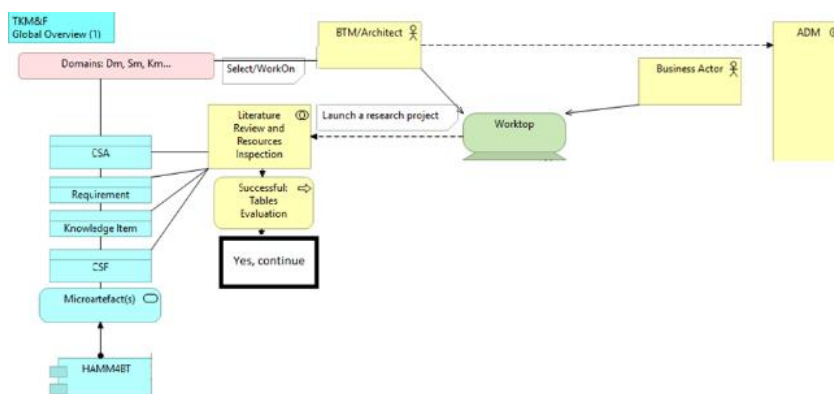
The author based his Research and Development Project for IC (RDP4IC) method on intelligent neural networks (Trad, & Kalpić, 2018). The Concept integration concept is agnostic to any specific application and intelligent CS field, as shown in Fig. 3, and is based on the Architecture

Development Method (ADM) (The Open Group, 2011a, 2011b). The *Concept* is central to implement Projects, where the Manager or an enterprise architect can use the Concept for Projects. In Projects, the Manager’s role is important and its actions are supported by the Concept (Thomas, 2015; Tidd, 2006; Lanubile, Ebert, Prikladnicki, & Vizcaíno, 2010; Trad, Kalpić, 2017a, 2017b, 2017c).



**Figure 4:** Intelligent management system.

A holistic systems approach is the optimal choice to model such a Concept, as shown in Fig. 4, where the decision model interacts with the external world via an implemented framework to manage CSFs and uses TRADf (Trad, & Kalpić, 2016b; Daellenbach, McNickle, & Dye, 2012). As shown in Fig. 5 the CSF is important for the phase 1 that qualifies the needed CSF set and decides if there is a need for a PoC.



**Figure 5:** Interaction with factors.

Projects are difficult to implement, because of their holistic nature, where the big part of complexity is met in its technical implementation phase (Watt, 2014; Gudnason, & Scherer, 2012). The TRADf can be applied to all Projects intelligent CS models (Joseph, 2014). Intelligent CS refers to any business conducted using different types of electronic media; where the most common form is the business that makes its transactions and revenue via the World Wide Web that is based on Internet technologies (e-business, 2014). The development and evolution of e-Business related fields like Business (and Financial) are a fundamental factor for any economy. Intelligent CS related fields added significant savings in the building of business infrastructures where they are also an enabler for DMS4IC and support quicker response to market requests. Market requests known as (e)transactions are essential for all intelligent CS related interactions. The technical implementation phase is the major cause of high failure rates in Projects. That is why the Managers’ skills should encompass knowledge of: 1) intelligent CS and Business (and Financial) processes’ architectures; 2) intelligent CS services’ technologies; 3) real-time unbundling of intelligent CS and Business (and Financial) environments (Willaert, 2001); 4) agile Project management; 5) implementation and integration of intelligent CS

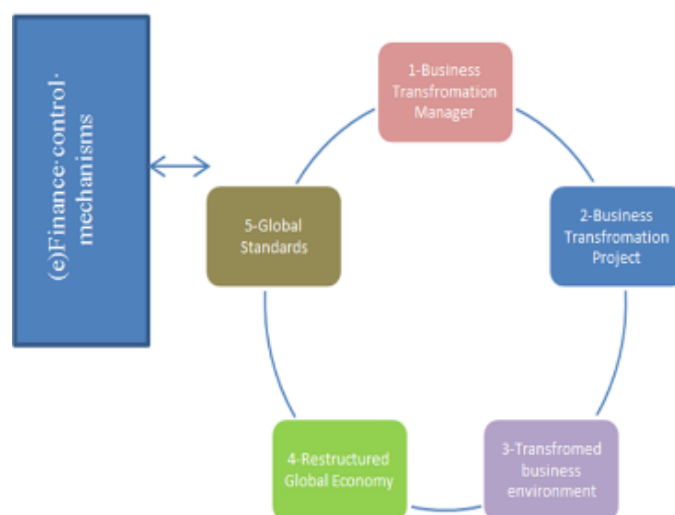
services; 6) organizational behavior and engineering; 7) management sciences methodologies; 8) intelligent CS or enterprise 2.0 architectures and their integration in concrete Project’s implementation phases (Platt, 2007). The actual hype of enterprise 2.0 in the intelligent CS organizations is a buzz word introduced by the Harvard Business School in 2006; they describe the usage of Web 2.0 and Web 3.0 technologies in transformed intelligent cities in order to increase productivity and efficiency. Therefore, the author highly recommends a qualified technocrat’s profile for the Manager; who needs to be assisted by a DMS4IC (Farhoomand, 2004; Trad, & Kalpić, 2013). Projects lack a holistic aspect that is assured by the *Concept* that is this article’s focus (Trad, & Kalpić, 2016, 2020; Cearley, Walker, & Burke, 2017; Thomas, 2015; Trad, & Kalpić, 2013).

## The Focus

Concept’s recommendations can be applied by Project’s managers and stakeholders (Desmond, 2013) that uses TRADf microartefacts (Trad, & Kalpić, 2017b, 2017c, 2018; Johnson, & Onwuegbuzie, 2004). The RDP4IC is based on a mixed methodology and is unique (Gunasekare, 2015; Easterbrook, Singer, Storey, & Damian, 2008); where this article tries to prove the Concept feasibility through an experiment and Research Question (RQ).

## 2. The RDP4IC

Projects failure rates are high and are constantly increasing (Gartner Research, 2002). That is due to the complexity encountered in the implementation phase; to enhance the success rate, the author proposes the TRADf that is unique and can be considered as a pioneering approach. TRADf recommends linking a Mathematical Model (MM) to all levels of the Project, as shown in Fig. 6 (Trad, & Kalpić, 2022; Agievich, 2014) including the CSF based Concept (Tidd, & Bessant, 2018).



**Figure 6:** Presents levels of project’s interaction (Trad, Kalpić, 2017a, 2017b, 2017c, 2017d).

## The Applied Research Framework

The *Concept* can be applied to various types of Projects (Trad, 2018a, 2018b) and is a part of the Selection management, Architecture-modelling, Control-monitoring, Decision-making, Training management, Projects management, Finance management, Geopolitical management, Knowledge management, Implementation management and Research management Framework (SmAmCmDmTmPmFmGmKmlmRmF, for simplification reasons, in further text the term

TRADf will be used). This article’s RQ is: “Can a holistic intelligent cities design concept be used in urban transformation project(s) be applied to MEA and Lebanese cities?”. The TRADf is owned in its totality including copyright, by the author; where this article is an IGI Global copyright and these two objects are distinct and different. This article’s RQ was formulated after a Literature Review Process (LRP).

### The Research’s Literature Review and Gap

The knowledge gap was acknowledged, mainly because the existing literature, on failure rates and on various methodologies treating Projects, offer practically no insight into a holistic approach to designing intelligent cities (Farhoomand, 2004; Trad, & Kalpić, 2013; Bruce, 1994). This RDP4IC inspects a holistic approach for the RQ, which is mainly based on the TRADf that makes it unique.

### The Research’s Uniqueness

The uniqueness of this research promotes a holistic unbundling process, the alignment of standards and strategies to support Projects (Farhoomand, 2004). The uniqueness of this research project is based on its holistic approach that combines: 1) Project; 2) AHMM4IC; 3) software auditing, modelling and architecture; 4) business engineering; 5) financial analysis; 6) Manager’s profile; 6) holistic urban and EA; and 7) it offers a methodology and Framework.

### Reviews and Check of the Critical Success Factors/Critical Success Areas

The Concept promotes the transformation through the use of Critical Success Area (CSA) that contains a set of CSFs, where a CSF is a set of Key Performance Indicators (KPI), where each KPI corresponds to a single Projects requirement and/or an item that can be a profile requirement or skill that has a column in each evaluation table (Trad, & Kalpić, 2018c; Putri, & Yusof, 2009). Where for each CSA an Excel Workbook (WB) is created and in which all its CSFs are stored. As shown in Fig. 7, the WB has scripts in the background that are automated to calculate the weightings and ratings. This RDP4IC proposes a standardized and automated manner to evaluate LRPs. That is a structured evolution in regards to just the popular subjective simple reading methods that do not make any sense. If the automated LRP’s evaluation (phase 1) is successful, only then the experiment is done.

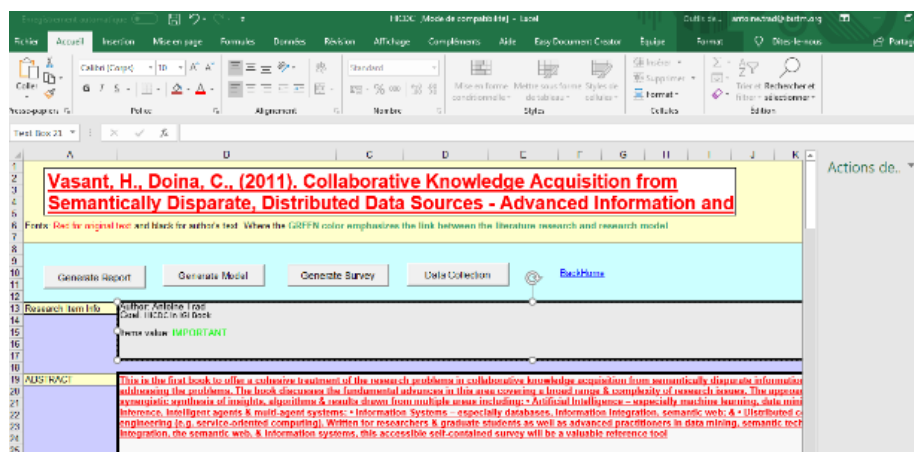
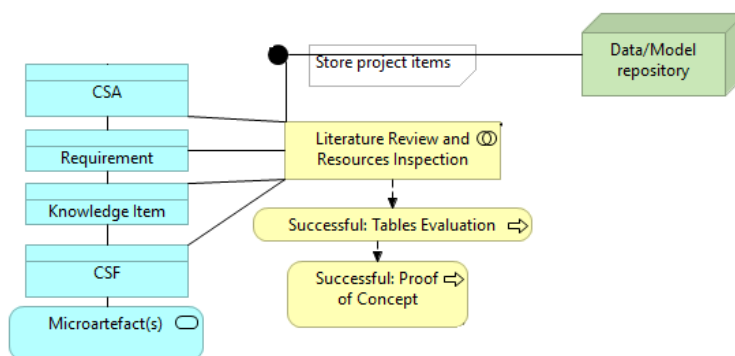


Figure 7: The factors and areas development workbook sheets.

As shown in Fig. 8, a Project starts with the first phase called the feasibility phase to check the basic CSFs, to check if the Project makes sense; that is based on WB evaluation. Based on the Concept LRP and related evaluation processes known as the Qualitative(1), the most important extracted CSFs that are used and evaluated using the following rules (Trad, & Kalpić, 2018c):

- Stored WB references should be credible and are estimated by the author and follow a classification supported by the CSF management system.
- Projects like mergers are the result of organizational changes in companies to act as a single enterprise with consolidated WB CSFs, resources and business interests.
- Applied modelling language should be limited in order to make the Projects manageable and not too complex.
- The ADM is considered to be mature if it has been in use for more than ten years and that it has been reported as successful to enforce the interest in using the ADM.
- The ADM is appropriate for any project’s local conditions and manages the TRADf’s iterations and CSFs with WB tuning scripts.
- If the aggregations of all the Project’s CSA/CSF WB tables/sheets are positive and exceed the defined minimum, the Projects continues to its PoC or can be used for problem solving.
- This evaluation concept will be applied to seven different CSAs that are presented in tables.



**Figure 8:** The factors interaction in the TRADf.

### 3. The Urban Architecture Case

#### Modelling Intelligent City’s Case

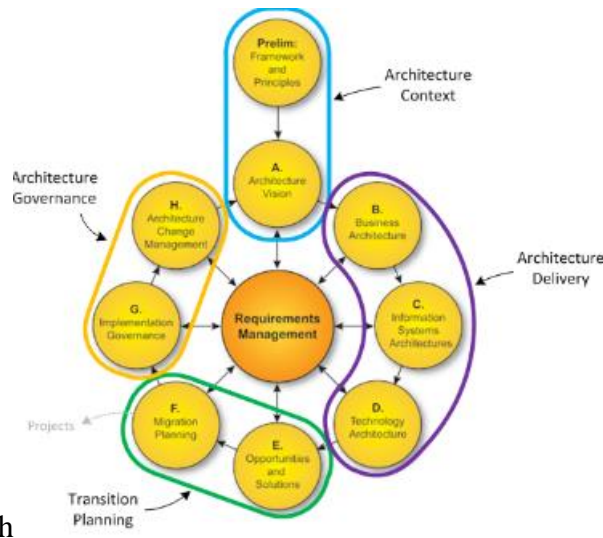
Concept uses an ACS, developed by the author that is based on the LRP’s resources (Kassir, 2010) and the Open Group’s reference study, it presents the possibilities to implement Projects’ components; using a modelling environment (Kassir, 2010). The Concept is related to an ideal CS model’s CSFs that define and tune the actions needed to ensure the success of the Projects; initially CSFs had been used in the domains of data analysis, urban architecture and intelligent systems analysis (Trad, & Kalpić, 2018c).

#### Integrating Critical Success Factors

A CSF is measurable and mapped to a weighting that is roughly estimated in the first iteration and then tuned through ADM iterations, to verify the Concept feasibility; where a holistic business and urban/enterprise architecture CSFs are essential (Morrison, 2016; Felfel, Ayadi, & Masmoudi, 2017). The main issue here is how to define what is really an intelligent/smart CS; because this seems to be somehow a pejorative term. For example, is Zurich, which is considered the most intelligent/smart CS, more intelligent than Athens or Palermo. If so, why? Knowing that the two latter cities have immense history and culture, but less high quality fast food services (Ahlers, Wienhofen, & Petersen, 2019). The author refers to intelligent, as an evolution in respect to the local context and reality; not to the commercial sense of the term. By the way, the very intelligent Zurich is the worldwide center of organized SOGFP crime (DW, 2019).

## The Architecture Development Method and Projects

This RDP4IC focuses on the Concept to assist distributed intelligence, urban complexity, CS knowledge access, local economy and urban technology/infrastructure. Concept includes a hyper-heuristics tree that supports a wide class of problem types, and it is a major benefit (DW, 2019; Markides, 2011), where the DMS4IC offers a set of recommendations. The TRADf’s parts must synchronize with the ADM that are shown in Fig. 8.



**Figure 9:** Business architecture phases (The Open Group, 2011a, 2011b).

## Business and Legal Framework

As global business has taken off in all cities which are participating in current expansion, the issues of regulations and legal acts arise. Lately, there has been a worldwide hyper-evolution in the development and implementation of regulation for internal business laws. Global business law and taxation give insights and a framework for support to cities to integrate. The notions of jurisdictions and regulations depend on the contract’s dispositions and the applied intelligent CS law. Legal and other regulations play an important role and they differ in various regions (The Open Group, 2011a, 2011b; Penn, & Arias, 2009).

## Applied Case Study’s Critical Success Factors

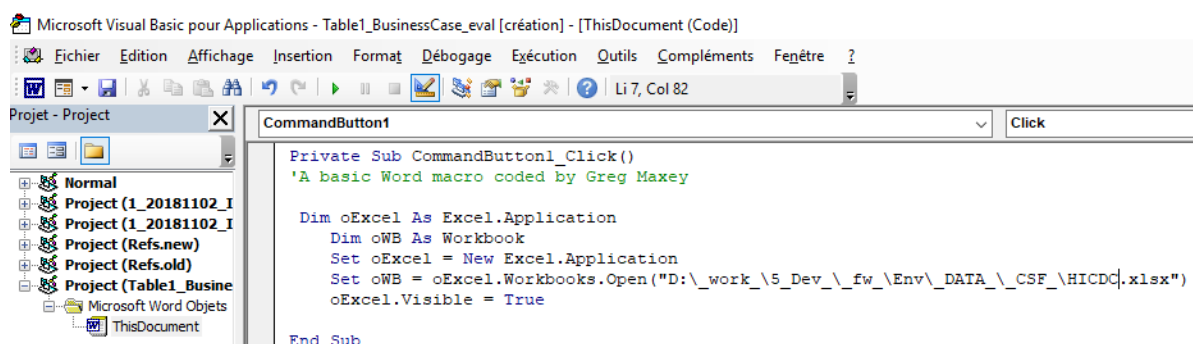
**Table 1:** The applied case study’s critical success factors that have an average of 5.75.

| Critical Success Factors            | KPIs                     | Weightings                       |
|-------------------------------------|--------------------------|----------------------------------|
| CSF_UrbanCase_Modelling             | VeryComplex              | From 1 to 10. <b>06 Selected</b> |
| CSF_UrbanCase_Factors               | Complex_Classification   | From 1 to 10. <b>08 Selected</b> |
| CSF_UrbanCase_References            | VeryLimited              | From 1 to 10. <b>05 Selected</b> |
| CSF_UrbanCase_ArchitectureDevMethod | IntegratedForProjectPart | From 1 to 10. <b>08 Selected</b> |
| CSF_UrbanCase_Technologies          | RudimentaryStage         | From 1 to 10. <b>04 Selected</b> |
| CSF_UrbanCase_Governance            | Primitive                | From 1 to 10. <b>09 Selected</b> |
| CSF_UrbanCase_Transformation_TKM&F  | NoDifference             | From 1 to 10. <b>03 Selected</b> |
| CSF_UrbanCase_Leading_Governance    | ComplexImpossible        | From 1 to 10. <b>03 Selected</b> |

valuation

Based on the CSF review process that was presented in this article’s section ‘Reviews and Check of the Critical Success Factors/Critical Success Areas’ and the ‘Mathematical Model’, the important business case’s CSFs are used and evaluated as shown in Table 1. As shown in Table 1, the button ‘valuation’ will generate the results shown in columns 2 (KPIs) and 3

(weightings); where the script is launched as shown in Fig. 10, where the TRADf interfaces office word and excel tools using basic scripts.



```
Microsoft Visual Basic pour Applications - Table1_BusinessCase_eval [création] - [ThisDocument (Code)]
Fichier  Edition  Affichage  Insertion  Format  Débogage  Exécution  Outils  Compléments  Fenêtre  ?
Projet - Project
Normal
Project (1_20181102_I
Project (1_20181102_I
Project (Refs.new)
Project (Refs.old)
Project (Table1_Busine
Microsoft Word Objets
ThisDocument

Private Sub CommandButton1_Click()
'A basic Word macro coded by Greg Maxey

Dim oExcel As Excel.Application
Dim oWB As Workbook
Set oExcel = New Excel.Application
Set oWB = oExcel.Workbooks.Open("D:\_work\_5_Dev\_fw\_Env\_DATA\_CSF\_HICDC.xlsx")
oExcel.Visible = True

End Sub
```

**Figure 10:** The word document script that interfaces the workbook and factors.

In Table 1, the result’s aim is to prove or justify that this section, the urban architecture case and how it can be used with the PoC. The next CSA to be analyzed is the holistic AHMM4IC’s integration. This section’s deduction is that the AHMM4IC is crucial for the RDP4IC’s credibility, where it is the basis for its mathematical model and structure.

#### 4. The AHMM4IC

##### The Basic Element

The Concept CSFs define the initial algorithm nodes that are identified as vital for successful targets to be reached and maintained and is the AHMM4IC’s basic element that is needed for the Projects to estimate its success or failure; using the exposed two phases (Morrison, 2016).

##### Quantitative-Qualitative Research Mixed Model

A problem, RQ, CSF or phenomenon are examined in iterations relating breadth and depth, using heuristics/beam search, which is specialized for unknown problems or the ones that appear in a preliminary phase or first iterations. Then, the TRADf qualitative research module input data stream(s) consist(s) of sets of numbers that are collected from sets generated by using designed/structured and approved/validated data object-collection modules and statistically processed by the researcher or analyst; where the selected qualitative method is selected by the user.

##### The Applied Mathematical Model’s Structure for IC

The AHMM4IC for Concept has a composite structure that can be viewed as follows:

- The static view has a similar static structure like the relational model’s structure that includes sets of CSAs/CSFs that map to tables and the ability to create them and apply actions on these tables; in the case of AHMM4IC that are intelligent CS microartefacts and not tables (Lockwood, 2018).
- The behavioral view, comprises actions designed using a set of mathematical nomenclature, the implementation of the AHMM4IC is in the internal scripting language; used also to tune CSFs (Lazar, Motogna, & Parv, 2010).
- As the skeleton of the TRADf that uses intelligent CS microartefacts’ scenarios to support just-in-time Concept requests.



## The Static Mathematical Model

| AMM4BT                     |                                      |      |
|----------------------------|--------------------------------------|------|
| mcRequirement              | = KP I                               | (1)  |
| CSF                        | = $\Sigma$ KPI                       | (2)  |
| CSA                        | = $\Sigma$ CSF                       | (3)  |
| Requirement                | = $\bigcup$ mcRequirement            | (4)  |
| (e)neuron                  | = action+ mcIntelligenceArtefact     | (5)  |
| mcArtefact                 | = $\bigcup$ (e)neurons               | (6)  |
| mcEnterprise               | = $\bigcup$ mcArtefact               | (7)  |
| (e)Enterprise              | = $\bigcup$ mcEnterprise             | (8)  |
| mcArtefactScenario         | = $\bigcup$ mcArtefactDecisionMaking | (9)  |
| IntelligenceComponent      | = $\bigcup$ mcArtefactScenario       | (10) |
| OrganisationalIntelligence | = $\bigcup$ IntelligenceComponent    | (11) |
| AMM4BT                     | = ADM+ OrganisationalIntelligence    | (12) |

**Figure 11:** The applied mathematical model’s nomenclature (Trad, & Kalpić, 2017a)

The Concept uses a CSF based AHMM4IC that is an abstract model containing a proprietary NLP that can be used to automate, transform and implement the Concept. The AMM nomenclature that is presented to the reader in Fig. 11, in a simplified form, to be easily understood, on the cost of a holistic formulation of the model; and as shown in Fig. 11:

- The abbreviation (and prefix) “mc” stands for micro.
- The symbol  $\Sigma$  indicates summation of weightings/ratings, denoting the relative importance of the set members selected as relevant. Weightings as integers range in ascending importance from 1 to 10.
- The symbol  $\bigcup$  indicates sets union.
- The proposed AHMM4IC enables the possibility to define Project as a model; using CSFs weightings and ratings.
- The selected corresponding weightings to:  $CSF \in \{ 1 \dots 10 \}$ ; are integer values.
- The selected corresponding ratings to:  $CSF \in \{ 0.00\% \dots 100.00\% \}$  are floating point percentage values. Weightings are shown in tables, second column and ratings in the third column.
- For some selected CSF, there is a predefined enumeration of KPIs or ratings, like for example:  $KPI \in \{ ImpossibleToIntegrate, VeryComplex, Complex, PossibleIntegration, Feasible \}$ ; the domain are constant strings of characters.
- A weighting is defined for a Concept CSF and a rating for a KPI; where the KPI is a rating for a given CSF and is one value taken out of an enumeration that is predefined. The first evaluation is in general very rough and through frequent ADM iterations it is tuned, because an Concept takes more than 20 years.

Concerning the constructs (or formulas) containing the symbol  $\bigcup$  are generated when the valuation button is pushed, like for example, for the CSF, CSF\_UrbanCase\_Modelling (Lazar, Motogna, & Parv, 2010):

- REQ\_UrbanCase\_Modelling is linked and created for the associated requirement.
- mcArtefact\_UrbanCase\_Modelling is linked and created for the associated microartefact.

$$AMM = Weigthing1 * Qualitative(2) + Weigthing2 * Quantitative(2) \quad (13).$$

As shown in Fig. 12, Qualitative(2) is the heuristics tree algorithm and Weigthing1 and Weigthing2 are tuned by the Concept team and the presented nomenclature defines the AMM of the static part of the AHMM4IC. Quantitative(2), is any quantitative method.

### The Applied Business Transformation Mathematical Model

The AHMM4IC can be modelled after the following formula for Business Transformation Mathematical Model (BTMM) that abstracts the Projects:

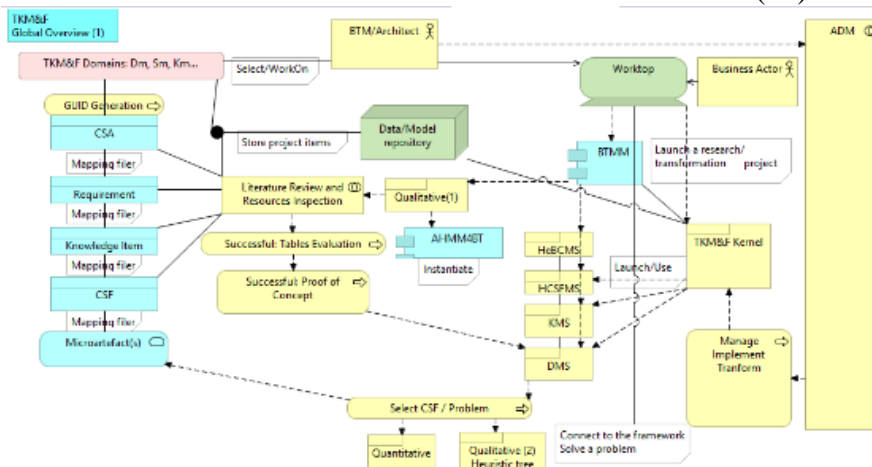
$$AHMM4IC = \sum AMM \text{ for an enterprise architecture's instance} \tag{14}$$

(BTMM):

$$BTMM = \sum AHMM4IC \text{ instances} \tag{15}$$

Where an instance is created for each iteration; the objective function of the BTMM’s formula can be optimized by using constraints and with extra variables that need to be tuned using the AHMM4IC. The variable for maximization or minimization can be, for example, the Project’s success, costs or another CSF. For the Concept PoC the success will be the main and only constraint and success is quantified as a binary 0 or 1. where the objective function definition will be:

Minimize risk BTMM (16).

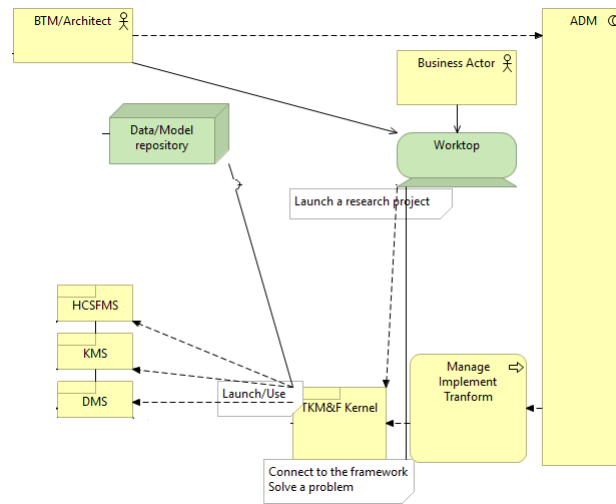


**Figure 12:** The framework’s components and its mathematical model.

By minimize, the aor refers to the optimization of phase 1; and if it is successful, then phase 2 is launched to inspect and solve surging problems. The BTMM is the combination of a Project methodologies and a holistic mathematical model that integrates the enterprise organizational concept, information and communication technologies (Lazar, Motogna, & Parv, 2010). As shown in Fig. 12, the AHMM4IC is a part and is the skeleton of the TRADf that uses microartefacts’ scenarios to support Concept requests. The Concept components interface the DMS4IC and Knowledge Management System for IC (KMS4IC), as shown in Fig. 13, to evaluate, manage and map CSFs for selection activities; if the aggregations of all the Project’s CSA/CSF tables exceeds the defined minimum the Projects continues to its second part, the Concept PoC.

### Framework’s Applied Mathematical Model Integration

The Project’s initialization phase generates the needed CSAs/CSFs and hence creates the Concept patterns to be analyzed.



**Figure 13:** The DMS4IC interface.

The AHMM4IC is a part and is the skeleton of the TRADf that uses microartefacts’ scenarios to support Concept instance requests (Agievich, 2014).

### The Mathematical Model’s Integration Critical Success Factors

Based on the Concept review process the most important CSFs are evaluated as follows:

**Table 2:** The critical success factors that have an average of 6.14.

| Critical Success Factors             | KPIs            | Weightings                |
|--------------------------------------|-----------------|---------------------------|
| CSF_AHMM4BT_TKM&F_Integratiou        | Feasible        | From 1 to 10. 07 Selected |
| CSF_AHMM4BT_InitialPhase             | RandomUnsure    | From 1 to 10. 05 Selected |
| CSF_AHMM4BT_PoCPhase                 | RandomUnsure    | From 1 to 10. 05 Selected |
| CSF_AHMM4BT_Qualitative&Quantitative | Complex         | From 1 to 10. 07 Selected |
| CSF_AHMM4BT_Final_BITMM              | UnVerifiedModel | From 1 to 10. 05 Selected |
| CSF_AHMM4BT_ADM_Integration          | Synchronized    | From 1 to 10. 09 Selected |
| CSF_AHMM4BT_HPMS_Interfacing         | UnStable        | From 1 to 10. 05 Selected |

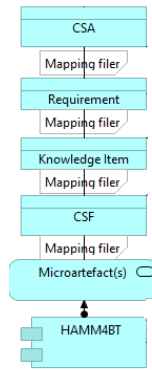
valuation

As shown in Table 2, the result’s aim (6,14 is very low) is to prove or justify that AHMM4IC is mature and possible to be used for the Concept integration; and cannot be used for the PoC. If though the result is fairly low, the next CSA to be analyzed is the holistic management of the ICS. This section’s deduction is that the infrastructure and ICS unbundling processes are to be analyzed, even though the results are deceiving.

## 5. The ICS’ Integration

### Distributed Unit of Work

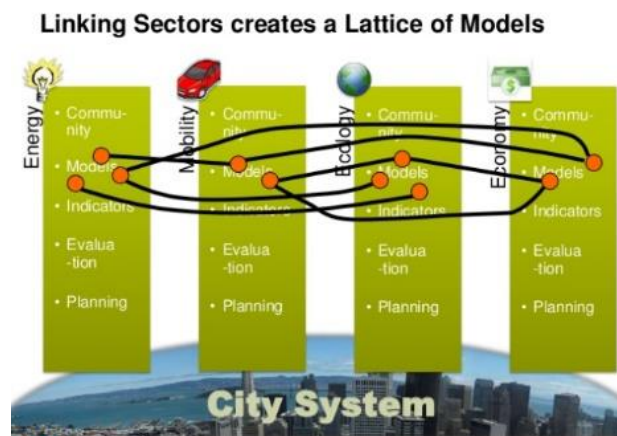
Microartefact granularity and responsibility definitions for Concept scenarios is a complex undertaking; added to that there is the implementation of the “1:1” mapping and classification of the transformed microartefacts, as shown in Fig. 14. The urban and EA concepts use methodologies like The Open Group’s Architecture Framework (TOGAF) ADM that supports the Concept (Neumann, 2002) where various types of identifiers can be used. TOGAF models can include concerns, principles, designs, views and frameworks related to civil engineering, urbanism and ICs (Proper, & Greefhorst, 2010).



**Figure 14.** The framework’s microartefact interactions.

### Unique Identifiers Integration and Processes

Various types of identifiers can be used for Concept, like radio frequency identifiers, phone numbers, visual/vocal recognition tags... to identify and monitor humans, animals, buildings, cars and other objects for various types of activities. Concept is supported by the TRADf to support inter-connected models that are including various domains, creating new values, as shown in Fig. 15 (Kolbe, 2015). These models can be described using City Geography Markup Language (CityGML).

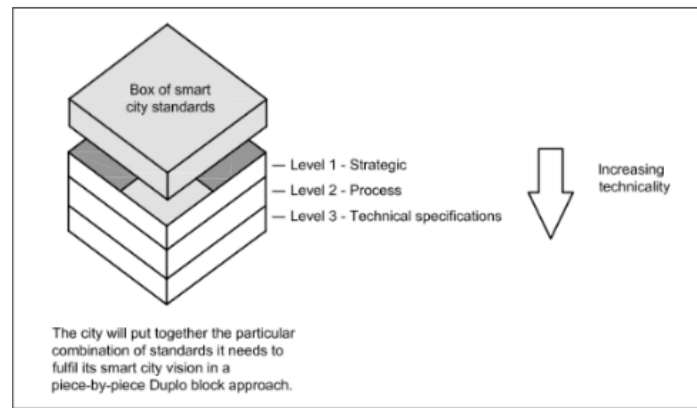


**Figure 15:** The intelligent city model (Kolbe, 2015).

Concept offers models supporting Managers decisions to achieve sustainable benefits within the planned Project in a standard way.

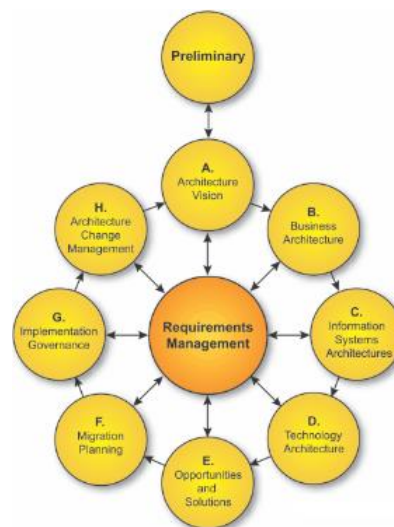
### Intelligent City Standards

To manage agile Projects, an adequate mapping concept integrates mainly technology standards (OASIS, 2014) and is the main principle and strategy using a linear “1:1” manner; used to relate Project resources. The proposed standards have the following levels: 1) strategic; 2) process; and 3) technical (Lea, 2017); as shown in Fig. 16.



**Figure 16:** The standard levels (Lea, 2017).

These standards and tooling environments support the Projects through an iterative pseudo-bottom-up approach, as shown in Fig. 17.

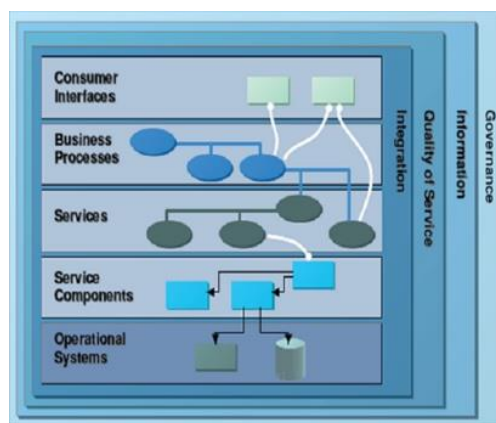


**Figure 17:** The iterative architecture development process (The Open Group, 2011a, 2011b).

Without the use of Concept, an Concept can: 1) very probably have poor performance; 2) lack scalability; and 3) fail, become un-usable and un-maintainable.

### **Intelligent Services Strategy and Security**

The TRADf’s applies Service Oriented Architecture (SOA) concepts that use service directory for vertical Concept solutions, as shown in Fig. 18. The TRADf recommends the adoption of a light variant of TOGAF where its atomic Concept services approach provides the conceptual and logical viewpoints (Gartner, 2005).



**Figure 18:** Service’s integration (Gartner, 2005).

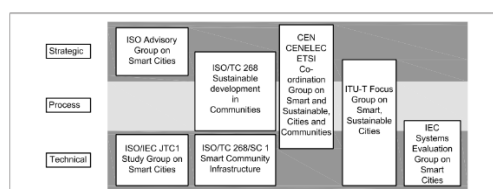
The TRADf and Concept define a global vision on CS’s security by applying holistic qualification procedures that englobes security concepts from many domains (Clark, 2002).

### Traffic and Garage Management Systems

Concept should support, agent-based architectures for intelligent traffic and parking management systems containing autonomous agents that perform decision support for real-time traffic management (Hernández, Ossowski, & García-Serranoa, 2002). These important and endemic problems have to be co-ordinated with a vast variety of other adjacent topics like the usage of the Internet.

### Internet of Things and Infrastructure Control

For smart cities, distributed communication, a standard from the Institute of Electrical and Electronic Engineers (IEEE) for an architectural framework for the Internet of Things (IoT) can be used. The standard is in its early stages and offers a reference model defining relationships among various IoT domains like, transportation, healthcare and many others... Domains are transformed to be used for the transition to smart cities, applying common architecture elements supporting complex domains, like finance (BSI, 2015).



**Figure 19:** Internet supported services (BSI, 2015).

### Telecommunication and Roaming

IoT and mobile infrastructure have expanded to interconnect endpoints and cities, to create a virtual and holistic environment. In these virtually interconnected cities, standard applications, endpoints and mobile apps collaborate in real-time. City map for urban transport app have become standard utilities that englobe also data management tools that help handle feedback and incident alerts; such apps are interconnected with other tools like electronic finance apps and many other (Bradshaw, 2016).

### Electronic Payments and Finance

Projects use technologies to transform the quality of life where automating economy and digitalization of financial services are fundamental by transforming customers’ behavior.

Banking is changing ... with or without the banks. Response to the millennials. Financial services, (2015)  
[http://ocakledigitalbank.com/resources/pdf/DBOF\\_Industry\\_Research\\_Report.pdf](http://ocakledigitalbank.com/resources/pdf/DBOF_Industry_Research_Report.pdf)

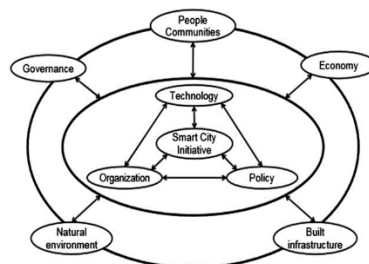
|  | Important | Current capability | Market lag |
|--|-----------|--------------------|------------|
| Mobile device payments                         | 94%       | 44%                | -50%       |
| Market Lag                                     | 92%       | 24%                |            |
| Real-time analytics                            | 90%       | 30%                | -60%       |
| Digital advisory service                       | 83%       | 28%                | -55%       |
| Location-driven services                       | 82%       | 19%                | -63%       |
| Offers via social media                        | 78%       | 34%                | -44%       |
| Comparison services based on financial profile | 76%       | 28%                | -48%       |
| Social media account management                | 72%       | 14%                | -58%       |
| Gamification                                   | 72%       | 15%                | -57%       |
| Digital personal assistant                     | 67%       | 12%                | -55%       |

**Figure 20:** Financial services integration (Makarchenko, Nerkararian, & Shmeleva, 2016).

The evolution of technologies-based services is un-linear in different countries. Projects need to transform banks to automate crucial financial services. The technology transformation of Deutsche Bank, Raiffeisen Bank, Hana-Bank and Bank Group are good examples for Projects (Makarchenko, Nerkararian, & Shmeleva, 2016).

### Drones and City Airspace Slots

Drones were associated with combat objects; evolution has given the opportunity to be used in many civil and business fields and the most emerging area is their involvement in Projects. Drones and their slots are playing a key role in Concept, offering patterns for a variety of domains, such as medical, finance, traffic, package delivery, policing-security, transport monitoring, firefighting and many other. There are many challenges, such as safety, security, terrorism threat, managing slots, legal regulations, power supply, pollution and privacy; especially in densely populated areas (Asghar, Alvi, Safi, & Khan, 2018).



**Figure 21:** Initiatives framework for smart CS (Asghar, Alvi, Safi, & Khan, 2018).

### Intelligent Buildings, Security and Construction Units (Domotics)

An intelligent reorganization of Byrut CS, if possible, makes it ready to integrate the local, regional and global smart world, whatever that means; such a Concept needs visceral Domotics. Smart devices are exponentially increasing the need to interface Concept data and functions. The hyper-evolution of new smart scenarios and applications make lives superficially easier but very chaotic. IoT is Domotics main infrastructure supporting scalable building solutions; ensuring the interoperability between natively incompatible Domotics technologies, information infrastructure, software apps; it has progressed to support buildings automation. Domotics endpoints interact using Internet addresses (Miori, & Russo, 2014).

### Standard Information Technology Procedures

The evolution of intelligent systems and the actual immaturity of design, development, qualification and operations for Projects still are in an infancy age, or simply chaotic. Tools for implementation environments are still confronted with serious project issues. These problems show that archaic tools are inappropriate for large enterprise intelligent systems and the author recommends the use of information technology concepts, such as:

- Patterns' concept expresses a structural concept for Concept where it offers patterns to

provide: 1) knowledge and intelligence templates to instantiate microartefact scenarios; 2) description of their responsibilities, relationships and content; 3) a help to define complex relationships; 4) definition of default CSA and CSF sets model; and 5) simplification of the CSF table evaluations.

- Resources, artefacts and factors, the TRADf’s repository maps relate the selected CSFs to various types of Project’s resources, like architecture models, microartefacts and requirements.

### The ICS’ Critical Success Factors

Based on the LRP and factors’ evaluation, the most important CSFs that are used are evaluated to the following:

**Table 3:** The critical success factors that have an average of 7.20.

| Critical Success Factors               | AHMM enhances: KPIs | Weightings                |
|--|---------------------|---------------------------|
| CSF_ICS_UID_IntegrationProcessesModels | VeryComplex         | From 1 to 10. 03 Selected |
| CSF_ICS_Standards                      | InitialState        | From 1 to 10. 05 Selected |
| CSF_ICS_Services                       | Supported           | From 1 to 10. 07 Selected |
| CSF_ICS_Traffic                        | ExistingProcedures  | From 1 to 10. 08 Selected |
| CSF_ICS_IoT_Telecom                    | ComplexEnvironments | From 1 to 10. 08 Selected |
| CSF_ICS_Finance                        | ExistingSupport     | From 1 to 10. 09 Selected |
| CSF_ICS_Drones                         | InitialState        | From 1 to 10. 05 Selected |
| CSF_ICS_Domotics                       | Supported           | From 1 to 10. 08 Selected |
| CSF_ICS_HPMS_StandardsIntegration      | Supported           | From 1 to 10. 09 Selected |
| CSF_ICS_Procedures                     | Supported           | From 1 to 10. 10 Selected |

valuation

As shown in Table 3, the results show that it is very complex to implement (lower than 8.5, is discarded). The next CSA to be analyzed, which is the integration of the ADM. This section’s deduction is that the ICS and other fields are dependent on an EA paradigm and therefore the ADM is crucial for the integration of the Concept.

## 6. The Integration of ADM

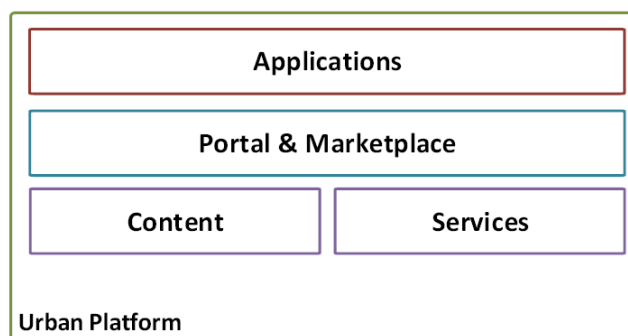
### Basics

EA supports IC in designing and implementing change in an agile manner. EA based IC planning accelerates the understanding and acceptance of architecture. EA and ADM supported IC planning can deliver (Burke, 2004; Ahlers, Wienhofen, & Petersen, 2019): 1) City plans and vision; 2) Zoning plans; 3) Building code; 4) Building-materials list; 5) Long-term business impact:

### Reference Architecture and its Phases

The Concept’ integration with TOGAF and ADM, enables the management and automation of Projects where the ADM is a generic method and recommends a set of phases and iterations to develop the Projects; it designs parts. As TOGAF is a framework, it can be integrated like in the case of ESPRESSO reference architecture for Projects (Cox, Parslow, De Lathouwer, Klien, Kempen, & Lonien, 2016).





**Figure 22:** Urban platform framework (Cox, Parslow, De Lathouwer, Klien, Kempen, & Lonien, 2016).

The intended Concept’s reference architecture is to support Projects with an implementation- and vendor-agnostic concept with enhanced interoperable and standards blueprint. Technological and implementation agnostic concept promotes (Cox, Parslow, De Lathouwer, Klien, Kempen, & Lonien, 2016): 1) avoiding locked-in concepts; 2) integration of various urban platforms; 3) certification and compliancy; 4) modularity; and 5) market structure agnostic concept. The ADM manages the Project’s development iterations and its interaction with the Concept.

### The Intelligent City Architecture Blueprint

The TRADf uses intelligent CS standards that include EA frameworks, Business Process Models (BPM), microartefacts interoperability... The mentioned intelligent CS standards are managed by the TRADf, which delivers added value and robustness to Projects. The proposed TRADf’s Concept capabilities help in establishing an architecture principal guideline that defines the Project’s initial phase and vision; which is based on a “just-enough” architecture the ADM (The Open Group, 2011a, 2011b).

### The Architecture Development Method Critical Success Factors

Based on the LRP and CSF evaluation process, the most important ADM’s CSFs are evaluated to the following:

**Table 4:** The critical success factors that have an average of 7.80.

| Critical Success Factors         | AHMM enhances: KPIs  | Weightings                |
|----------------------------------|----------------------|---------------------------|
| CSF_ADM_CSF_Initialization&Setup | Heterogenous&Complex | From 1 to 10. 06 Selected |
| CSF_ADM_IntegrationProcesses     | ExistsSupported      | From 1 to 10. 07 Selected |
| CSF_ADM_Phases                   | Supported            | From 1 to 10. 09 Selected |
| CSF_ADM_Requirements             | MappingAutomated     | From 1 to 10. 09 Selected |
| CSF_ADM_HICDC_Architecture       | Supported            | From 1 to 10. 08 Selected |

valuation

As shown in Table 4, the results show that it is very complex to implement (lower than 8.5, is discarded). The next CSA to be analyzed, which is the integration of the KMS4IC. This section’s deduction is that the Concept can be integrated with significant difficulties in Projects and a holistic ADM and the Concept is suitable for KMS4IC and DMS4IC; or any other intelligence-based systems like the KMS4IC.

### 7. The Holistic Urban Knowledge Management System For IC

For an urban KMS4IC the goal is to obtain the basis to manage information items using a holistic management concept that offers also the possibility to access distributed heterogeneous knowledge; where the knowledge items are associated with the CSFs (Rockart, 1979). In the 21st century KMS4IC is of ultimate strategic importance for the management knowledge in

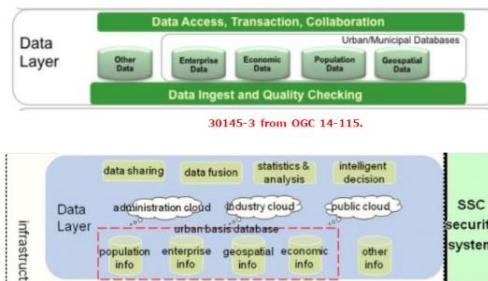
smart cities. In cities many traditional various knowledge management accesses exist and are a barrier for KMS4IC and Projects (Malhotra, 2005).

### The Holistic Urban Knowledge Management

The KMS4IC manages urban Knowledge Items (uKI); where uKIs and microartefact scripts are responsible for the manipulation of intelligence and control various Concept’s knowledge processes. The KMS4IC supports the Concept underlying mechanics to manage uKI microartefacts; and is responsible for access and uKI’s extraction, using holistic systemic approach (Trad, & Kalpić, 2016b; Daellenbach, McNickle, & Dye, 2012).

### The Holistic Knowledge Strategy

As shown in Fig. 23, KMS4IC contains identifiable data objects or uKIs that link CS objects using a unique identifier (Cox, Parslow, De Lathouwer, Klien, Kempen, & Lonien, 2016). uKIs map to CSFs and microartefact(s) and are classified in specific CSAs. A Concept concept expresses a fundamental structural Project’s concept for the KMS4IC/uKI implementation; which enables a holistic approach to knowledge access and its mapping to CSFs.



**Figure 23:** Intelligent CS data and knowledge management (Cox, Parslow, De Lathouwer, Klien, Kempen, & Lonien, 2016).

### The Knowledge Management Success Factors

As shown in Table 5, the results show that it is possible to implement (higher than 8.5, is not discarded). The next CSA to be analyzed, which is the integration of the urban DMS4IC. The KMS4IC’ integration result proves that it is fairly difficult but possible to implement an Concept to interface the urban DMS4IC. Based on the LRP, the most important knowledge CSFs that are used are:

**Table 5.** The critical success factors that have an average of 8.67.

| Critical Success Factors            | AHMM4BT enhances: KPIs | Weightings                |
|-------------------------------------|------------------------|---------------------------|
| CSF_uKMS_Infrastructure_Integration | Supported              | From 1 to 10. 08 Selected |
| CSF_uKMS_eKI_Mapping                | ComplexToImplement     | From 1 to 10. 08 Selected |
| CSF_uKMS_Patterns                   | Implementable          | From 1 to 10. 09 Selected |
| CSF_uKMS_HICDC_Integration          | Implementable          | From 1 to 10. 09 Selected |
| CSF_uKMS_HICDC_AccessManagement     | StandardIntgeration    | From 1 to 10. 09 Selected |

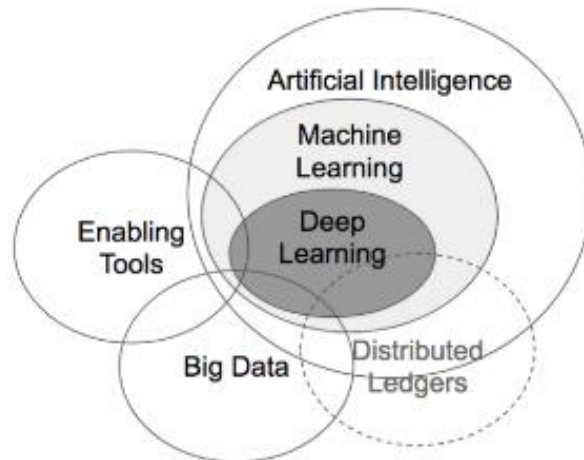
valuation

## 8. The Integration of the DMS4IC in ICs

### Critical Success Factors and Objectives

CSFs can be applied in the (Trad, & Kalpić, 2014): 1) selection of Concept resources; 2) strategy; 3) DMS4IC engine; and 4) training needs. Where Projects have become in many countries, priorities and previewed budgets would be \$135 billion by 2021 that will make Projects sustainable. Where the main objectives would be: 1) Livability; and 2) Workability; 3)

Sustainability. As shown in Fig. 24, various decision domains have enabled the integration of Artificial Intelligence (AI) (or complex decision systems) to support aspects of life; like robotics/automation, drones, and others (Vander Ark, 2018; Gardner, 1999).



**Figure 24:** Intelligent CS decision domains (Vander Ark, 2018).

The aim of such systems is (Walker, 2019): 1) Helping administration to support people to use cities; 2) Improving infrastructure; and 3) Improving public security. These actions would improve economic situation. That implies that the analysis and management of risk is one of the important pre-requisites to ensure the success of a Project. The TRADf integrates risk management and performs the analysis using a DMS4IC (Hussain, Dillon, Chang, & Hussain, 2010).

### An Extremely Long and Risky Transformation

Standard Projects are very risky, the risks levels are very high at about 70%; Concept are even more risky, when using radical and long-term transformations (Malhotra, 2005). In the Concept based DMSs, Projects team members can select and tune types of CSAs and CSFs to be processed. The selected CSFs are orchestrated by the AHMM4IC’s choreography engine that is the base of the DMS4IC (Trad, Kalpić, 2017a, 2017d;The Open Group, 2011a, 2011b). The TRADf’s interfaces the DMS4IC that uses an empirical problem-solving algorithm that is used in the case when an optimization algorithm approach is impractical or when the problem is too complex and multi-dimensional.

### The Decision-Making System’s Critical Success Factors

Based on the LRP and evaluation processes, the most important DMS4IC’s CSFs that are used are evaluated to the following:

**Table 6:** The critical success factors that have an average of 7.4.

| Critical Success Factors          | AHMM4T enhances: KPIs | Weightings                |
|-----------------------------------|-----------------------|---------------------------|
| CSF_DMS_ComplexSystemsIntegration | VeryComplex           | From 1 to 10. 06 Selected |
| CSF_DMS_HPMS_Interfacing          | Supported             | From 1 to 10. 09 Selected |
| CSF_DMS_KMS_Interfacing           | ComplexIntegration    | From 1 to 10. 07 Selected |
| CSF_DMS_DMP                       | IntgeratesAsKernel    | From 1 to 10. 10 Selected |
| CSF_DMS_HolisticApproach          | VeryComplex           | From 1 to 10. 06 Selected |

valuation

As shown in Table 6, the results show that it is not possible to implement (lower than 8.5, is discarded). The next CSA to be analyzed, which is the integration of the PoC. The DMS4IC’ integration result proves that it is fairly difficult but possible to implement a Concept.

## **9. The Hoslistic IC Design Concept**

### **Historical Facts on Beirut**

Beirut’s original Semite Phoenician (SP) name was Byrut which in Aramean, means a well (Fisk, 2011), a probably 10,000 years old CS. The Grand Liban (French for Great Lebanon) was an artificial mixture of 22 minorities. Until 1975 it had an outstanding economy. In spite of time and consequent MEA’s geopolitical dramas, the Lebanon has preserved its mixed Westernized SP heritage and has even been capable of enclosing other cultures like the Europeans, Arabs, Arameans, Assyrians, Armenians, Persians and Kurds to make it a unique and a complex culture that in the ’70s became the cosmopolitan Byrut’s Style de Vie. Its exposed cultural and ethnical mixture made Byrut a very attractive CS and a leading financial hub. Byrut’s financial predisposition attracted many institutions and personalities to create and promote their businesses. To conduct an Concept for the extremely complex CS of Byrut, that is a part of the predominantly Christian Mont-Lebanon region; there would be a need for an evolutionary process to become a dynamic smart and multi-cultural CS. Such a process must be a long-term one that includes an urbanized strategic planning subprocess that has to be thoroughly prepared. The target Concept must deliver a war prone strategy. Actually, and probably because of the geopolitical situation related risks such a concept cannot be implemented easily; but King Abiff Hiram’s SP descendants are known to be masons (Trad, & Kalpić, 2018).

### **Hiram the SP King of Tyre and Masons-The Origin of Organized Masonic Massive Constructions**

The SP Byrut is one of the most ancient cities in the world. The first historical reference to Byrut was found in the ancient Egyptian Tell el Amarna’s works dating from the 15<sup>th</sup> century Before Christ Era (BCE). In 2015, Byrut CS was officially confirmed as a new wonder CS. The SP nature and affinity for commerce, hedonism and vast organized masonic construction that started with King Abiff Hiram, the SP King of Tyre, remain the main quality of the modern Lebanese, one of such is Minister President, the late Rafic Hariri, who bewildered many by his ability to rebuild the seriously damaged capital CS of Byrut and other parts of the Lebanon in record time that made Byrut again a regional hub and enabled it to regain its position in the global and Mediterranean spheres

(Trad, 2018b; Zalloua, 2004)

### **Byrut’s Architecture and Samir Kassir**

Byrut stands at the crossroads of European and Mediterranean civilizations, for more than seven thousand years that is described in the works of Samir Kassir who delivered a reference book on Byrut, just before his assassination in 2005, by the Syrian killing squads. The squads that eliminated most of the Lebanese elite. Byrut, Kassir’s book, is a tour de force that presents this CS from its very ancient to modern times. Covering the influences of French/Latin/Crusade, Seleucid, Arab, Ottoman and European incarnations. Kassir vividly presents the spectacular growth of the cosmopolitan capital, in the nineteenth and twentieth centuries and its orchestrated destruction in 1975 by the Syrians; with the aim to improve Switzerland’s financial situation (Trad, 2018b; Trad, & Kalpić, 2018b; Kassir, 2010).

## **From the Switzerland of the Middle-East to the Orient of Nowhere**

Byrut’s cosmopolite features with a unique ethnically diverse financial system where privileged by the constitution as a predominant liberal banking system that was designed by Michel Sursock. The idea of a financial Franco Lebanese entity melted down in front of a ruthless ethno-religious war; financed by the suspicious bankers and safe heavens. During the civil war from 1975 to 1991, directed anarchy reigned in Byrut. The CS was ruled by militias who destroyed its banks, CS centre and it suffered significant damage. The human casualties were enormous and the effect on the economy apocalyptic (Trad, & Kalpić, 2018).

### **An Innovation Jump-Starter**

The 1991 Gulf War aligns Syria and the US, to invade Iraq; the Syrians gained the right to dismantle Lebanon and brought to power the late Rafic Hariri, a billionaire and masonic tycoon, who became a Prime Minister and who promised that Byrut will become a smart CS (New Internationalist, 1994). In fact it did, but his giant efforts were crushed with his assassination in 2005 by the Syrian killing squads.

### **Post 1975 War Period**

#### A Smart CS

In order for Byrut to become a smart CS, there is a vision to use technology to manage its assets that include, universities, schools, libraries, ports, transportation systems, hospitals, water/power plants, waste management, governance/law enforcement, and other services. Such Concept must insure collecting data from the sensors and providing endpoints with services. Sensors are used to measure the readings for various kinds of data, then this data are analysed and displayed; like in the case of smart parking, which enables to find an empty parking location and to advise on traffic congestion. Such an infrastructure must be scalable and energy aware (El-Khoury, & Mohanna, 2016).

#### Locked-in

Byrut should avoid a political and technological locked-in situation but unfortunately its history and situation are the worst form of the locked-in.

#### Size of cities

Byrut because of its size and predisposition and visceral problem has to probably unbundle the Concept in separate sub projects to manage smaller entities.

#### Special Topics

Because of its very specific conflictual nature Byrut has to pay special attention to:

- Its specific diverse and cosmopolitan affinities.
- Integrate moderate robotization and automation.
- Domotics for smart buildings is very promising.
- Animal space and care is inexistent, and a lot of cultural work is to be done.
- Gas and oil fields have been discovered and would probably bring wealth; and many problems like pollution.
- Human behavior is one of the most difficult things to be transformed.
- Transport and free objects (like bikes, cars) is inexistent or in a catastrophic status.
- Green space and sports, in these fields a lot has to be done, it is still in its early difficult stages.
- Internet and Wi-Fi that can be transformed, because it is based on private initiatives.
- Waste management, in a terrible state and is causing major problems.

- Pollution is a partial problem, because the CS lies on the sea side and protected by very high mountains which divert the streams of toxic air.
- People with special needs, like elderly and handicapped need support. It is all on private and expensive basis.
- Social and medical services are all expensive and on private basis.
- Unifying information, using RSS feeds, exists in limited private use.
- Fast and hyper food chaos, causing many types of problems is not managed.
- Lebanon has an ultra-liberal economy model that counters Concept as its main goals has uncommercial attitude and objectives.

## The Byrut Blast

The solidarity and Byrut blast:

- Many Popes, leaders, Kings and Presidents intervened strongly to support the minorities in Lebanon. The last tragic mega blast of the port of Beirut, on the 4th of August 2020, destroyed the eastern Christian suburbs of Beirut.
- The French President Emmanuel Macron was the first foreign world leader to urgently visit Lebanon after the Directed Mega-Blast (DMB) that rocked Beirut. Which shows the special Franco-Lebanese historical relationship.
- The August 4th DMB shook Beirut, killing many people and injuring 1000s, leaving 100,000s without shelter. It destroyed the Christian sector of shoreline around the SP’s historical port and caused major damage throughout the CS. A two-week state of emergency was declared. The cause of the explosion is linked to stocks of ammonium nitrate in a warehouse at the port used by pro Syrian and Iranian militias.

France immediately offered solidarity with Lebanon, and President Macron paid a visit to the country, offering aid and resources. Where he stated: I express my fraternal solidarity with the Lebanese people after the explosion that led to so many victims and to so much damage tonight in Beirut... France stands by Lebanon's side. Always. French aid and resources are on their way to Lebanon... He also the historical term Lebanon is France and France is Lebanon.

## The Holistic Intelligent City Design Concept Critical Success Factors

Based on the LRP and evaluation processes, the most important Concept’s CSFs that are used are evaluated to the following:

**Table 7:** The critical success factors that have an average of 7.9.

| Critical Success Factors      | AHMM4T enhances: KPIs      | Weightings                |
|-------------------------------|----------------------------|---------------------------|
| CSF_HICDC_SystemsIntegration  | VirtuallyImpossible        | From 1 to 10. 09 Selected |
| CSF_HICDC_Architecture_Skills | HistoryCapacitiesPromising | From 1 to 10. 10 Selected |
| CSF_HICDC_Leaders             | ManagementEnabled          | From 1 to 10. 09 Selected |
| CSF_HICDC_DMP_Capacities      | HumanlyCapable             | From 1 to 10. 08 Selected |
| CSF_HICDC_HolisticApproach    | Supported                  | From 1 to 10. 08 Selected |
| CSF_HICDC_TKM&F_Support       | Complex                    | From 1 to 10. 05 Selected |
| CSF_HICDC_RoleOfExperience    | Rach                       | From 1 to 10. 09 Selected |
| CSF_HICDC_Skills              | Existing                   | From 1 to 10. 09 Selected |
| CSF_HICDC_ExistingStatus      | Poor                       | From 1 to 10. 02 Selected |
| CSF_HICDC_Demotics            | Supported                  | From 1 to 10. 09 Selected |
| CSF_HICDC_Geopolitics         | Conflictual                | From 1 to 10. 09 Selected |

valuation

As shown in Table 7, the result shows that it is virtually impossible a Concept but this means that there can be a rescoping of the RQ and focusing on the Manager capabilities. This article’s deduction that selects and evaluates the CSFs, is based on the six tables that this RDP4IC has generated, and the following phase is the PoC for Concept’s implementation.

### 10. The Integration of the Prototype

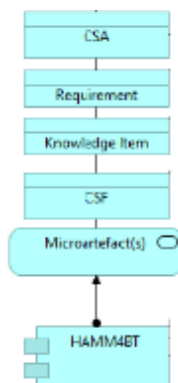
The ACS is a concrete case of the reconstruction of Byrut by R. Hariri where the demo application uses the TRADf for the PoC implementation (Trad, 2018a, 2018b).

### The Architecture Method’s Phases’ Setup and IC Factors

The Concept’s implementation phases’ setup looks as follows: 1) phase A or the Architecture Vision phase, establishes a roadmap; and 2) Phase B or the Business Architecture phase shows how the Project’s targets roadmap realizes the key requirements.

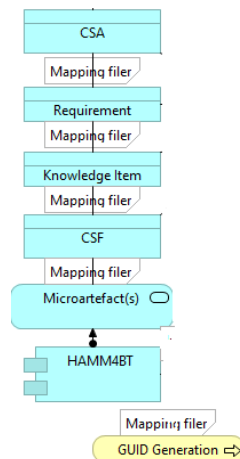
### The Proof of Concept

The articles’ PoC is implemented using TRADf was also developed exclusively by the author, who owns the total copyrights. The PoC presents the Concept mechanics that interface the DMS4IC, which uses the internal initial Concept set of CSFs’ as an example for this article, is presented and evaluated in Tables 1 to 7. The services based microartefacts have bindings/mappings to specific Projects resources like CSFs, as shown in Fig. 25.



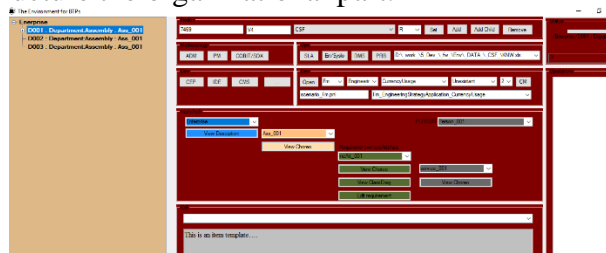
**Figure 25:** The TRADf services based microartefacts concept.

The used microartefacts are designed using EA methodologies and related tools. The Concept defines relationships between the Projects requirements and (e)Services based microartefacts (and CSAs/CSFs), using global unique identifiers, as shown in Fig. 26 (Beauvoir, & Sarrodie, 2018).



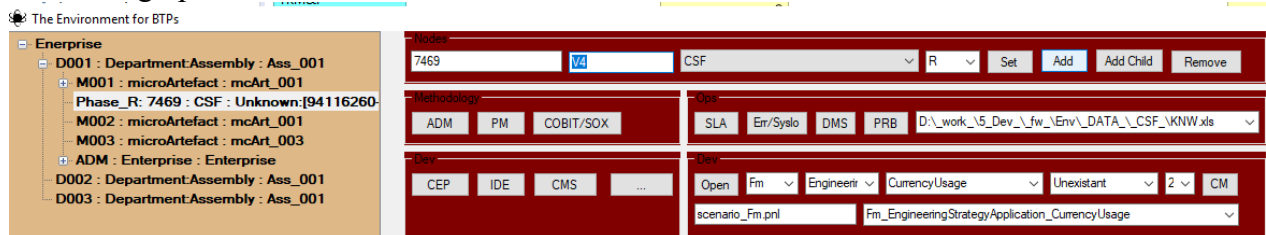
**Figure 26:** The TRADf’s global unique identifiers interaction (GUID).

The PoC is achieved by using the TRADf client’s interface that is shown in Fig. 27; where the starting activity is to structure the organizational part.



**Figure 27:** The TRADf’s client interaction.

Once the development setup interface is activated, the NLE interface can be launched to implement the needed microartefact scripts to process the defined six CSAs. After starting the TRADf’s graphical interface, the sets of CSFs are selected.



**Figure 28:** The TRADf’s factor setup interface From the TRADf client’s interface.

Then follows the CSF attachment to a specific node of the TRADf’s graphical tree, as shown in Fig. 28; to link later the microartefacts. The NLE development setup and editing interface can be launched to develop the intelligent CS services to be used in microartefacts. These scripts make up the intelligence basis and the AHMM4IC’s instance set of actions that are processed in the background to support intelligent CS services to be used in microartefacts. The AHMM4IC uses intelligent CS services that are called by the DMS4IC actions, which manage the edited mathematical language script and flow. This research’s Concept instance, the AHMM4IC and its related CSFs were selected as demonstrated previously. Once the microartefact is ready, the CSF and NLE files are configured; in this article six tables and the result of processing of the first initial phase, as illustrated in Table 8, show clearly that the Concept can be used in Projects. Concept is not an independent component and is bonded to all the Project’s overall architecture, hence there is a need for a holistic approach.

**Table 8:** The holistic factor management system research’s outcome is 7,27.

| CSA Category of CSFs/KPIs                           | Influences transformation management | Average Result       |
|---|--------------------------------------|----------------------|
| The Applied Case Study Integration                  | VeryComplex                          | From 1 to 10<br>5.75 |
| The Usage of the Architecture Development Method    | IntegrationPossible                  | From 1 to 10<br>7.80 |
| The Information and Communication Technology System | TransformableWithDifficulties        | From 1 to 10<br>7.20 |
| The Mathematical Model’s Integration                | VeryComplex                          | From 1 to 10<br>6.14 |
| The Decision Making System                          | TransformableWithDifficulties        | From 1 to 10<br>7.40 |
| The Holistic Knowledge Making System                | IntegrationPossible                  | From 1 to 10<br>8.67 |
| The Holistic IC Design Concept                      | IntegrationPossible                  | From 1 to 10<br>7.90 |

Evaluate First Phase

The TRADf and hence the AHMM4IC’s main constraint to implement the Concept is that CSAs for simple Projects components, having an average result below 8.5 will be ignored; these values are defined by the Project’s team. In the case of the current CSF evaluation, an average



result below 7.5 will be ignored. As shown in Table 8, the overall average is 7,27, this fact keeps the CSAs (marked in green) that helps to make this work’s conclusion; and drops the ones in red. It means that the Concept integration is not mature and cannot be used in all types of projects. Of course, the complexity in integrating the Concept in Projects must be solved in multiple transformation sub-projects, where the first one should try to transform the basic intelligent CS services repository.

## 11. Conclusion

This RDP4IC is based on the TRADf unique mixed research model; where CSFs and CSAs are offered to help Projects managers and urban architects to minimize the chances of failure when implementing an Concept. This article is part of a series of research works related to AHMM4IC, Projects, DMS4IC and KMS4IC. This article is based on mixed research model; where CSAs/CSFs are offered to help Projects evaluate each Projects phase. In this article, the focus is on the Concept that defines a central factor pool to be used throughout the Projects. The most important managerial recommendation that was generated by the previous research phases was that the Manager must be a strong leader. The PoC was based on the CSAs/CSFs links to a specific Projects resources and the reasoning model evaluated the selected CSFs. The deduced result implies that an attempt of Concept based transformation is very complex and needs a strong leader like Rafic Hariri. The managerial recommendations are offered to help Managers decrease the high failure rates. The already published research and development publications have produced the following outcomes:

- Knowledge gap, the research has proved the existence of a multi-dimensional knowledge gap that exists between the complexity and the needed skills for Projects’ management.
- The Byrut rebuilding experience showed the need for very capable managers.
- The PoC proved the research’s method and delivered the recommendations on how to manage Managers.
- The TRADf supports the Manager by using the Concept pattern and delivers a set of managerial recommendations for Projects.

## Recommendations

The managerial recommendations are needed for finding the solutions to enable the holistic management of intelligent CS. Because of the low score, Table 8 shows that the Concept implementation is a very risky transformation process and that today the TRADf can be used for Projects. The resultant technical and managerial recommendations are:

- A Concept must be established and tried to check its feasibility.
- The EA and ADM’s integration in a Concept enables the automation of its interfaces and facilitates IC or city planning (Gartner Research, 2002).
- The Projects must be separated in multiple transformation sub-projects.
- Unbundle the CS’s services to deliver the needed Concept’ services classification.
- The Manager must be a strong leader.
- Setup the weighting and rating rules.
- Setup the mapping concept.
- Setup a central Concept to be used in Projects.
- Select the Concept’ CSFs, KPIs and CSAs.
- An Manager must be an agile project manager.
- Use of intelligent CS process models is suggested.
- The Manager must have cross-functional skills and a strong leadership, like the case of Hariri.

- Define the interface to the KMS4IC and DMS4IC. The Concept needs to implement a DMS4IC.
- Model the Concept’ and microartefacts interaction.

Concept managerial recommendations, and the TRADf, round up the approach needed for the complex concept.

### **Future Research Works**

This research topic appears to be undiscovered and very complex, because many intangible values are ignored, like schooling. The probable reason for such a de facto situation is the classical approach that is based on too much scoping of the research question and simplifying the research method to the level of marketing-like quantitative descriptive statistics taught in many business schools; which undermines the possibility of solving more complex problems and development of sophisticated decision systems. The future research and development process will continue to tune the TRADf and will work more specifically on the IC security.

### **Acknowledgement**

In a work as large as this research project, technical, typographical, grammatical, or other kinds of errors are bound to be present. Ultimately, all mistakes are the author’s responsibility. Nevertheless, the author encourages feedback from readers identifying errors in addition to comments on the Concept and the TRADf in general. It was our great pleasure to prepare this article and its experiment. Now our greater hopes are for readers to receive some small measure of that pleasure and support for his project.

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# Enterprise Transformation Projects-Cloud Based Concept for Business Process Management (CBC4BPM)

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## Abstract

This chapter presents the fundamentals of the Cloud Transformation Concept (CTC) and this concept is a basic component of the author’s transformation framework and in complex business transformation projects. The implementation of the CBC4BPM is supported the author’s Applied Holistic Mathematical Model (AHMM) for CTC (AHMM4CTC) and his various research works on Business Process Management (BPM), Artificial Intelligence (AI), AI Services (AIS), Compute Services (CS), Mathematical Models, cross-functional transformations projects. The AHMM4CTC is based on cross-functional research on an authentic and proprietary mixed research method that is supported by his own version of an AI learning models, search tree, which is combined with an internal heuristic’s algorithm. The focus is on CBC4BPM’s requirements, BPM services, data management, and corresponding transformation strategy. The proposed AHMM4CTC based CBC4BPM is a business process’ environment which uses a real-life case of business transformation project, which needs a scalable Cloud Platform (CP) infrastructure that is supported by the alignment of various existing CP services, standards, enterprise architecture paradigm, and development strategies. The Google CP (GCP) was chosen as a sample CP, but there is need to define a standardized architecture methodology, and CP procedures so that the organization build its own private Cloud for BPMs and avoid being locked in; and above all gain in its business efficiencies.

**Keywords:** Cloud, Compute Systems, BPM, Enterprise architecture, Artificial Intelligence, Mathematical Models, Development Cycles, Requirements, Web Services, Strategic and Critical Business Systems, Requirements Engineering, Business transformation projects, Organizational Intelligence, CSFs/areas, Performance Indicators, Software (re)engineering and Strategic Vision

## 1. Introduction

### The Basics

The CBC4BPM is based on research resources related to CP BPM, CP AI, CP CSs, and CP security, to offer a set of recommendations, which can be applied to enable CBC4BPM based transformations. The CBC4BPM strategy is a generic CP driven approach that uses Enterprise Architecture (EA) and the BPM based projects. The GCP includes various BPM resources that offer different levels of development, controls, features, and Information and Communication Systems (ICS) management and design support. BPM resources needs different levels of provisioning, that depend on the used BPM services. CBC4BPM main topics include: 1) Use of BPMs in preemptible and standard CSs like Virtual Machines (VM), Compute Engines (CE), App Engine, (AE) Standard (AES), AE Flexible (AEF), Kubernetes Engine (KE)/clusters, Use Cases (UC); 2) The interaction with Cloud Functions (CF); 3) The use of BPMs with Infrastructure-as-Code (IaC); and 4) The use with services architecture. CBC4BPM can use existing products like Google’s Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) concepts and its core functionalities. CFs are a serverless compute services for event processing, and it is designed to execute code in response to BPM and other types of events. Other CBC4BPM aspects when designing the workflows, are managing state in distributed systems’ interactions, data flows, and monitoring and alerting (Sullivan, 2020); which would support business availability

This chapter’s background combines: CBC4BPM, AI, Machine Learning (ML), CP security, Development and Operations for CTC (DevOps4CTC) strategy, Knowledge Management

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System for CTC (KMS4CTC), EA, heuristics/mathematical models, ICS management, and business transformation technics. The CBC4BPM is a generic and cross-business that interacts with a learning process which manages sets of Critical Success Factors (CSF) that can be used by an enterprise or organizational transformation projects (or simply the *Project*). This chapter’s experiment uses an insurance case (Jonkers, Band & Quartel, 2012a) and is based on many years of Research and Development Project adapted for CTC (RDP4CTC). The CBC4BPM is business driven and is agnostic to any Applied Problem Domain (APD) and is founded on the author’s genuine research framework that in turn is based on many existing industry standards, like the Architecture Development Method for CTC (ADM4CTC) (The Open Group, 2011a, 2011b). The Business Transformation Manager, CP architect or enterprise architect (or simply the *Manager*) can integrate BPM technologies in the *Entity’s* EA’s roadmap, where CBC4BPM’ must deliver the path for integrating BPMs with the ADM4CTC, in all *Project’s* activities. The RDP4CTC is based on Literature Review Process for CTC (LRP4CTC), a Qualitative Analysis for CTC (QLA4CTC) methodology and on a Proof of Concept (PoC), used to solve the Research Question (RQ), in which the management of processes has a crucial and his decisions are aided by using the Decision Making System (DMS for CTC (DMS4CTC) (Agiievich, 2014). Many CSFs influence CBC4BPM’s integration, like: 1) BPMs’ interface mechanisms; 2) Managing *Project* risks; 3) *Entity* resources mapping to CBC4BPM requirements; 4) BP and BPM skills; 5) CP security, infrastructure and requirements technological support; 6) BPMs’ test capacities; and 7) Monitoring and control subsystem. A CP is optimal for the CBC4BPM because the synchronizing of processes, tasks, actions, and resources can be a major issue; and that is the main focus.

## The Focus

CP based EA methods, such as The Open Group’s Architecture Framework’s (TOGAF) and its ADM4CTC, which support is needed for the CBC4BPM. Actual CP technics for *Project* focus on isolated BPM tools, services, processes, and CSs of the *Entity*. Minimal modelling technics is need for the CBC4BPM which used standard BPM and security frameworks to align with other CPs, ADM4CTC, and atomic Building Blocks (aBB). This chapter also illustrates how *Projects* can benefit from using the CTC and proposes an adequate RDP4CTC.

## 2. The RDP4CTC

The TDP4CTC RQ is: “Which CP characteristics and support is needed for in the implementation of an *Entity* CBC4BPM?”. Where the kernel of this research is based on the Heuristics Decision Tree (HDT), ML and CSFs (and areas). A Critical Success Area (CSA) is a category (or set) of CSFs where in turn a CSF is a set of Key Performance Indicators (KPI), where a KPI maps (or corresponds) to a single BPM requirement. For a given BPM requirement or problem, the *Project* identifies sets of CSAs, CSFs and KPIs, for the DMS4CTC and map them to CP’s artefacts. Hence the CSFs are important for the mapping between BPM requirements, resources, and DMS4CTC (Peterson, 2011). Therefore, CSFs reflect CSAs that must meet the *Project’s* goals and constraints. Measurements technics, which are provided by the Transformation, Research, Architecture, Development framework (*TRADf*), are used to evaluate performance in each CSA, where CSFs can be internal or externa. Once the initial sets of CSFs and CSAs have been identified, then the *Project* can use the DMS4CTC to deliver solutions for CBC4BPM problems. The CSF-based RDP4CTC uses the AI/ML/HDT based DMS4CTC, where in RDP4CTC’s phase 1 (represented in automated tables), which form the empirical part of the RDP4CTC, checks the following CSAs: 1) RDP4CTC, synthesized in Table 1; 2) ICS, synthesized in Table 2; 3) ADM4CTC, synthesized in Table 3; 4) The DMS and KMS, synthesized in Table 4; 5) The APD; which is in this research chapter the CBC4BPM,



synthesized in Table 5; and 6) This chapter’s outcome Table 6. The CBC4BPM delivers recommendations on how to align *Project’s* CP resources by using *TRADf*.

### The Framework-TRADf

The CBC4BPM alignment strategies manage the *Entity’s* CP BPMs, resources and Microartefacts’ which used various types of technologies. *TRADf*, supports various types of technologies. The CBC4BPM is complex and is a risky approach, because: 1) Complex CP BPMs and resources management; 2) Granularity level; 3) Processes and tasks synchronization; 4) Mapping mechanisms; and 5) Implementation of existing process components. A system approach for CBC4BPM based *Projects* (Daellenbach, & McNickle, 2005), and as mentioned, the focus is on the BPM. CBC4BPM is generic and can be applied to any standard or private CP. This chapter is a part of many years research cluster that has produced a large set of articles and *TRADf*; and parts of previous works are reused for the better understanding of this complex iterative research. If all facts are only referenced, it would have been tedious to understand this RDP4CTC which is based on an Empirical Engineering Research Model (EERM) (The Open Group, 2011a).

### Empirical Engineering Research Model

The EERM is optimal for engineering projects and it uses an authentic mixed method that is a natural complement to Quantitative Analysis for CTC (QNA4CTC) and QLA4CTC research methods, to deliver empirical concepts as a possible holistic approach for mixed methods; in fact, both methods are compatible and the difference is the scope and depth of the research process. EERM’s validity checks if the RDP4CTC is acceptable as a contribution to existing scientific (and engineering) knowledge. The author wants to convince the valuable reader(s) the proposed recommendations and the related PoC, are valid and applicable. In engineering, a PoC is a design and software prototype of a testable RQ where one or more CSFs (or independent variables, in theoretical research) are processed to evaluate their influence on the EERM’s dependent variables. The PoC permits to evaluate with precision the CSFs and if they are related, whether the cause–effect relationship exists between these CSFs and CSAs. The CBC4BPM uses EA and ICS standards (The Open Group, 2011a).

### RDP4CTC’s CSFs

Based on the LRP4CTC, the most important CSFs are presented in Table 1.

| Critical Success Factors        | KPIs     | Weightings                       |
|---------------------------------|----------|----------------------------------|
| CSF_RDP4CTC_Standards           | Feasible | From 1 to 10. <b>09 Selected</b> |
| CSF_RDP4CTC_CSF_CSA_Integration | Proven   | From 1 to 10. <b>10 Selected</b> |
| CSF_RDP4CTC_Complexity          | High     | From 1 to 10. <b>08 Selected</b> |
| CSF_RDP4CTC_EERM                | Proven   | From 1 to 10. <b>10 Selected</b> |
| CSF_RDP4CTC_TRADf               | Possible | From 1 to 10. <b>09 Selected</b> |
| CSF_RDP4CTC_LRP4CTC             | Feasible | From 1 to 10. <b>09 Selected</b> |

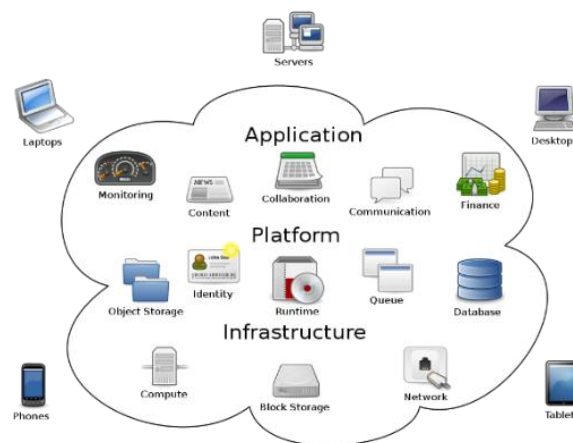
**Table 1:** CSFs that have the average of rounded 9.2.

### 3. ICS’ Role

#### ICS related Cloud Basics

ICS’ evolution has enabled CBC4BPM to support distributed systems, where the integration of various types of BPMs in CSs is an important CSF for the *Entity’s* business robustness, and sustainability. Therefore, the business stability of an *Entity*, depends on the CBC4BPM, that

includes a framework to manage distributed BPMs, which are used to improve the *Entity*'s Time To Market (TTM) related activities. The CBC4BPM can be used in all phases of a *Project* and is based on existing competitive CP concepts, BPM best practices, agility, and aBB based services architecture. The CBC4BPM supports *Projects*, by applying the CP, to synchronize all its activities. The main problem for *Projects* is to unbundle its legacy ICS and use an BPM based CP. CP is the on-demand availability for transformed ICS and its BPMs/resources, like CP subsystem, and CSs' capacities, which can be interfaced by actors. *Entity* wide CPs have business/technical operations and functions distributed over various locations (data centers). CP is based on sharing of resources to support business coherence and uses the *pay-as-you-go* business model; such a model reduces capital expenses but can also generate unexpected operating expenses, when wrongly used. As shown in Figure 1, CP includes a group of networked components providing services, which do not need to be individually located. The CBC4BPM provides an entire managed suite of ICS platform components, which can be designed internally to support complex BPM operations (Wikipedia, 2022a).



**Figure 1:** The CP (Wikipedia, 2022a).

*Entity*'s Private CP (PCP), enables the processing of its BPM activities, which include a large set of applications and resources. The *Entity*'s set of applications and resources are managed by the PCP, where BPM based applications are used to serve end clients. The DMS4CTC is the base of the and CBC4BPM to support the *Entity*'s business capabilities to operate in many PCP/ICS, financial and business fields, like, business data management, security management, business services, policy making, regulatory and governance activities. The CBC4BPM uses central domains, like EA, CP, and business services' coordination. This RDP4CTC will offer a set of recommendation to support the *Entity*'s CP evolution (Trad, 2022a).

## CP and CTC's Evolution



**Figure 2:** Magic Quadrant for the CTC (Bala, Gill, Smith, & Wright, & Ji, 2021).

*Entities* have accelerated their use of CP providers, to become agile and the main differences between CP providers needs strategic *Project's* BPM capacities. Where in the case of public CP's IaaS can offer services (Bala, Gill, Smith, & Wright, & Ji, 2021) The CBC4BPM supports BPM usage in the context of a CP. There are many BPM solutions for CPs, whereas most BPM platforms are not optimally designed for the CP; and most used are *Appian, Pegasystems, and ProcessMaker*. CPs need to integrate BPMs that bring the *Entity* many tangible benefits, like: 1) Speed in development and design of BPM scenarios; 2) Provides reliable and available BPM environments; 3) Availability by using servers; and 4) *Pay-as-you-go* pricing concept, makes *Entities* pay for the resources they consumed. By selecting a BPM platform with an optimal cloud support and *Project* architects (McClintock, 2020) 1) *Scalability and minimal maintenance*; 2) *Business automation for accessibility*; 3) *Agility and connectivity*, to enable BPM platforms; and 4) *CP Security*. CTC's structure must contain the following (Gupta, 2019): 1) Basic BPM elements to support evolution; 2) Compatible with main CP providers, like Microsoft Azure, GCP...; 3) PCPs are accessible only to *Entity's* employees; and Public CPs provide BPM services to external clients; 4) Benefits improvements; 4) Handles massive BPM processing; 5) On demand strategies; and 6) The use of combined BPM and ICS models: which combine PaaS, SaaS, IaaS, Services-based Application Programming Interface (API)... To support *Project's* readiness and hence business sustainability\$.

### Business Transformation Readiness

The CBC4BPM supports all *Project* BPM/tasks, including the tools usage, processes, and CP management. Important advances in CPs' processes, discipline, skills, and methodologies to enhance Enterprise Capacity to Execute, which is the *Entity's* ability to perform all the BPM/tasks including decision making within time constraints. There exist non-ICS-specific processes, discipline, and skills to deal with this type of endeavor. The CBC4BPM can deal with *Project's* management issues (The Open Group, 2011a). Managing CP's infrastructure implies that the modeling the CP that is based on: Resources sharing, High business availability, and Load-balancing. CP's security is important, and the *Project* defines how to design and

implement security concepts and standards. Today there are many standards and they are applicable and help in the unbundling of legacy ICSs. An important CSF for *Projects* is to use aBBs based CBC4BPM strategy (The Open Group, 2011a); where such aBBs based CBC4BPM must respect standards. *Entity’s* activities are achieved by combining various synchronized CSs to promote Business Process Automation (BPA). There are no precise recommendations of such an aBB based CBC4BPM strategy, but there are some technics related to organizational BPM, services, and CP controls.

### aBB based BPMs in CP’s Context

BPM based CP supports the interaction of *Project* aBBs and resources, in a synchronized manner, by using the ADM4CTC to assist CBC4BPM activities (The Open Group, 2011a). The CBC4BPM includes mapping mechanisms that use HDT based scenarios to support CP’s integration and to avoid problems. The CBC4BPM supports a *Project* by offering aBB based BPMs mappings to handle various types of services. The author recommends using aBBs mapping construct, where the major set of aBBs and BPMs are developed in portable libraries. Managing of complex *Projects*, like the CBC4BPM based ones, demand in-depth knowledge of aBB based BPMs in the context of a CP. Where technical and organizational skills to design a robust BPM solution that automate all the *Entity’s* business and other activities. The CBC4BPM defines in the initial *Project’s* phases the main concepts that are exposed to all *Project’s* teams (Trad, & Kalpić, 2017).

### ICS’s CSFs

Based on the LRP4CTC, the most important CSFs are presented in Table 2.

| Critical Success Factors    | HMM enhances: KPIs | Weightings                       |
|-----------------------------|--------------------|----------------------------------|
| CSF_ICS_CP_Basics           | Proven             | From 1 to 10. <b>10 Selected</b> |
| CSF_ICS_Standards           | Proven             | From 1 to 10. <b>10 Selected</b> |
| CSF_ICS_aBBs                | Complex            | From 1 to 10. <b>08 Selected</b> |
| CSF_ICS_CTC_Evolution       | Complex            | From 1 to 10. <b>08 Selected</b> |
| CSF_ICS_BTR                 | Possible           | From 1 to 10. <b>09 Selected</b> |
| CSF_ICS_Development_Agility | Complex            | From 1 to 10. <b>08 Selected</b> |
| CSF_ICS_Security            | Complex            | From 1 to 10. <b>08 Selected</b> |
| CSF_ICS_ADM4CTC_Automation  | Proven             | From 1 to 10. <b>10 Selected</b> |

**Table 2:** CSFs that have the rounded average of 8.90.

#### 4. EA and CBC4BPM’s Integration The CTC and Architecture Standards

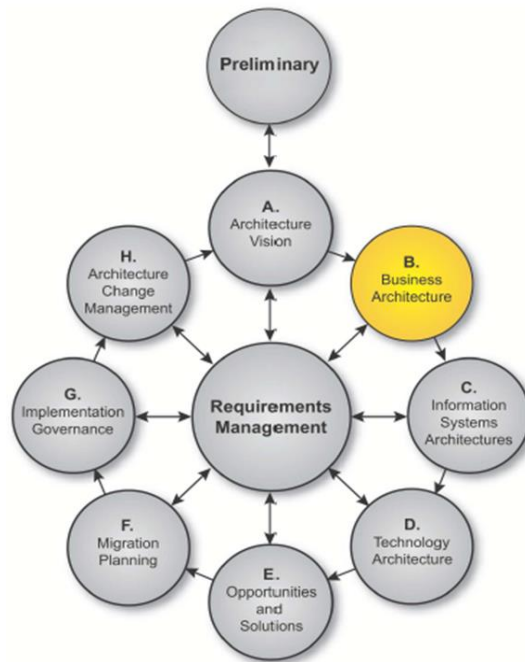


Figure 3: TOGAF’s main phases (The Open Group, 2011a).

Legacy architecture layers represent a silo model where it is very hard to melt them down into a CP; in fact it is a set of business (like BPM) and technology silo components. Moving to a standardized CP is the first step to a basic CBC4BPM. Using CBC4BPM, the *Project* can transform the ICS platform into a dynamic BPM based CP (The Open Group, 2011a). EA supports the CBC4BPM by offering: 1) The Architecture Capability Understanding to adapt the optimal CP; 2) As shown in Figure 3, TOGAF’s integration with the CTC-BMP (The Open Group, 2011a); and 3) Tools for Business Architecture and Modeling, where the *Project* focuses on designing the CBC4BPM and delivering of PCP.

#### Designing the CTC based PCP

The CTC based PCP is designed as a set of hosted CSs and CP models by using EA and the *On Premises Hosting Model*, as shown in Figure 4, where the *Entity* is responsible for its PCP and installed BPMs (Charles, 2017).

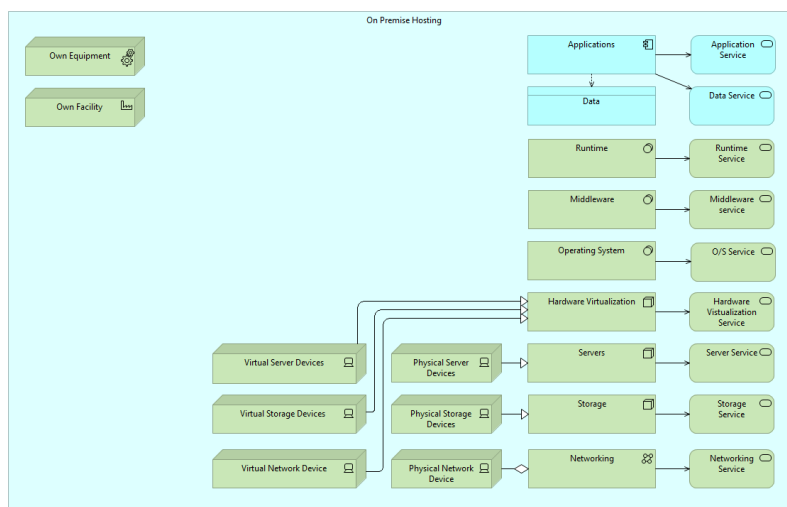


Figure 4: On Premises Hosting Model (Charles, 2017).

*The IaaS Hosting Model*, represents hosting in both *On Premise* and in the *Cloud*, where the *Entity* manages its EA based PCP and all its components like CSs and Operating System (OS); which reduces business operations costs.

### **EA based CTC and PCP**

EA based CTC (EAI4CTC) is needed to transform *Entity's* fragmented legacy of processes (both semi-manual and automated) into BPMs in the PCP that is agile and is supportive of the defined *Project* strategy. *Projects* need effective BPMs implementations is an important CSF for their successes and an to achieve competitive advantage. The CBC4BPM addresses this need, by defining a strategic PCP context for the evolution of the *Entity*. To support PCP's architectural transformation, it is essential to develop an appropriate business capability for EAI4CTC, through *Entity's* BPM capacities, structures, roles, responsibilities, and processes. EAI4CTC's maturity assessment, includes the following EAI4CTC's: 1) Governance processes, organization, roles, and responsibilities; 2) Architecture skills assessment; 3) Skills Framework for managing business, data, application, and technology activities; 4) Assess Business Transformation Readiness (BTR) to quantify the *Entity's* readiness; 5) BTR's risks and mitigation activities, by identifying risks associated with EAI4CTC's vision; 6) Confirm RBT's feasibility, to review the results from the previous iteration; 7) Integrate BPM development; and 8) Impact on the Architecture Roadmap and the Implementation, Migration Strategy, and needed skills.

### **EAI4CTC based CTC Skills**

CBC4BPM and modeling strategy, comprise: PCP based BPM implementation, UC design, BPM integration, Strategic planning, services modeling, etc... The *Project team* must understand CBC4BPM requirements and to integrate business information, team members, facilitate consensus in the implementation phase, synthesizes and translates strategic goals into actionable tasks, etc.... (*TOGAF, Skills, 2011*). EAI4CTC skills, is another perspective of skills are the *Project's* implementation, that typically comprises: Detailed BPM in system's modeling, Business building component design and Standardized ADM4CTC's integration, etc...

### **ADM4CTC's Integration**

ADM4CTC's integration with the CBC4BPM, enables the automation of the *Project's* BPMs, aBBs, Microartefacts, throughout its phases. The ADM4CTC encloses cyclic iterations, where information about all its PCP operations. The CBC4BPM is business or technology agnostic platform and its integration with the ADM4CTC offers: 1) Strategic just-in-time BPM and Microartefact's management; 2) Performance improvements; and 3) Using BPM and EA tools for modelling. The ADM4CTC offers the control and monitoring of *Project's* BPM's and Microartefacts' by using various types of tests and integration concepts like: 1) Test Driven Developments (TDD) that is an archaic manual concept where *Project* developers design the test first and then do the development. The TDD evaluate the design for a given set of PCP requirements and verifies its status; 2) The Acceptance Test Driven Development (ATDD) concept supports collaboration of *Project's* business clients, testers, and engineers (Koudelia, 2011). Based on TDD's and ATDD's concepts, PCP's requirement's behaviour can be checked; 3) For BPM automated testing, Business Process Testing (BPT) can be used for its end-to-end validation (SOFTWARETESTINGHELP, 2022); 4) The Behavior-Driven Development (BDD) concept includes TDD, integration and ATDD tests that serve as a formalism for communication between the *Project* and the end business users; where PCP's application cartography is essential.

## PCP’s Application Cartography

Using EA4CTC modelling languages like Archimate, offers the following characteristics (Hosiailuoma, 2021): 1) *Entity’s* strategic behavioural and structural elements (like BPM) modelling; 2) Manages an optimal PCP infrastructure and landscapes for BPM. PCP BPM based applications can be classified as follows (Togaf-Modeling, 2020): 1) Classifications can be done the use of EA capacities like TOGAF’s the Application Communication Diagram (ACD), to depict all used CP’s models and applications; 2) BPM and other interfaces are associated to CP resources; 3) ACDs present either an *Entity’s* application cartography of the existing configuration, or a transformed one; 3) This type of EA based CBC4BPM that is based on unbundled services; 4) Services’ based BPMs are interconnected using connectors; and 5) The EA based CBC4BPM is layered. *Project’s* building and solution blocks are used to solve CP’s implementation requirements that needs a set of EA and BPM principles to integrate the mentioned blocks, where blocks are a set of deliverables. The dimensions of applied EA are scoped to the boundaries of the *Project*. In the second edition of Gartner’s hype cycle for CBC4BPM, that describes aspirations are running high for *EA & modeling strategies* and their related applicable business transformation architecture patterns, it describes also the underlying avant-garde technologies; it concludes that business artifacts lag maturity and concrete market penetrations (Ylimäki, 2006; Schekkerman, 2004). EA based CBC4BPM supports CP’s decision and knowledge systems.

## The ADM4CTC and the CBC4BPM CSFs

| Critical Success Factors             | HMM enhances: KPIs | Weightings                       |
|--------------------------------------|--------------------|----------------------------------|
| CSF_ADM4CTC_CP_Standards_            | Feasible           | From 1 to 10. <b>09 Selected</b> |
| CSF_ADM4CTC_PCP_CTC_BPM              | Complex            | From 1 to 10. <b>08 Selected</b> |
| CSF_ADM4CTC_Skills                   | Lack               | From 1 to 10. <b>08 Selected</b> |
| CSF_ADM4CTC_Integration_Requirements | Feasible           | From 1 to 10. <b>08 Selected</b> |
| CSF_ADM4CTC_ACD                      | Possible           | From 1 to 10. <b>09 Selected</b> |

valuation

**Table 3:** CSFs that have an average of 8.40.

Based on the LRP4CTC, the most important CSFs are presented in Table 3.

## 5. Decision and Knowledge for the CTC

### CBC4BPM’s Risk Assessment

CBC4BPM’s Risk Readiness Assessment and the CTC has the following characteristics (The Open Group, 2011a): 1) It integrates TOGAF’s *Business Transformation Readiness Assessment* that supports the *Capacity to Execute* all CP’s BPM tasks; 2) Includes the *Enterprise Capacity to Execute* the tasks needed for the *Project*; 3) Its assessment process checks CBC4BPM’s readiness to implement defined requirements; 4) To assess the risks for each readiness CSF and identify improvement of BPM actions to mitigate risks; 5) Integrates *Business Transformation Risks and Mitigation Activities*; 5) Relates CSFs and *Risks Estimations* by an AI/ML process (Ylimäki, 2006).

### AI/ML Usage

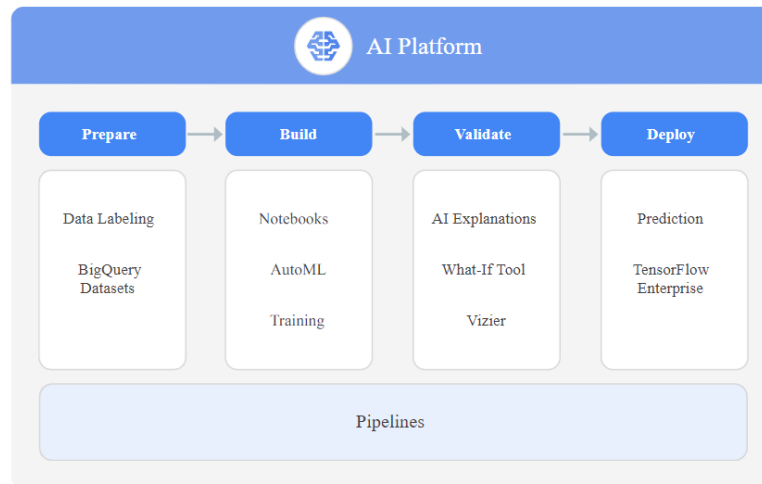
CBC4BPM can use AI Engine (CTCAIE), which is a suite of services used to integrate AI/ML models. It is a hyper-accessible AI/ML environment; where the CTCAIE is designed to support

data scientists and data engineers to streamline AI/ML workflows, and access AI modules; and is with AutoML (Google’s ML engine). CTCAIE services are designed to support BPM activities seen in a typical ML workflow, as shown in Figure 5, these services are available for AI/ML operations (Green, 2020):

- *Prepare*: Generally, data is first prepared that includes ingest, clean, feature engineer operations in *BigQuery Datasets*, which is a collection of tables in GCP hyper-scale data storage. *BigQuery* is an interface to the *Entity*’s data storage, and an AI service. But it’s the backbone of ML workflows. GCP includes a *Data Labelling Service* for labeling experimental/training data; which uses human labelers to generate highly accurate labels for a collection of data that can be used in ML models; such a process is used for the classification of images, video, audio, and text. In the of images for example, labeling options may include: 1) Classification of images information; 2) Image box bounding; 3) Image segmentation; and 4) Data labeling characteristics.
- *Build*: Concerns AutoML, the zero-code platform for ML training models, where machines train machines. Cloud AutoML enables teams with limited ML skills to train high-quality ML models with an intuitive client. It uses transfer learning and neural architecture search technology; leveraging extensive research technology to support ML models to achieve faster performance and more accurate decisions.
- *Validate*: Explainable and manageable AI environment supports *Projects* to understand model’s decisions, verify the model’s behavior, recognize bias in models, and finding manners to improve models and related training data. This eliminates random decisions, activities, and recommends models’ tuning. The *CTCAIE Vizier* has an advanced approach where it offers a black-box optimization service, to tune hyperparameters and optimize used model’s output.
- *Deploy*: When a model was trained using no-code AutoML, or an advanced *Tensorflow* model built using *CTCAIE Notebooks*, *CTCAIE* offers a set of services to support the deployment of models and generate solutions, decisions and predictions. *CTCAIE Prediction* manages the *Entity*’s infrastructure needed to process the model and to make it available for of *Project* requests.

The previous operations support ML Pipelines (MLOps), which are important for the CBC4BPM; where it is the practice of deploying robust, repeatable, and scalable ML pipelines to manage the pool of *Entity*’s models. The *CTCAIE* offers a set of services to support the *Entity*’s pipelines. The *CTCAIE Pipelines* support for creation of ML pipelines, using processors like, *Kubeflow Pipelines* or *TensorFlow Extended (TFX)*. *Project*’s continuous evaluation supports the monitoring the performance of implemented models and provides continual return on how these models are performing in various *Project*’s phases. Deep Learning (DL) VM or image supports the provisioning of cloud VMs for ML applications. Finally, DL provides preconfigured and optimized containers for CP’s (Green, 2020); and such a heterogenous needs a design strategy.





**Figure 5:** GCP’s AI capacity (Green, 2020).

CBC4BPM supports complex intelligent systems and refers to classical operational research, systems analysis and global systems modelling. Complex systems management is an approach for building and deploying BPMs and it replaces legacy distributed systems with a set of AHMM4CTC models that automate CP’s BPM and Microartefact implementation. Complex system’s management adapts to CP problems and requests by using CBC4BPM’s mapping concept and intelligent scenarios (Daellenbach, & McNickle, 2005).

### Intelligent Scenarios

CP’s BPMs and Microartefacts use AI scenarios, where a scenario is an interaction of standard services; and a CP is an alignment of resources that is based on the 1:1 concept. A CP supports a variety of business actors including browsers, and mobile applications. A CP handles aBB requests by executing business processes (Richardson, 2014) which use MicroService Architecture (MSA) that differs from legacy architectures. The use of MSA provides autonomy, composability, scalability, and fault-tolerance. MSA is a promising architecture for intelligent scenarios. A *Project* delivers organizational design artifacts and a classification concept. This classification concept is used to classify the BPMs, aBBs, intelligent scenarios, and business processes. Data models and related patterns, are agnostic to database types, but the diversity of data-sources generate major CP problems. Data services for CPs focus on the encapsulation of the data schema (Pavel, 2011).

### Using an AHMM4CTC Instance

The AHMM4CTC that is presented to the reader in a simplified form to be easily understandable on the cost of a holistic formulation of the architecture vision. The CBC4BPM uses the AHMM4CTC that is formalized as shown in Figure 6.

**Basic Mathematical Model’s (BMM) Nomenclature**

|  |  |       |
|--|--|-------|
| <i>Iteration</i>                       | = An integer variable “ <i>i</i> ” that denotes a <i>Project/ADM iteration</i> |       |
| microRequirement                       | = (maps to) KPI  | (B1)  |
| CSF                                    | = $\Sigma$ KPI   | (B2)  |
| Requirement                            | = (maps to) CSF = $\bigcup$ microRequirement                                   | (B3)  |
| CSA                                    | = $\Sigma$ CSF   | (B4)  |
| microMapping microArtefact/Req         | = microArtefact + (maps to) microRequirement                                   | (B5)  |
| microKnowledgeArtefact                 | = $\bigcup$ knowledgeItem(s)   | (B6)  |
| neuron                                 | = action->data + microKnowledgeArtefact  | (B7)  |
| microArtefact / neural network         | = $\bigcup$ neurons  | (B8)  |
| microArtefactScenario                  | = $\bigcup$ microarteifact   | (B9)  |
| AI/Decision Making                     | = $\bigcup$ microArtefactScenario  | (B10) |
| microEntity                            | = $\bigcup$ microArtefact  | (B11) |
| Entity or Enterprise                   | = $\bigcup$ microEntity  | (B12) |
| EntityIntelligence                     | = $\bigcup$ AI/Decision Making   | (B13) |
| BMM( <i>Iteration</i> ) as an instance | = EntityIntelligence( <i>Iteration</i> )                                       | (B14) |

**Figure 6:** The AHMM4CTC nomenclature.

As shown in Figure 6, the symbol  $\Sigma$  indicates the summation of all the relevant named set members, while the indices and the set cardinality have been omitted. The summation should be understood in a broader sense, more like set unions. The *Project’s* development and mapping processes are a part of the CTC which uses the DMS4CTC. The DMS4CTC, as shown in Figure 7, is based on a light version of the ADM4CTC.

**The Generic AHMM’s Formulation**

$$\text{AHMM} = \bigcup \text{ADMs} + \text{BMMs} \quad (\text{B15})$$

**AHMM’s Application and Instantiation for CTC**

$$\text{Domain} = \text{CTC} \quad (\text{B16})$$

$$\text{AHMM4}(\text{Domain}) = \bigcup \text{ADMs} + \text{BMMs}(\text{Domain}) \quad (\text{B17})$$

**Figure 7:** The AHMM4CTC for the BPM domain.

The enterprise AHMM4CTC is the combination of an EA, existing standards, and transformation methodologies. A transformation is the combination of an EA methodology like the TOGAF and the AHMM for a Domain, like BPM, that can be modelled after the following formula for the CTC based Transformational Model (CTCTM):

$$\text{CTCTM} = \text{EA} + \text{AHMM4CTC} \quad (\text{B18})$$

**DMS4CTC’s CSFs**

Based on the LRP4CTC, the most important CSFs are presented in Table 4.

| Critical Success Factors              | AHMM enhances: KPIs | Weightings                       |
|---------------------------------------|---------------------|----------------------------------|
| CSF_KMS&DMS4CTC_AHMM4CTC_Support      | Possible            | From 1 to 10. <b>09 Selected</b> |
| CSF_KMS&DMS4CTC_RiskAssessment        | Complex             | From 1 to 10. <b>08 Selected</b> |
| CSF_KMS&DMS4CTC_AI_Support            | Possible            | From 1 to 10. <b>09 Selected</b> |
| CSF_KMS&DMS4CTC_IntelligentScenarios  | Possible            | From 1 to 10. <b>09 Selected</b> |
| CSF_KMS&DMS4CTC_ComplexSystems_Design | Proven              | From 1 to 10. <b>10 Selected</b> |

valuation

**Table 4:** CSFs that have an average of 9.0.

## 6. CBC4BPM' Transformation and Integration

### Basics and Core Concepts

BPM and workflows are fully-managed orchestrations which execute services in order to achieve a BPA. These BPMs are a combination of services that include custom services hosted on the CP and which can use CFs, and resources. BPM's basic concepts are (Google, 2022c):

- BPM based applications makes service dependencies explicit and observable in their end-to-end execution.
- A BPM that specifies an application, operational, or a process provides a source-of-truth or canonical narrative for the process.
- BPMs are serverless, scalable as needed, and no charges are incurred while being in an idle state, because BPMs contain no code or library dependencies and does not need security updates. When a BPM instance is deployed the minimum need for maintenance must be ensured; and it can hold its state, retry, poll, or wait for up to a year.
- A BPM consists of a set of steps described using the BPM Notation (BPMN); and when a BPM is created, it can be deployed, which makes it ready to be instantiated and executes. BPM instances' executions are independent, and the CP's rapid scaling capacity allows for a high number of concurrent instances to execute.
- A BPM instance can execute using the client interfaces, libraries, or console/batch by using an API request. BPM implementation needs to define the needed actions/tasks and the order of their execution using the BPMN. A BPM instance must have at least one action. A switch block can be used as a selection mechanism that allows the value of a BPM expression to control its flow during the execution; and a for loop be used to iterate over a sequence of objects.
- A CP scheduler can be used to execute a BPM instance on a particular schedule; where the BPM can have runtime arguments and data is passed. As mentioned, BPM instances invoke services, parse responses, and construct inputs for other connected BPM instances or services. Where calling a service avoids the complications of extra invocations, additional dependencies, and services calling services. A service library must be ready to serve BPM instances and to avoid too complex BPMs.
- Services can used for complicated cases because they are easier to implement complex code than BPMN syntax. A BPM instance action can make a web request and assign the response from the call to a BPMN variable. A BPM instance publishes connectors that can be used to connect to other CP APIs within the BPM, and to integrate the same instance.
- BPM's standard library and built-in environment variables support *Projects* to be easily construct arguments for services and process responses; and this standard library

includes modules and frequently used functions, like data type and format conversions. Error handling make BPM instances more resilient and that can customize their behavior when a failure or problem occurs, when using BPM instances' exception handling, which includes automated Web requests call retries.

- BPM instance’s callbacks allows its execution to wait for another service to make a request to the callback endpoint; that request resumes the execution of the BPM instance. With callbacks, a BPM instance signals that a specified event has occurred, and the need to wait on that event without polling.
- Authentication and access control is used when a BPM instance needs to execute. This instance needs to authenticate and this mitigates the risk of accidental or malicious calls by using BPM instance.
- Observability supports BPM instance to automatically generate execution logs in the CP logging subsystem. Logs can be controlled and archived by the CP. The CP offers audit logging information.
- BPM design and implementation needs adequate CP tools.

### **BPM’s Design and Implementation**

When using a CP for BPM design and implementation, which improves the speed of the DevOps4CTC, that is the speed in development and design of BPMs and related services. And also, the speed in their execution, monitoring, and reliability. The CP provides a reliable and available BPM environment with a maximum uptime, redundant servers through the use of load balancing, auto-scaling capacity based on predetermined thresholds, and pricing is based on CS’ resources that was consumed. CP based BPM solution enables external collaboration with other CP experts. CP based BPM solution enable (Google, 2022d):

- Scalability and low maintenance, as the ICS evolves the business grows also, and on-premises solutions are hard to (re)scale. In most cases there is a need to purchase extra hardware to support the increased need for disc storages. On-premise installations require an internal/on-site team to monitor and manage CP’s activities, which is expensive. That is a significant investment and risk, especially for non ICS-focused *Entities*. Finally, on-premise installations require constant communication with your BPM support staff in order to manage upgrades. Unless your In-House (IH) staff has a high level of technical expertise, these projects can be highly risky. CP based BPM solutions, support multi-tenancy without extra investments or overhead, because CP’s infrastructure is located off-site. Added to that CP based BPM providers take care of maintenance for *Entities*. They are supposed to be experts in the requested CP domains and can meet downtime challenges.
- Accessible anywhere, at any time, that enable *Project* teams to work and communicate remotely. CP based BPM solutions supports actual tech work habits, by allowing *Project* users to access *Entities* ICS from virtually anywhere, and at any time. Most of CP based BPM solutions can be accessed through a Web browser on any type of device and CP BPM platforms with mobile apps can be accessed on devices like smartphones and tablets. An important advantage of using a CP based BPM application is that the solutions editor becomes responsible for managing upgrades and security patches; the *Entity* does not have to to plan and manage the installation of patches and upgrades. In CP based BPM, the accessed data is saved automatically on the CP’s remote server which is load-balanced and protected from fail-overs.
- Agility and connectivity can be used when *Entity’s* legacy on-premises CP’s based BPM platforms are traditionally dedicated to static processes that are difficult to transform; and in general they are used as black boxes and are difficult to integrate with other BPM

based applications or services. CP based BPM platforms are low-code, the *Entity* gains flexibility to transform legacy processes as business needs change, grow, and evolve. A CP offer agility and flexibility, which support the deployment of BPMs in record time. CP based BPM solutions are lighter and agile than existing legacy systems. They can connect to other BPM solutions using APIs. This important technology transformation and shift improves the *Entity's* Return On Investment (ROI) for both the *Entity* and the solutions provider.

- Security, concerning on-premises data security that can be a complex task, especially for smaller *Entities*. CP based BPM solutions have to be protected from data breaches, and the *Project's* security team is responsible for closing the exposure to sensitive ICS' information and working with risk management and legal to address potential privacy statute concerns. When CP based BPM solutions use data is in the cloud, most existing like GCP are responsible for securing *Entity's* data. CP providers have large teams of CP engineers and resources dedicated specifically to preventing security breaches. But the *Entity* must clear up important issues such as as data sovereignty and regulations like the General Data Protection Regulation (GDPR) are complicating data storage in the CP; which in most case block to usage for CP providers and request for an internal PCP. That all depends on the type of *Entity* and the level of compliance with all applicable laws and regulations.
- A CP based BPM solution can be GCP's Composer which is a fully managed workflow orchestration service built on Apache Airflow. Which can be used in hybrid and multi-cloud modes. For a successful transformation the transition to the CP needs a hybrid data environment by orchestrating BPMs that cross between on-premises PCP and the public cloud. Such a tool supports the creation of BPMs that connect to data, processing, and interface services across the CP and enable a unified data interface structure. GCP Composer is an open source product based on the Apache Airflow, which gives *Project's* engineers to be freed from lock-in and portability.
- A CP based BPM solution like the GCP Composer support easy orchestration, where pipelines are configured as Directed Acyclic Graphs (DAG), which can be apprehended by any user's profile. The automated deployment supports instant access to a complete library of connectors and multiple graphical representations of BPMs workflow in action, and integration troubleshooting sub-processes. Automatic synchronization of used DAGs ensures application run on schedule and are reliable.
- A CP based BPM solution enforces the *Project's* capacity and competence development.

### **BPM's Capacity and Competence Development**

The ADM4CTC supports the CBC4BPM by the creation of BPM's capacity building, best practices, and *Entity*-specific CP capabilities, which supports *Project* experts to avoid and evaluate CP risks. The CBC4BPM is treated as a separate domain within the CTC, which is in this chapter used to integrate BPM Microartefacts and resources. CBC4BPM is the enforcement of the *Entity's* computing policies which includes the following BPM related domains (The Open Group, 2011b): 1) BPM's interaction with services based methodology; 2) Management of viewpoints, where the CBC4BPM is a separate one; 3) To design internal non-normative CBC4BPM scenarios; 4) To design single-purpose CBC4BPM instances; 5) To develop coordinated CBC4BPM models; and 6) Defined global and BPM security aspects.

### **Business CP's Advantages and Models**

*Entities* need business CPs, which are complex, because of their technological heterogeneous structure. The CBC4BPM has five main characteristics: On-demand internal self-service, *Entity* wide network access, resources planning & pooling, rapid elasticity, and optimized services.

CBC4BPM has main backbone services models: IaaS, PaaS, and SaaS; and has four deployment models: PCP, public CP, community CP, and hybrid CP. CBC4BPM type of cloud computing, has various forms and it can be implemented in various ways that can benefit the *Entity*'s evolution.



**Figure 8:** CP Models (Digital Innovation Junction, 2020).

Various financial models presenting revenue, capital and operational expenditure, and costs are the models from which ROI is calculated. Using CBC4BPM, CSFs of the four ROI (or business advantages) are evaluated, these CSFs are: utilization, time compression, scale, and quality (The Open Group, 2021a, 2021b). CBC4BPM is a mainstream technology for *Entities*, which want to eliminate the need for technological expertise; this is beneficial for Small and Medium sized Enterprises (SME), who need affordable, on-demand service that provides robust/secure data and storage solutions, and heavily improves overall business productivity. CP based services, *Entities*' PCP solutions are optimal for *Entities*. *Self-service* CP access means that *Entities* specialists can at any time retrieve and store data, in real time. CP-based BPM services offer scalable and reliable solutions that can be implemented to streamline business activities, support, and growth (LeadingEdge, 2022): Flexibility, Business continuity, Cost efficiency, Improved collaboration, Scalability and performance, Automatic software updates, Environmentally friendly, Automatic software integration, Usability and accessibility of information, Streamlining applications and processes, Compliance and security, and CP business models. The development of CBC4BPM based applications, has made the entrants in the ruthless environment possible for an *Entity* to provide new value propositions, and to allow them to disrupt the existing *value chain* in ways that was not done before, and which was impossible to do previously. *Entity*'s new PCP enables the use of distributed BPM services and tools. The major CSFs that can be mapped to innovative operating CP models, as shown in Figure 8, can support the *Project* by the use of CP (Digital Innovation Junction, 2020): *Business model, Operating model, Technology and enrichment of shopping experience, and artefacts.*

## **CP BPM and Artefacts**

The CP uses many standard artefacts like in the case of a GCP and they will be presented in this section that has the following BPM types: 1) CE-VM that offer configured processors, memory, disk, and OS environments; 2) KE-Managed Kubernetes clusters, used to automate deployment, scaling, and management of containerized applications; 3) Cloud Run (CR), is a fully managed serverless platform that runs containers; 4) AE, is a fully managed serverless platform for web applications; where it handles the networking, application scaling, and database scaling; and 5) CF is an event-driven serverless function (Sullivan, 2020; Google, 2022b). CFs is a serverless compute service suited for events’ processing and it is designed to respond to and execute functions in response to events in the BPM. CF use three types of artefacts: Events, Triggers, and Functions. An event is an action that occurs in the CP. CFs support BPM based Applications at specific times, with the use of the two mentioned services, CSs can execute applications without human assistance; and both services relieve *Project* teams from implementation of a service which runs as a daemon and checks if an event occurred and then may execute a CF; which needs BPM resources provisioning.

## **BPM Provisioning**

A CP like GCP, provides an interactive console and a command-line interface for managing compute, storage, and network resources; and also provides the *Deployment Manager* (DM) service that supports the specification of IaC. IaC is optimal to allow *Project* teams reproduce CP environments rapidly. It also supports CBC4BPM based Application reviews, version control, and other implementation engineering practices. DM uses declarative templates that describe what is to be deployed. Managing CP’s state information is common when designing a CP (or a distributed system). Stateful CPs may present major challenges, when designing CBC4BPM based Applications. Connecting a client to a server solves the problem of keeping state information available to an Application instance that uses it. Another issue is that databases are complex Applications and can be difficult to manage. CPs (like the GCP) offer various managed databases, like: *Cloud SQL* and *Cloud Datastore*, which reduces operational barriers.

## **CP Dataflows and Pipelines**

Applications contain a set of modules (or services) and monolithic (or legacy) Applications. Business operations need multiple steps of processing using Applications. These operations can be synchronous or asynchronous; the workflow uses a synchronous call to a service. Synchronous calls are calls to another service (or CF) that wait for the operation to complete before returning; asynchronous calls do not wait for an operation to complete. A BPM based CP Dataflow (CPD) is fully managed and there is no need for provisioning and managing their instances to process data in stream. The service also operates in batch mode without changes to processing code.

## **CBC4BPM Security**

CBC4BPM’ Security (CBC4BPM) requirements are pervasive in all EA, ICS, DevOps4CTC, and business domains and to all ADM4CTC phases. The CBC4BPM focuses mainly on the infrastructure and development processes that are not visible to other functions; it also focuses on the protection of the BPM Microartefacts and resources. The CBC4BPM manages single-purpose BPM components and measures the quality of used artifacts, by: 1) Using AI/ML modules and rules for handling of data/information resources; 2) Defined CBC4BPM policies, 3) Codify data/information management policies; 4) Enable CP based BPM’s risk analysis and evaluation scenarios; 5) Enable VM, load balancers and other artefacts management to support BPM’s integration; 6) Support Internet of Things (IoT) artefacts usage and management; and

7) Support Data classification policy documentation. The CBC4BPM has its types of unique building blocks, collaborations, and interfaces; these blocks must interface with the CP to support security policies and to avoid interfering with critical operations. CBC4BPM is effective to design and implement controls in the *Target Architecture* in the initial development cycle to support reengineering development and deployment. The CBC4BPM manages the services flow's fallout, abnormal flows, failure modes and the possibilities in which CP's applications can be interrupted or attacked. All *Entities* have security concerns and they should dedicate an CBC4BPM to support the CP (The Open Group, 2011b), which uses CP logs. CP logging enables a central logging for all CBC4BPM resources, where logged data is essential for maintaining, measuring, and optimizing performance and security. It is complex to leverage logged data from heterogeneous multi-CPs. The CBC4BPM needs to build a *Multi-Cloud Logging Strategy* that includes where logging operations can be complex. *Multi-Cloud Logging Strategies* enable cohesive operations and unify incompatible services and data medias. CPs need strict governance and legal constraints to achieve this legal support, CSFs are selected and asserted, to monitor the used Business CP's artefacts. The Identity and Access Management (IAM) service is designed to allow a PCP specify which operations can a user perform on resources. IAM elements are: Identities and groups, Resources, Permissions, Roles, and Policies:

- Identities and groups are objects that are used to grant access permissions to users, where an identity is an object that represents an actor (person or other delimiter) that executes actions on a CP resource. There are various types of objects: Google account, Service account, and Cloud Identity domain. A Google account is used by an actor who interacts with the CP, like developers or administrators. These accounts are identified by an email address and a CP Identity is an IaaS offering. Groups have an associated email address and are useful for giving permissions to sets of users; and when a user is added to a group, he acquires the permissions granted to the group.
- Resources are CP objects and can be accessed by users; there is a large category, like: Projects, VMs, AE applications, Cloud Storage buckets, Pub/Sub topics. A CP defines a set of permissions associated with each type of resource; and permissions vary according to the resource's functionality.
- A permission is the right to perform an action on a resource and permissions vary by the type of resource with which they are associated. Storage resources have permissions associated with creating, listing, and deleting data.
- Roles are sets of permissions and by using the IAM is that administrators grant roles to identities, and not permissions. It is impossible to grant a permission directly to a user, and it is granted by assigning an identity. Roles can be granted to identities, where an identity can have multiple roles. Roles are granted for CP projects, folders, or organizations, and they apply to all resources under them. There are three types of roles: Predefined, Primitive, and Custom. Predefined roles are created and managed by a CP and the roles are organized around groups.
- Policies, it is possible to associate a set of roles and permissions with resources by using policies. A policy is a set of statements that define a combination of users and associated roles. This combination of users and a role is called a *binding*.
- Data Security, a CP provides multiple mechanisms for securing data in addition to IAM policies, which control access to data; and the essential services are encryption and key management. Encryption is the process of encoding data so it yields a coded version of data, which cannot be converted back to its original form without the key. There is a difference between encryption at rest and encryption in transit. Encryption at *Rest* Google encrypts data and there is no need to configure a policy to enable this operation,



which is applied to Google data storage services, like: *Cloud Storage*, *Cloud SQL*, and *Cloud Bigtable*. Encryption occurs at multiple levels and there are various data encryption and key encryption keys in a CP.

### **CBC4BPM Main Features**

CBC4BPM main features are (Google, 2022c):

- Redundancy and fault-tolerance, supports that BPMs are automatically replicated across multiple zones and checkpoint state after each step, ensuring executions continue even after outages. Failures in other services are handled through default and customizable retry policies, timeouts, and custom error handling.
- Self-documenting, specify BPMs in YAML or JSON with named steps, making them easy to visualize, understand, and observe. These machine-readable formats support programmatic generation and parsing of workflows.
- Wait up to one year, is the period for a given period to implement polling. Connectors provide blocking steps.
- Event-driven, scheduled, and programmatic triggers support BPMs’ executions are low-latency, supporting both real-time and batch processing.
- Web callbacks, create unique callback links inside the BPM and this is useful for waiting for external systems and implementing human-in-the-loop BPMs.
- Security BPMs run in a sandboxed environment and have no code dependencies that will require security patches.
- Seamless authentication in the CP, orchestrates the execution of any CP service and BPM.
- Low-latency execution, where fast scheduling of BPMs’ executions and transitions between steps.
- Fast deploys are in seconds and supports a fast developer experience and quick BPM changes.
- Integrated logging and monitoring, that uses an out-of-the-box integration with CP logging with automated BPM execution. CP monitoring tracks BPMs’ execution volume, error rates, and execution time.

### **Existing CP Products**

Traditionally *Entities* have BPM based applications on-premises deployment practice, and *Projects* aim to have CP based solutions. BPM providers offer CP deployment, but such *Projects* are complex and take long time and human effort; some of possible CP BPM solutions are (Business Process Incubator, 2020).:

- Appian, is a low-code development platform that supports the creation of high-impact BPM based applications to improve customer experience, achieve operational excellence, and simplify global risk management and compliance. Appian has a CP-based offering in various APDs.
- Pega, is a leader in customer engagement and BPA software and is adapted to CP offering advanced AI and robotic automation to support various APDs.
- ProcessMaker, is a low-code intelligent BPM platform that transforms silos and is BPA solution supports cross-domain collaboration.

But products and commercial Cloud based offerings and solutions must be hanged to IH solutions, which can include the following capacities: 1) The integration of scalable Cloud business platforms (Trad, 2022); 2) A Polymathic Cloud transformation concept especially for

the Compute System’s capacities (Trad, 2023a); and 3) IH private Cloud based *Projects* for business intelligence (Trad, 2023b).

### CBC4BPM’s Development CSFs

Based on the LRP4CTC, the most important CSFs are presented in Table 5.

| Critical Success Factors               | KPIs      | Weightings                       |
|--|-----------|----------------------------------|
| CSF_CTC_BPM_Core_Concepts              | Possible  | From 1 to 10. <b>09 Selected</b> |
| CSF_CTC_BPM_Design_Implementation      | Feasible  | From 1 to 10. <b>09 Selected</b> |
| CSF_CTC_BPM_Capacity_Competence        | Supported | From 1 to 10. <b>09 Selected</b> |
| CSF_CTC_BPM_Security                   | Complex   | From 1 to 10. <b>08 Selected</b> |
| CSF_CTC_BPM_Business_Advantages_Models | Supported | From 1 to 10. <b>09 Selected</b> |
| CSF_CTC_BPM_Artifacts                  | Proven    | From 1 to 10. <b>10 Selected</b> |
| CSF_CTC_BPM_Provisioning               | Possible  | From 1 to 10. <b>09 Selected</b> |
| CSF_CTC_BPM_Dataflows_Pipelines        | Possible  | From 1 to 10. <b>09 Selected</b> |

valuation

**Table 5:** CSFs that have an rounded average of 9.0.

## 7. The PoC’s Implementation

This PoC uses a *Entity* using *CloudEcoSource* case and GCP’s UCs, which launches three separate transformation initiatives, or *Projects*, which use TOGAF and ADM phases, to apply the CBC4BPM. *Entities* must have robust CP based BPM solution and other functions. The *CloudEcoSource* and GCP’s UCs, which wants an CBC4BPM-based solution, needs to engage several external *Cloud Service Providers and Partners*, to the transformation of its heterogeneous ICS and distributed process platform and software services; and also to support its critical business needs. The *Entity* intends to use the TOGAF standard for EA practices, GCP Composer for BPM, and aBBs, which are used to manage its CBC4BPM based services as patterns. As already mentioned, *CloudEcoSource* has three distinct CBC4BPM-specific initiatives which are based on the following sub-systems: IaaS, PaaS, and SaaS; these sub-systems are for basic *CloudEcoSource* operations. This PoC describes how *CloudEcoSource* plans to use EA and CBC4BPM to create and evolve various business models. The following features present *CloudEcoSource*’s initiatives (The Open Group, 2021a): 1) The IaaS initiative, concerns the *Entity*’s infrastructure’s modernization, optimization and consolidation; with the expectations on how to transform, manage and regulate dynamic BPMs and resources consumption in a multi-tenant ICS infrastructure, with real-world effective management of security and privacy of its tenants, like for example the *Entity*’s clients; 2) The PaaS initiative, is related to the concept of Rapid Application Development (RAD) platform, where the PaaS-focused initiative is used to identify and describe EA based CBC4BPM capabilities of a platform for *CloudEcoSource* business solutions. Dynamic instances of the CBC4BPM platform(s) could be deployed and operated by a team, *Entity* or by partners of CBC4BPM’s Ecosystem; and 3) The SaaS initiative, concerns mainly an enhanced collaboration among multiple external BPM service providers; where the CBC4BPM assembles business capabilities for business collaborations that extend the *Entity*’s traditional applications’ boundaries, to support extended users (both internal and external users). The PoC’s development uses an

adapted implementation environment where it considers that the unbundling process and the Digital Transformation processes were successful as shown in Figure 9 (Trad, 2023c).



Figure 9: ETP's evolution.

GCP's UCs

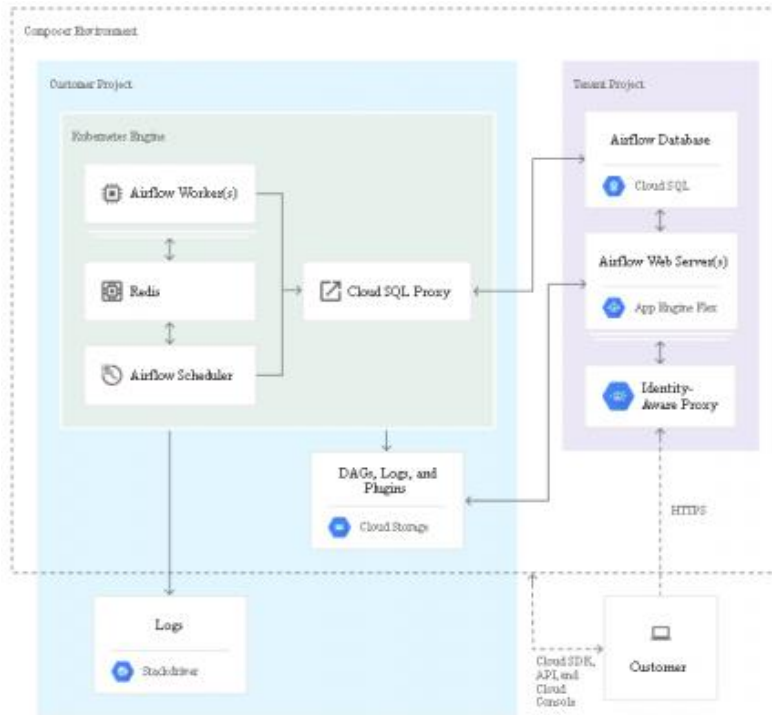


Figure 10: The GCP Compose setup.

In this PoC the following UCs were analyzed (Google, 2022c):

- Service orchestration, which creates a BPM solution by combining services. It performs a sequence of operations across multiple systems, waiting for all BPM operations to complete. It uses an event-driven approach.
- Batch jobs coordination, which operates on multiple items; it performs operations on a set of items or batches of data.

- Specific BPMs, used to automate line-of-business processes; it encodes the tasks in a BPM, including conditions, actions, and human-in-the-loop events.
- The GCP Composer was used to analyse the UCs.

### The LRP4CTC’s

The LRP4CTC (or Phase 1) outcome that supports the PoC’s background, by the use of an archive of an important set of references and links that are analysed using a specific interface. After selecting the CSA/CSFs tag is linked to various CP BPMs and Microartefacts scenarios; which is implemented as an item, in an Excel file; where all its details are defined; this concludes Phase 1. In this DMS4CTC related PoC (or Phase 2), the HDT to deliver solutions. The empirical part is based on the AHMM4CTC’s instance and the CP BPMs and Microartefacts mechanics’, which uses the internal initial sets of CSFs’ that are used in phases 1 and 2.

### From Phase 1 to Phase 2

The *Project’s* enumeration of CSAs are: 1) The RDP4CTC; 2) The UCs integration; 3) The Usage of the ADM4CTC; 4) The CP’s based BPMs, and security; 5) The AHMM4CTC’s Integration; and 6) The DMS4CTC and the KMS4CTC. Where Tables 1 to 5, where presented and evaluated in this chapter and they are this chapter’s empirical part.

### The PoC

The CBC4BPM ’s PoC was implemented using the research’s *TRADf* that had been developed using: The GCP and its BPM structure, *TRADf’s* Natural Language Processing 4 CTC (NLP4CTC), Microsoft Visual Studio .NET, C/C++, and JEE. The PoC is based on the CBC4BPM and the CSFs’ binding, using a specific *Project* requirement and related resources, where the CBC4BPM was designed using EA (like TOGAF) tools. The CBC4BPM processing model represents the mapping relationships between CP based BPM’s requirements, CP CSs, and the CSFs. As shown in Figure 10, the PoC sets-up the needed CSs.

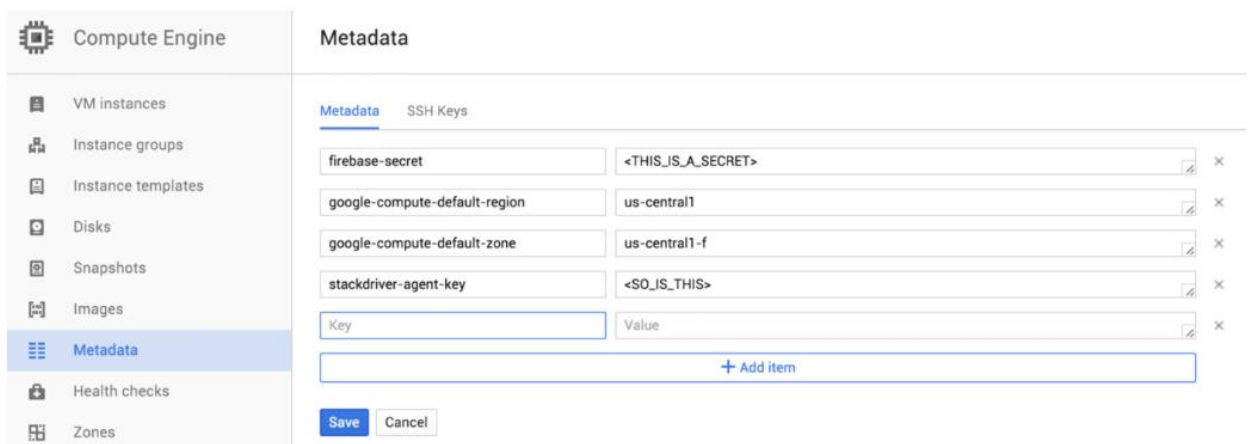
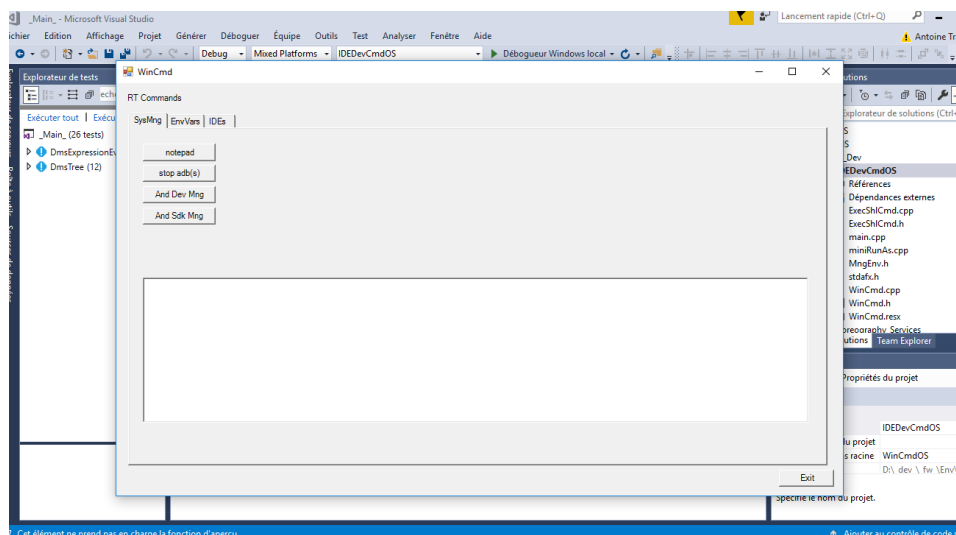


Figure 11: CSs configuration for BPM usage.

The PoC was achieved using the development environment and the research framework; were in the frontend the mapping/linking actions are activated by: 1) Choosing an HDT node that contains the requirement; 2) Choosing the BPM’ Microartefact(s) to be linked; and 3) Choosing to a BPM problem to be solved using an NLP4CTC scenario. When the setup is achieved, from the frontend the BPM requirements development initiation interface that is shown in Figure 11, can be launched.



**Figure 12:** The *TRADf*'s setup interface.

The CBC4BPM's uses the GCP database and the HDT makes calls to DMS4CTC to solve a concrete CBC4BPM problems. Once the development setup interface is activated, the NLP4CTC interface can be launched to implement the needed CP Microartefact scripts. These NLP4CTC scripts that make up the DMS4CTC subsystem and the CBC4BPM's relates set of actions. CBC4BPM-related CSFs were also selected as demonstrated previously in this chapter's five tables and the result of the processing of the DMS4CTC, as illustrated in Table 6, shows clearly that the CBC4BPM is not an independent component and in fact it is strongly bonded to the *Project*'s overall risk management approach.

| CSA Category of CSFs/KPIs   | Influences transformation management | Average Result        |
|-----------------------------|--------------------------------------|-----------------------|
| RDP4CTC's Integration       | Feasible                             | From 1 to 10.<br>9.20 |
| ADM4CTC's Integration       | Complex                              | From 1 to 10.<br>8.40 |
| ICS' Integration            | Complex                              | From 1 to 10.<br>8.90 |
| KMS4CTC/DMC4CTC Integration | Feasible                             | From 1 to 10.<br>9.0  |
| CTC-BPM Transformation      | Feasible                             | From 1 to 10.<br>9.0  |

Evaluate First Phase

**Table 6:** The CBC4BPM research's outcome is 8.80.

RDP4CTC's constraint is that CSAs having an average result below 8.5 will be ignored. As shown in Table 6 (which average is 8.80), this fact keeps the CSAs (marked in green) that helps make this work's conclusion; and no ones in red. It means that such an CBC4BPM integration will succeed and that the CBC4BPM transformation must be done in multiple transformation sub-projects.

## 8. Conclusion

The RDP4CTC is part of a series of publications related to Projects and CPs and is based on mixed action model the HDT; where CSFs are offered to help Project architects to diminish the chances for failure when building a PCP. In this article, the focus is on CBC4BPM, where its formalism defines a structured inter-relationship of CP based BPMs requirements, CSs, and Entity's resources. The CBC4BPM is an important factor for the Project's evolution and the most important managerial recommendation that was generated by the previous research phases was that the Manager must be an architect of adaptive business systems. The PoC was based on the CSFs' binding to a specific RDP4CTC resource and HDT's reasoning model that represents the relationships between this RDP4CTC's concepts, BMP's requirements, aBBs, and CSFs. The final result proves that an CBC4BPM supports the transformation process to deliver a PCP and to avoid commercial products.

## Solution and Recommendations

In this chapter that is related to the CBC4BPM, the author proposes a set of recommendations, table 6 shows that CBC4BPM implementation is possible and the resultant technical and managerial recommendations are:

- The RDP4CTC is an EERM and is feasible.
- An CBC4BPM must be established and tried with a PoC for its feasibility.
- The *Project* must be separated in multiple transformation processes, where the first one should attempt to transform the ICS to be PCP's stub.
- The CBC4BPM is applicable but complex.
- A *Project* must build a global CBC4BPM to integrate in the PCP.
- The legacy ICS and its unbundling is a crucial step for CBC4BPM and the future PCP; that is the main condition for the Project's readiness.
- The unbundling process generates aBBs/services that are common to all BPM types.
- EA and the ADM4CTC are the main methods for PCP's construction.
- After EA based CTC is ready the next step is to integrate the AHMM4CTC based KMS4CTC and DMS4CTC.
- CTC BPM' include the main markets platform services for the PCP.
- An *Entity* can build its own CP or the PCP, there is no need for a specific product.
- A PCP must integrate various security aspects and it delivers major business advantages.
- Enormous efforts must be applied to integrate various existing standards and concepts because the main problem is alignment of existing silos.
- The PCP enables the automation of aBBs to support implementation activities.

## Future Research Directions

The *TRADf* future research efforts will focus on the various strategy for CTC for Security.

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# The Influence of the Western Lifestyle on the Formation of Consumer Behavior of Generation Z

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Katarina Babaec<sup>3</sup>

## Abstract

A lifestyle is a way of life based on a set of values, attitudes, behavior and habits of an individual or a group of people. It is often considered one of the most important indicators of social status and identity, as it reflects the preferences and values of an individual or group in a certain social community. Also, it can be related to the economic and social conditions of the individual, such as income, education and place of residence. The diploma thesis entitled Western lifestyle and its impact on consumers in Croatia aims to clarify how Western civilization developed, how trends developed and how people lived in the West, it aims to clarify what lifestyle is, the influence of famous people and trends on lifestyle style and consumer awareness in Croatia, with an emphasis on the female population and generation Z and the types of lifestyle concepts that are present today. Furthermore, consumer culture, the influence of consumption on consciousness and other relevant terms related to the topic of the paper are to be clarified. After the theoretical part, the goal of the research is to examine (using a questionnaire) the influence of fashion trends on the behavior of women and how susceptible women are to copying the behavior of their idols on social networks. Also, the paper aims to investigate the attitudes and values of the young generation Z in relation to traditional values, social problems and their level of tolerance and acceptance of diversity. Furthermore, the research aims to determine the influence of brands and the consumption of signs on the choice of lifestyle and to understand the motivation for buying branded products as a means of identification with a certain lifestyle.

**Keywords:** lifestyle, trends, celebrities, generation Z, consumption of signs

## 1. Introduction

Lifestyle is a characteristic way (pattern) of behavior by which an individual or a certain group differs from others, how they live, how they spend their time and money, and how they distribute their income. Consumption thus becomes the center of social life and cultural values. The change in lifestyle is influenced by processes of globalization, technological progress, modern media that contribute to radical and rapid changes in the way of life by promoting consumerism, imitating media idols, creating media addicts and addicts of fashion trends that lead to changes in the consumption of products, attitudes and behavior of consumers. The way of life has been largely changed by the COVID-19 pandemic, which hit the whole world at the beginning of 2020. From the complete ban on the operation of cafes, hair salons, gyms, to the closure of airports and flight bans, curfews and restricted movement, mandatory wearing of masks, social distancing, mandatory hand disinfection before entering shops, public institutions, companies, etc. Consumers have suddenly changed their behavior patterns and began to buy things en masse in fear of resource shortages and the spread of the virus, which was obvious. Additionally, the social life they once had has shrunk due to the long bans. More and more people worked from home, which was already a common practice in Western countries, but to a lesser extent. Educational institutions were closed, so classes were held online for the first time, where many professors, parents and children encountered such a way of education for the first time, but everyone had to adapt to the new situation. The children were at home with the parent(s) all the time, so the parents spent their free time, which they would

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otherwise have spent in the gym, drinking coffee with friends in a cafe, shopping, etc., with the children.

The culture of a community or nation depends on the environment, values and beliefs in which they were raised. Therefore, different parts of the world have different cultures that are very different from each other. Consumer society suggests that there is room for improvement and self-concept of lifestyle regardless of age, gender and class origin. We live in an age where, due to rapid changes, the emergence of new and the dying out of old lifestyles, there is a preoccupation with adjusting the lifestyle, not only among the young and susceptible to influences, but also among adult women and men who are equally looking for something new, modern or different, whether in new experiences, relationships, travel, entertainment, community work, nutrition, care for the environment or animals, social symbols (clothes, shoes, cars), etc. The development of various social networks enables consumers to exchange information, experiences and opinions (so-called . reviews) about products and services. The aim of the work is to determine the influence of certain lifestyle components (activities, preferences, interests, opinions, etc.) on selection and purchase, as well as factors that influence consumer awareness, especially on the behavior of the female population and members of Generation Z with regard to changes in trends, social values and lifestyle choices. When researching the lifestyle among consumers, we will try to investigate characteristic patterns of behavior and different characteristics of consumers through the climate of living (environmental style). Also, the connection between choosing a lifestyle and consumption as an investment is investigated, in which the act of buying is the "consumption of signs" by which a certain lifestyle is recognized and how much influence celebrities and influencers have on the formation of a lifestyle.

## **2. Western Civilization**

The most general division of the world is the division into civilizations. They are the basis of history and all other forms of human organization arise from them, such as cultures, institutions, nations and social groups (Raić, 2019:178. Western civilization usually refers to the culture and society that originated in Europe and North America. This term includes societies that developed in Western Europe during the Middle Ages, such as Great Britain, France, Germany, and Italy, and later countries such as the U.S., Canada, and Australia. Western civilization consists of a number of countries and cultures that share similar values, customs and ways of thinking. It is often described as progressive and individualistic, with an emphasis on free markets, personal freedom, democracy, secularism, advances in technology, etc. It is also characterized by artistic and cultural achievements. However, Western civilization also has negative aspects, such as which are excessive focus on material things, excessive individualization and lack of empathy for others, etc. Kalanj (1998) cites Samuel P. Huntington who divided the world into 8 civilizations: Western, Confucian, Japanese, Islamic, Hindu, Orthodox-Slavic, Latin- American and African. On the other hand, Raić (2019) cites Oswald Spengler who divided the world into 8 main civilizations: Babylonian, Egyptian, Chinese, Indian, Mexican, Classical, Arab and Western or European. Among them Babylonian, Egyptian and classical are extinct. A conceptual clue denotes the fundamental idea or concept behind a culture, philosophy or social system. In the context of Western culture, a conceptual reference refers to a set of values, beliefs, norms and ideals that are based on Western philosophy, history and tradition that have characterized the development of Western civilization. The diversity of ideas and values concerning different topics and areas mark the key aspects of Western culture, such as freedom, democracy, individualism, capitalism, materialism, rationality, religious pluralism, scientific and technological progress and various aspects of society from political, economic, religious and social institutions.

In Western culture, there is a wide range of religious beliefs and practices that are present in society, which is often considered a positive aspect of Western culture, as it allows people to freely practice their faith and express their spiritual needs in a way that best suits their beliefs. Western culture is characterized by scientific and technological progress, which has led to a large number of innovations and inventions that have changed the way people live and work. This has led to great benefits, but it also has negative consequences such as unemployment due to automation (the transfer of human labor to machines) and over-dependence on technology. According to Duchesne (2011), the development of Western civilization and its dominance in today's globalized world can mostly be attributed to intellectual success. The West was very similar to Asia in terms of global trade, technology, productivity and per capita income, so it is almost indistinguishable from it. The concept of the West is actually the concept of a culture that is not geographically or ethnically determined, but is reflected by the ideal of a free, critical and self-reflective public culture. Furthermore, a culture is modern and Western when it has a concept of itself as a culture that grounds and legitimizes itself and when individuals are free to express their ideas and feelings through their own abilities Duchesne (2011).

Duchesne (2011) quotes Hegel as arguing that Europeans rejected monarchy and aristocratic privilege and created public institutions that protected the rights of individuals to freedom of expression, religious diversity, and criticism of government. This encouraged a new, modern ethos that encouraged respect for other cultures and encouraged the change of certain segments of culture to better fit into a society striving for self-determination, according to Duchesne (2011).

Today, in the Western world, trends change almost daily, and their influence is felt in all aspects of society, from fashion and entertainment to technology and lifestyle. For example, in the last few years, the popularity of veganism and vegetarianism has increased significantly in the Western world, and more and more people choose such a way of eating because of the impact it has on the environment, ethical and health reasons. On the other hand, the trend of a healthy lifestyle and exercise is also on the rise, and the fitness industry has seen significant growth in the last few years. Lipovetsky (2008) claims that the original Western lifestyle was directed towards consumer culture, which led to the creation of a new culture based on consumerism (consumption) of unnecessary things. This culture contributed to the creation of a consumer class that became addicted to consumption, which led to a more intensive consumer culture. Ultimately, the Western lifestyle influenced changes in consumer behavior and the creation of a new consumer class, a this trend is strongly reflected in Croatian consumers. Access to high technologies and demand for international brands has become more and more common. Such consumer behavior had a significant impact on the Croatian economy, creating new market opportunities and opportunities for the improvement of human life. Also, the western lifestyle helped make consumers in Croatia informed about new trends, which is another important contribution to the Croatian economy. The Western lifestyle has far-reaching but positive consequences for consumers in Croatia, making the Croatian economy more open, developed and stronger than ever before. The fast pace of life is also characteristic of the way of life in the West. People are often busy and have many obligations at work, at home and in social life. The fast pace of life can have both positive and negative effects, and some of the negative effects include stress, exhaustion, and the inability to enjoy the simple things in life. Recently, influencers and celebrities have become key factors in shaping fashion and beauty trends in the West. Many people follow the trends set by social media influencers and use the products they promote. This trend of copying celebrities can have positive effects, such as increasing self-confidence and expressing personal style, but it can also have negative effects, such as financial burden and potential health problems caused by improper use of the product. All these characteristics of the way of life in the West affect individuals, society and culture in general.

### **3. Lifestyle as a Determinant of Consumer Behavior**

The consumption of products and services determines our lifestyle and habits, affects our emotional state and satisfaction, and has a significant impact on the economy. It is important to distinguish lifestyle from way of life. "The way of life is most often associated with a stable community, and is expressed in the form of shared standards, rituals, patterns of social order and possibly a special dialect or speech of the community" (Chaney, 2003:119). Lifestyle is a set of habits, values, preferences and social activities that shape the lifestyle of an individual or a group of people. The lifestyle model includes factors such as background, socialization and experiences in the social environment. Lifestyles are shaped by specific social conditions that change over time and space, and in post-industrial and contemporary societies the processes of individualization and pluralization are often reflected through different lifestyles (Mlinarević, 2006). Consumer behavior, on the other hand, includes all activities related to the acquisition, use and disposal of products and services. These terms are interrelated, as lifestyle can be a key factor influencing consumer behavior. People arrive at their lifestyle through various processes that are formed throughout life, and which may be subject to change depending on life circumstances. Many factors influence the development of lifestyle, such as family, culture, social environment, education, occupation, religion, health, etc. Each individual creates his unique lifestyle based on these factors and his own life experiences. According to Tomić–Koludrović and Leburić (2020:113), free time is considered "one of the relevant indicators of lifestyles". Leisure is a key aspect of modern society and an important factor for individual well-being and social development. It refers to the time that people spend outside of their work duties and other daily activities, and it can be filled with various activities such as recreation, hobbies, social events, travel, etc. "Free time is the time of active rest, leisure, positive development, socialization, humanization and creative affirmation of personality" (Previšić, 2000:406). Young people's free time represents a separate field of educational activity, where family, school, peers, media and society play an important role in the process of socialization and influence on that field. Plenković (2000) states that free time can be described through four main characteristics: freedom, which represents the basis of human existence, creativity, which enables man to realize and realize freedom, activity, which is a transitional form of human life and includes elements of creativity and work, and work which it has a mechanical nature, but it needs to be connected with creativity. Contemporary research shows that many factors play a manipulative role in shaping young people's free time (Miliša, 2006). Miliša and Bagarić (2012) highlight values as a key factor in explaining lifestyle, but also emphasize that leisure activities are important for shaping that style. They ask questions like: How much time is spent on certain activities? Why is something done and for whom? Where and when are these activities performed? An example from life could be a person who has values such as health and family, which is reflected in his lifestyle. A person spends time exercising and eating healthy to maintain their health, but also spends time with family, engaging in activities together and paying attention to them. In his free time, a person prefers to spend time with family and friends, instead of watching television or surfing the Internet, which is in line with his values. Mišigoj-Duraković (2000) emphasizes that modern society, with its imposed fast rhythm of life, is changing the way and contents of spending free time, and the need for active participation is observed. However, there is a significant decrease in physical activity, which is a consequence of the pronounced consumerism and passivity of the individual in modern society. In the future, free time is expected to have the characteristics of a consumer culture, which is already present today.

More and more time and money are invested in leisure activities. Ceremonies, games, pastimes, cafes, discotheques, and other forms of entertainment are becoming more and more prevalent in everyday life (Lipovetsky, 2006). In today's society, leisure time is becoming increasingly

important given the growing emphasis on work performance and productivity. There is more and more talk about the importance of balancing business and personal commitments, and how free time can have a positive impact on workplace productivity and an individual's lifestyle in general. However, free time is not equally distributed in all social strata. It is related to socioeconomic conditions, which means that the wealthier classes have a greater opportunity to enjoy various leisure activities compared to the lower classes. That often leads to inequality in society and limits access to certain activities only to certain groups of people.

Free time is becoming an increasingly important part of life, especially for young people. They are increasingly looking for ways to fill time after school, college or work. In addition, the development of technology and social media allows them to more easily find activities that interest them and to connect with other like-minded people. One of the most popular leisure activities is social networking through social networks. Young people spend hours looking at the profiles and posts of their friends, as well as the influencers they follow. Also, many young people use their free time to play video games, watch series and movies or listen to music. However, more and more young people also recognize the importance of physical activity and a healthy lifestyle, so they often spend their free time exercising, running or doing some other type of sport. Also, volunteering is becoming increasingly popular among young people, which allows them to work on projects and activities that contribute to the community in their free time. However, it is important to note that some young people do not have enough opportunities or financial resources to fulfill their wishes and interests in their free time. This is why initiatives and programs that enable free or low-cost activities for young people are important.

A lifestyle is a set of habits, behaviors, values and attitudes that people adopt and practice in their daily lives. Lifestyle usually includes diet, physical activity, hobbies, clothing, attitude to money, work, education, social activities and other aspects of life. A lifestyle can be individual or common to a certain group of people who share similar values and interests. People who are work-oriented may have a different lifestyle than those who are focused on hobbies and social activities. Lifestyle can also be based on culture, religion, education, social and economic status and other factors. For example, the lifestyle of a person living in the city may differ from the lifestyle of a person living in the countryside. It is important to emphasize that lifestyle is not a fixed concept and that it can be changed and adapted during life. People often change their lifestyle after changing life circumstances or setting new goals and priorities in life.

Fulgosi and Radin emphasize that, as stated in the book by Miliša and Bagarić (2012:82), a person's overall behavior has its roots in his lifestyle, which affects the way a person perceives, learns and remembers things. A lifestyle is formed during childhood and usually becomes established later, although an individual may adopt new ways of expressing his style. However, these new ways are only specific and concrete forms of expression of the original style, which was formed in childhood. Basically, the initial lifestyle that is formed in childhood usually has a strong influence on the entire life of an individual.

The changes in lifestyles are mostly influenced by processes of globalization, technological progress, the emergence of new media and individualization, which contribute to radical and rapid changes in lifestyle. Also, media and advertising play a big role in the formation of lifestyle. Through various media channels, such as television, magazines, social networks, etc., people get influential ideas about how they should live their lives. This influence can be particularly strong among the younger population, who are often more inclined to adapt their lifestyles to trends promoted through the media and celebrities. On the other hand, various life circumstances, such as changes in career, marriage, parenthood, loss of a loved one, health problems, etc., can affect how people adapt their lifestyle. The concept of lifestyle represents a way of life that includes a set of habits, values, attitudes and activities that determine how an

individual spends his time, what he consumes, how he dresses, with whom he spends time and how he behaves in society. The concept of lifestyle can be individual or group, and in both cases it reflects the lifestyle of an individual or group and their interaction with the environment..

The concept of lifestyle is an important factor in marketing strategy as it helps in targeting a specific target group. Also, the concept of lifestyle has an impact on consumer behavior, as consumers choose products and services that are aligned with their lifestyle. Therefore, understanding the concept of lifestyle is essential for marketers who want to attract a specific target group. The concept of lifestyle is not static and can change over time. Various social, cultural, technological and economic factors can influence changes in the lifestyle concept of an individual or a group. For example, technological progress can lead to changes in consumer habits and the way they spend their time. In addition, the concept of lifestyle is related to the social status of the individual. An individual's lifestyle can be a reflection of his social status and economic situation, which can influence the choice of products and services that the consumer will buy. The concept of lifestyle can also be related to the culture and tradition of a certain group or society and the way in which this concept of lifestyle is reflected in their consumer behavior. Ultimately, the concept of lifestyle is important for understanding consumer behavior and marketing strategies used to target a specific target group. Understanding this concept helps marketers better adapt to consumers' needs and develop marketing campaigns that align with their lifestyle concept.

Lifestyles can also be analyzed through symbolic meanings. Lifestyles are often interpreted through the symbolic values that a certain person or group attributes to certain activities, objects and social practices. Symbols can be different for different cultures and groups, and their interpretation can change over time. Examples of symbols attributed to certain lifestyles include clothing, music, food, drinks, sports activities, hobbies, and mode of communication. For example, a person who prefers alternative rock can be identified through clothing, hairstyle and accessories such as badges, while a person who prefers classical music can be identified through other symbols such as concert tickets, museum visits or music books. Symbols are often associated with certain social values and attitudes, so lifestyles can be interpreted through the values attributed to symbols. For example, a person who identifies with hip-hop culture may emphasize values such as social justice, community, and the expression of individuality, while a person who identifies with punk culture may identify through values such as rebellion against authority, anarchism, and nonconformism. Analyzing symbols and symbolic values associated with lifestyles can help us understand how people shape their identity and how they identify with different groups and cultures.

Appearance, iconography, a special way of presenting and seeing new forms of social connection is an important means of expressing lifestyles, a kind of "image", and the young bearers of these styles especially enjoy "fashion recognition". They are based on socio-structural patterns such as occupation, religion, gender, origin, ethnicity and age. Religion is a way of life for a large part of people of different confessional affiliations. Lifestyles acquire, in this context of an established way of life, their specific identity, for example through different (subcultural) trends. Lifestyles represent a symbiosis of accepting certain values and behaviors. Lifestyles form a link between orientations and behavior, social position, living and working conditions, and place of residence. Situations "that introduce changes in only one of the areas of life can only partially, and not completely, change one's lifestyle" (Tomić-Koludrović, Leburčić, 2002:161).

#### 4. Consumer Culture

Culture, in general, consists of shared meanings, rituals, norms, and traditions that are collected among members of organizations or societies. It determines the identity of the human community, its individuals, social organizations and its economic and political system. Culture is dynamic and continuously developing, accepting new ideas, while at the same time connecting with old ones. Values are the central principle of every culture, and from them emerge the norms and rules that define what is right or wrong, and what is acceptable or unacceptable. Norms include customs, moral rules and conventions (Solomon, M. R. et al., 2009:506-510).

Consumer culture refers to the set of habits, values and behaviors that determine the way people buy, use and dispose of products. In today's world, where the market is constantly changing and developing, consumer culture plays an important role in shaping social norms and values. While some people enjoy buying new products and consuming them, others criticize the same products. On the one hand, consumer culture provides numerous benefits. For example, buying products can help sustain economic growth and create jobs. On the other hand, consumer culture has its negative sides. For example, excessive consumption can lead to accumulation of waste and negative impacts on the environment, and some products can be harmful to health. Consumer culture can also encourage greed, materialism and dissatisfaction, which can have negative consequences for society. In order to reduce the negative effects of the consumer culture on the economy, it is necessary to develop a more sustainable and responsible way of consumption. This includes promoting product quality, rather than quantity, and encouraging consumers to purchase products that are environmentally friendly and sustainable. Also, it is necessary to promote a more responsible approach to the use of resources, such as water and energy, and encourage the development of a sustainable economy that is aimed at long-term development and growth (Čolić, 2013).

One of the fundamental characteristics of consumer culture is consumerism, which refers to the attitude and values that promote consumption as a central element of life. Consumerism can be seen as a manifestation of the capitalist economic system, where consumption is the key driver of economic growth. Although consumption and consumerism are often used as synonyms, they are not actually synonymous terms. Consumption refers to the act of buying and using products and services, while consumerism is much more than that - it represents a way of life based on the systematic and continuous purchase and consumption of products as an expression of cultural values. Therefore, consumerism can be considered a cultural expression and manifestation of the ubiquitous act of consumption (Čolić, 2013:13 according to Miles, 2006). Another characteristic of consumer culture is the trend of orientation towards brands. Consumers today are looking for products and services that carry a certain brand, and this often leads to the situation that the prices of such products and services are higher than those of the competition. It is safe to say that customers who buy such products are actually buying a status symbol, not "just" a product (Solomon, M.R. et al., 2009:37-43).

Solomon, M.R. et al. (2009:37) state the following types of relationships that a person can have with a brand:

- Attachment related to self-image: the product that the user chooses and uses can contribute to shaping his identity and the way he presents himself to others.
- Nostalgic attachment: the product has a function of nostalgic attachment and serves as the user's connection to the past time and memories of their past version.
- Interdependence: the product plays a role in the user's daily routine and becomes an integral part of it, thus developing a habit and dependence on the product.

- Love: the product has an emotional impact on the user and evokes feelings such as warmth, passion or other strong emotions, which can lead to a stronger bond between the user and the product.

Characteristics of consumer culture are instant gratification and individualism. Instant gratification can be obtained by purchasing products and services. Consumers often buy things they don't need, but they only buy them because they are new or popular. Today's consumer thinks less and less about the long-term consequences of consumption, and focuses more and more on immediate satisfaction. This can lead to excessive consumption, irresponsible behavior towards the environment and accumulation of unused products and waste. Consumers today are increasingly buying products and services that are tailored to their personal needs and preferences. This is the result of the increasing variety of products and services on the market and the digitization of consumer culture. The preceding characteristics have positive and negative effects on society and the economy, and their impact can be improved through more sustainable and responsible consumption that will benefit both society and the environment.

Consumption and consumer culture as opposed to culture and society are two key topics that are often questioned when talking about the influence of the Western way of life on consumers in Croatia. While consumption has become one of the main drivers of economic growth in the country, many wonder what impact it has on culture and society.

In today's world, consumption has become one of the key aspects of modern society. Consumer culture and its impact on society attract the attention of many researchers and scientists, especially in the field of social sciences. One of the modern approaches to consumption is the concept of "creative consumption", which is based on the idea that consumers want to express themselves through the products and services they buy. This concept emphasizes the role of consumers as creative and independent individuals, not just passive recipients of advertising messages. Creative consumption also encourages the development of new and innovative products and services, not just copying existing models.

Another modern approach is "sustainable consumption", which promotes the consumption of products and services that do not endanger the environment. This approach emphasizes the importance of reducing consumption, using recycled materials and sustainable energy sources. Sustainable consumption also includes awareness of the social and ethical aspects of the production and distribution of products, as well as how consumption affects the lives of other people in the community.

The third approach is "socially responsible consumption", which focuses on encouraging the consumption of products and services that support socially responsible production and distribution. Socially responsible consumption emphasizes the importance of respect for human rights, environmental protection and sustainable development. This approach also encourages transparency in the production and distribution of products and helps consumers make informed decisions. In modern society, technology plays an increasingly important role in consumer culture. Online shopping, social networks and digital marketing have become an indispensable part of the modern lifestyle.

In the modern approach to consumption, consumer culture and society are closely related. Social networks and technology have led to increased transparency and interaction between consumers and producers, but at the same time they have also created negative trends, such as fake lives on social networks and addiction to online shopping. The modern approach to consumption in Croatia also includes increased awareness of the importance of sustainability and environmental issues. Consumers are increasingly inclined to buy products that are produced sustainably, are environmentally friendly, and are not tested on animals. With rapidly developing technology and social networks, we can expect that access to consumption in



Croatia and around the world will continue to evolve. As a society, we must recognize the positive and negative impacts of technology and social networks on consumer culture, and work to develop a sustainable and responsible approach to consumption.

#### **4.1. Europe - the social space of lifestyles**

Europe is a continent with a rich history, culture and diverse social spaces that reflect a wide range of lifestyles. One of the most prominent social spaces in Europe is Western Europe. This region includes some of the most developed countries in Europe and the world, including Germany, France and Great Britain. Lifestyles in these countries are characterized by a high standard of living and an emphasis on individualism and consumerism. Consumption and material wealth are considered important symbols of status and social position.

On the other hand, Eastern Europe has a somewhat different social space that reflects historical and cultural differences. Although some countries such as Poland and Hungary began to embrace Western ways of life after the fall of communism, others retained their traditional values and lifestyles. For example, Romania and Bulgaria are still societies based on traditional family values, and religion plays an important role in social life. Central Europe has its own characteristics of social space, with an emphasis on history and tradition. Countries like Austria, the Czech Republic and Slovakia have a rich cultural heritage that is reflected in their lifestyles. These countries also show an emphasis on education and health care, as well as on work and working conditions. The impact of globalization and modernization is also being felt in Europe, with major changes in social spaces across the continent. Social spaces changed as technology developed, and traditional values were replaced by new values and trends. Consumption became ubiquitous in Europe, leading to the growth of consumerism as a way of life.

Consumption has a great influence on the consciousness of the individual, which means that what we buy and spend can affect our values, attitudes and perception of the world around us. Consumer society promotes the idea that happiness can be achieved through shopping, which can lead to the creation of false values and priority goals in life. For example, consumer society often encourages people to value material things and status, instead of personal relationships, health and happiness. Consumption can also affect our perception of ourselves and others. Buying products that are advertised as "popular" or "desirable" can create a false image of what is important in life and what it means to be successful. In addition, buying a product can create a sense of identity and belonging to a certain social group or trend.

#### **5. Research Methodology**

The research was conducted using the survey method, and its online version using a Google form from February 7 to March 10, 2023. The survey questionnaire was posted on the social network Facebook, which enabled access to different profiles of people in order to obtain the most representative research results. In addition to Facebook, the survey was sent on Viber and WhatsApp. 186 people were examined in the research, and the sample was random. The questionnaire consisted of three parts. The first part of the survey consisted of demographic questions about gender, age, level of education, employment status, monthly income and location of residence. In the second part of the survey, questions related to following fashion trends and the influence of celebrities on the female population. The third part refers to Generation Z, which grew up in the age of rapid development of technology and the Internet, which significantly influenced their lifestyle and attitudes. Generation Z is considered the most numerous generation in history, which has so far grown up entirely in the digital age. Whether their attitudes and values differ from previous generations will be investigated through questions about attitudes and values, and the last, fourth part was about the consumption of signs, which refers to the purchase of products or services as a means of expressing a certain lifestyle and identity. The questions asked in the survey aim to find out whether people buy

products because of their functionality or because of the symbolic values that these products represent. The questions in the survey were of open and closed type and rated from 1 to 5, i.e. Likert scale. The survey consisted of 28 questions.

Research questions 12, 13, 14, 15 and 16 were used to prove / disprove the hypothesis H1: Change in trends has the greatest effect on the behavior of the female population. To prove / disprove the hypothesis H2: Members of the young generation Z are not interested in traditional values, but are more tolerant and ready to accept differences, research questions 20, 21, 22 and 23 were used, and to prove / disprove the hypothesis H3: Choosing a lifestyle of style is an investment in which the act of buying is the "consumption of signs" by which a certain lifestyle is recognized, research on question number 28 was used.

The goal of the research is to obtain relevant data on the influence of celebrities in the United States and Western Europe on the lifestyle and awareness of consumers in Croatia. Also, the attitudes, opinions and preferences of the female population and generation Z in choosing a lifestyle and consumer habits and lifestyle as an investment will be investigated. The goals of the research include examining the influence of changes in fashion trends on the behavior of the female population, determining the attitudes and values of the young generation Z in Croatia in relation to traditional values, the influence of celebrities and social networks, the influence of consumerist lifestyles on the attitudes of young people, and understanding the influence of brands and the consumption of signs on the choice of lifestyle among young people. The goal of the research is also to determine how sensitive young people are to social problems and how willing they are to contribute to social changes. The research problem of this thesis is to determine the influence of certain lifestyle components on consumer behavior, especially the female population and generation Z in Croatia, and the lack of recent research in that area. The subject of the research is the impact of the western lifestyle on consumers in Croatia, with a focus on changing trends and the impact on the female population and generation Z. The aim of the research is to investigate how consumers in Croatia accept changes, novelties and trends and how the choice of lifestyle affects consumption as an investment . Based on the defined problem and subject of research and objectives, three hypotheses are defined that will be tried to be proven by collecting and analyzing primary data:

**Hypothesis H1:** Change in trends has the greatest effect on the behavior of the female population.

**Hypothesis H2:** Members of the young generation Z are not interested in traditional values, but are more tolerant and ready to accept differences.

**Hypothesis H3:** Choosing a lifestyle is an investment in which the act of buying is a "sign consumption" that identifies a certain lifestyle.

Out of a total of 186 respondents who participated in the research and answered the questionnaire, 129 were women, 54 were men and 3 people did not want to state their gender. Women who filled out the survey questionnaire make up 69.4% of the total number of respondents, while men who filled out the survey questionnaire make up 29% of the total number of respondents, and 1.6% are people who did not declare their gender. Based on the obtained data, a large difference is visible between the number of women and men who participated in the survey questionnaire. The largest number of respondents, 46.2% of them are between 26 and 35 years old, 21% of respondents are between 19 and 25 years old, 19.4% of respondents are between 36 and 45 years old, and 3.8% of respondents are under 18 years old. and the same number of respondents, 3.8%, are over 56 years old. When it comes to education, most of the respondents answered that they had completed a secondary vocational education, even 40.9%. 26.9% have completed undergraduate studies, while 24.7% of respondents have completed graduate studies, then 3.8% have completed post-graduate, doctoral or specialist

studies, while the smallest number of respondents, 3.2%, have completed basic school, and 0.5% have no education. Regarding employment, 147 (79%) respondents stated that they were employed, while 16 respondents (8.6%) were studying, i.e. in student status. Of the remaining respondents who answered the questionnaire, 11 respondents (5.9%) are unemployed, 6 respondents (3.2%) are students, 5 respondents (2.7%) are retired, and one respondent (0.5%) is self-employed. Most respondents, 40 (21.5%) have monthly incomes (income) in the amount of EUR 800 to 999, followed by 37 respondents (19.9%) who have monthly incomes in the amount of more than EUR 1,200. Furthermore, 34 respondents (18.3%) answered that they have a monthly income of up to EUR 599, 31 respondents (16.7) have a monthly income in the amount of EUR 600 to 799, 27 respondents (14.5) have a monthly income in the amount from 1,000 to 1,199 EUR.

According to the stated results and presented table 1, it is evident that:

- the average mean value given by respondents for the statement: Fashion changes every few years because trends come and go faster than ever, and women follow them the most because they want to keep up with the trend is 4.19 with a variance or deviation of 0.989. Given that the variance is below 1, it can be concluded that based on the results of this question, the hypothesis can be confirmed, considering that the deviations in the answers are not that big.
- the average mean value given by respondents for the statement: The female population is more susceptible to following and copying the fashion and beauty trends of celebrities and individuals who present different "must have" products on social networks is 4.25 with a variance or deviation of 0.849. Given that the variance is below 1, it can be concluded that based on the results of this question, the hypothesis can be confirmed, considering that the deviations in the answers are not that big.
- the average mean value given by the respondents for the statement: By copying a celebrity or a certain person who satisfies "aesthetics", women achieve a better image of themselves in their own eyes, and thus strive to be noticed and accepted by others is 3.91 with a variance of deviation 1.181. Given that the variance is above 1, it can be concluded that based on the results of this question, the hypothesis cannot be confirmed, considering that the deviations in the answers are greater.
- the average mean value given by respondents for the statement: You prefer to buy trendy clothes rather than timeless clothes, even though timeless clothes are more practical and functional because you can wear one thing in more ways and on more occasions is 2.63 with a variance or deviation of 1.564. Given that the variance is above 1, it can be concluded that based on the results of this question, the hypothesis cannot be confirmed, considering that the deviations in the answers are large.
- the average mean value given by respondents for the statement: If celebrities and individual people (influencers) did not advertise products that are ecologically produced and not tested on animals, you would not buy eco and animal friendly products either, is 2.06 with a variance or deviation of 1.412 . Given that the variance is above 1, it can be concluded that based on the results of this question, the hypothesis cannot be confirmed, considering that the deviations in the answers are large.

**Table 1: Hypothesis H1, T-test**

| One-Sample Test  |        |     |                                 |                 |                    |   |       |
|--|--------|-----|---------------------------------|-----------------|--------------------|---|-------|
| Test Value = 0   |        |     |                                 |                 |                    |   |       |
|  | t      | df  | Significance<br>One-<br>Sided p | Two-<br>Sided p | Mean<br>Difference | 95% Confidence<br>Interval of the<br>Difference |       |
|  |        |     |                                 |                 |                    | Lower   | Upper |
| Fashion changes every few years because trends come and go faster than ever, and women follow them the most because they want to keep up with the trend.   | 57,499 | 185 | <,001                           | <,001           | 4,194              | 4,05  | 4,34  |
| The female population is more susceptible to following and copying the fashion and beauty trends of celebrities and individuals who present various "must have" products on social networks.       | 62,934 | 185 | <,001                           | <,001           | 4,253              | 4,12  | 4,39  |
| By copying a celebrity or a certain person who satisfies "aesthetics", women achieve a better image of themselves in their own eyes, and thus strive to be noticed and accepted by others.         | 49,330 | 185 | <,001                           | <,001           | 3,914              | 3,76  | 4,07  |
| You prefer to buy trendy clothes rather than timeless clothes, even though timeless clothes are more practical and functional because you can wear one thing in more ways and on more occasions.   | 28,667 | 185 | <,001                           | <,001           | 2,629              | 2,45  | 2,81  |
| If celebrities and individual people (influencers) did not advertise products that are ecologically produced and not tested on animals, you would not buy eco and animal friendly products either. | 23,695 | 185 | <,001                           | <,001           | 2,065              | 1,89  | 2,24  |

**Source:** own research - results obtained in the SPSS Statistics program

To prove or disprove hypothesis H1, the T-test was used to determine statistical significance. The relationship between the difference between two arithmetic means and the error (or standard error) of that difference is looked at. The more times the difference is greater than the error, the more we "trust" it. The test has significance  $\alpha$ , if the probability of error of the first type is less than  $\alpha$  (Test level  $\alpha$ ). Conventionally, the level of significance is  $\alpha=0.05$

(significant or statistically significant) or  $\alpha=0.01$  (very significant or very statistically significant).

Table 2 shows us the average ratings of the statements used to prove/disprove hypothesis 2. From the given table we can see that the average value of the statements is above 3.30. Therefore, we conclude that the majority of respondents believe that members of the young generation Z are not interested in traditional values, but are more tolerant and are ready to accept differences. As the variance for each is higher than 1, we can conclude that the respondents gave different answers to the question and are not completely sure of their answer.

**Table 2:** Hypothesis H2, T-test

|   | t      | df  | Significance |             | Mean Difference | 95% Confidence Interval of the Difference |       |
|---|--------|-----|--------------|-------------|-----------------|---|-------|
|   |        |     | One-Sided p  | Two-Sided p |                 | Lower                                     | Upper |
| For members of Generation Z, reality is shaped by virtual reality. They maintain communication and socializing through social networks and various platforms, and because of this they lose interest in physical encounters and are less social.                            | 47,683 | 185 | <,001        | <,001       | 3,823           | 3,66                                      | 3,98  |
| Due to watching the fake lives of celebrities and individuals, as well as various social expectations, the youth of Generation Z feel pressure and develop certain mental disorders, anxiety, depression, and feel lonely and alienated.                                    | 53,762 | 185 | <,001        | <,001       | 4,005           | 3,86                                      | 4,15  |
| Unlike the previous generation Y (millennials), generation Z is more tolerant, open and ready to accept differences, cares about social problems, strives for changes for the better in society, the environment and sustainable development.                               | 39,110 | 185 | <,001        | <,001       | 3,301           | 3,13                                      | 3,47  |
| Members of generation Z are characterized by the so-called ability multitasking - the ability to perform two or more jobs/actions at the same time. They strive for financial independence, quick earnings, instant gratification, materialism and a consumerist lifestyle. | 46,742 | 181 | <,001        | <,001       | 3,615           | 3,46                                      | 3,77  |

Table 2 shows the T-test results for the questions that were asked to prove or disprove hypothesis H2. The t-test is used to determine statistical significance. On the basis of the table, it can be concluded that the particles or questions related to H2 are statistically significant for the proposed hypothesis, because all the results of the t-test have a very low p-value (<0.001).

**Table 3:** Hypothesis H3, Descriptive statistics

|  |                             | Levene's Test<br>for Equality<br>of Variances |       | t-test for Equality of Means |        |                                    |                    |                        |                                     | 95%<br>Confidence<br>Interval of the<br>Difference |       |
|--|-----------------------------|---|-------|------------------------------|--------|------------------------------------|--------------------|------------------------|-------------------------------------|--|-------|
|  |                             | F   | Sig.  | t                            | df     | Significance<br>One-<br>Sided<br>p | Two-<br>Sided<br>p | Mean<br>Differ<br>ence | Std.<br>Error<br>Diffe<br>renc<br>e | Lower  | Upper |
| You will rather buy a product of a well-known foreign brand than a domestic one  | Equal variances assumed     | 65,143  | <,001 | -2,018                       | 19     | ,029                               | ,058               | -,333                  | ,165                                | -,679  | ,012  |
|  | Equal variances not assumed |   |       | -2,345                       | 11,000 | ,019                               | ,039               | -,333                  | ,142                                | -,646  | -,020 |
| The lifestyle of your idol is an example of the lifestyle you want to have   | Equal variances assumed     | ,014  | ,905  | -,114                        | 19     | ,455                               | ,910               | -,028                  | ,244                                | -,538  | ,482  |
|  | Equal variances not assumed |   |       | -,108                        | 13,322 | ,458                               | ,916               | -,028                  | ,258                                | -,583  | ,528  |
| Following the lifestyle of famous Americans changes ours as well   | Equal variances assumed     | 2,797   | ,111  | -,775                        | 19     | ,224                               | ,448               | -,139                  | ,179                                | -,514  | ,236  |
|  | Equal variances not assumed |   |       | -,810                        | 19,000 | ,214                               | ,428               | -,139                  | ,171                                | -,498  | ,220  |
| The American market is the main one in creating new trends/fashions  | Equal variances assumed     | 1,543   | ,229  | -3,440                       | 19     | ,001                               | ,003               | -,972                  | ,283                                | -1,564   | -,381 |
|  | Equal variances not assumed |   |       | -3,821                       | 15,603 | <,001                              | ,002               | -,972                  | ,254                                | -1,513   | -,432 |
| In life, it is more important for you to live harmoniously in the circle of family and friends than to follow fashion and be trendy      | Equal variances assumed     | ,187  | ,670  | -2,738                       | 19     | ,007                               | ,013               | -1,861                 | ,680                                | -3,284   | -,439 |
|  | Equal variances not assumed |   |       | -2,634                       | 14,587 | ,010                               | ,019               | -1,861                 | ,706                                | -3,371   | -,352 |
| Young people will rather spend the first big money they get on buying a good car than invest it  | Equal variances assumed     | ,268  | ,611  | -3,269                       | 19     | ,002                               | ,004               | -1,583                 | ,484                                | -2,597   | -,570 |
|  | Equal variances not assumed |   |       | -3,345                       | 18,575 | ,002                               | ,003               | -1,583                 | ,473                                | -2,576   | -,591 |
| Today's young people don't want to have "no name" products because they think that people who use branded products will make fun of them | Equal variances assumed     | 1,966   | ,177  | -1,414                       | 19     | ,087                               | ,173               | -,778                  | ,550                                | -1,929   | ,373  |
|  | Equal variances not assumed |   |       | -1,328                       | 12,804 | ,104                               | ,207               | -,778                  | ,586                                | -2,045   | ,490  |

**Source:** own research - results obtained in the SPSS Statistics program

The table shows the results of Levene's test for equal variances and t-test for equal means for the data set "You will buy a product of a well-known foreign brand rather than a domestic one".

Levene's test for equality of variances shows that the F value is equal to 65.143 and the p-value is less than 0.001, which indicates a statistically significant difference in variances between the two groups of subjects. This means that the variability of responses in the group that prefers foreign brands is different from the variability of responses in the group that prefers domestic brands.

The t-test for equal means showed that the t-value was -2.018 and the p-value of the one-tailed test was 0.029 and the two-tailed test was 0.058. This means that there is a statistically significant difference between the mean values of these two groups of respondents. Also, the mean value of the group that prefers foreign brands is lower than the mean value of the group that prefers domestic brands. The 95% confidence interval for the difference in means is -0.679 to -0.012.

When using the t-test for equal means, it is assumed that the variances in the two groups of subjects are equal, but since Levene's test showed that the variances are not equal, the t-test values when equality of variances is not assumed are also reported. In this case, the t value is -2.345 and the p-value of the one-tailed test is 0.019 and the two-tailed test is 0.039. These values also indicate a statistically significant difference in the means of the two

**Hypothesis H1:** Change in trends has the greatest effect on the behavior of the female population.

After the tests, it was determined that fashion changes every few years because trends come and go faster than ever, and women follow them the most because they want to keep up with the trend. It was also established that the female population is more susceptible to following and copying the fashion and beauty trends of celebrities and individuals who present different "must have" products on social networks. The obtained result was determined by the variance below 1. While we were unable to confirm the following claims on the other hand: By copying a celebrity or an individual person who satisfies "aesthetics", women achieve a better self-image in their own eyes, and thus strive to be noticed and accepted by others, You prefer to buy trendy clothes rather than timeless ones, even though timeless clothes are more practical and functional because you can wear one thing in more ways and on more occasions, So that celebrities and individual people (influencers) do not advertise products that are ecologically produced and are not tested on animals, neither do you would buy eco and animal friendly products. We can also conclude that the respondents are not completely sure of their answer. Based on the T-test, we conclude that the particles related to hypothesis H1 are statistically significant for the given hypothesis. While based on the conducted Cronbach Alpha coefficient, we get good reliability of the research sample.

Therefore, based on all the conducted tests, we conclude that the hypothesis H1: Change in trends has the greatest influence on the behavior of the female population is accepted.

**Hypothesis H2:** Members of the young generation Z are not interested in traditional values, but are more tolerant and ready to accept differences.

After the tests, the average grade above 3.30 was determined. On the basis of which it can be concluded that the majority of respondents believe that members of the young generation Z are not interested in traditional values, but are more tolerant and are ready to accept differences. It was also determined that the deviation for each question is more than 1, and it is concluded that the respondents gave different answers to the question and are not completely sure of their answer. Based on the results of the T-test, it is concluded that the particles related to hypothesis H2 are statistically significant for the given hypothesis, and based on the Cronbach Alpha coefficient, we obtain good reliability of the research sample.

Therefore, based on all the conducted tests, we conclude that hypothesis H2: Members of the young generation Z are not interested in traditional values, but are more tolerant and ready to accept differences.

**Hypothesis H3:** Choosing a lifestyle is an investment in which the act of buying is a "sign consumption" that identifies a certain lifestyle.

After the tests, the average value of claims above 3.2 was determined for the following claims: The American market is the main one in creating new trends, The goal of young people is to earn money and have a high standard of living, Young people will spend the first big money on buying a car and not investing , In life, it is more important to live harmoniously in the circle of family and friends than to follow fashion and be in trend. Today's youth do not want to have "no name" products because they think that their peers who use branded products will make fun of them. Therefore, it is concluded that the majority of respondents still believe that choosing a lifestyle is an investment in which the act of buying is the consumption of signs that identify a certain lifestyle. As the deviation for each answer is more than 1, it is concluded that the respondents gave different answers to the question and are not completely sure of their answer.

Based on the results of the T-test, we conclude that the particles related to the hypothesis H3 are statistically significant for the given hypothesis, in the following answers: You will rather buy a product of a well-known foreign brand than a domestic one, The American market is the main one in creating new trends/fashions, In your life it is more important to live harmoniously with family and friends than to follow fashion and be trendy. Young people will spend the first big money they earn on buying a good car rather than invest it. Based on the conducted Cronbach Alpha coefficient, we did not obtain satisfactory reliability of the research sample.

Therefore, on the basis of all the conducted tests, it is concluded that the hypothesis H3: Choosing a lifestyle is an investment in which the act of buying is a "sign consumption" by which a certain lifestyle is recognized and accepted.

During the implementation of the research, certain limitations appeared that should be taken into account when interpreting the results. The first limitation refers to the sample of respondents, which was relatively small, only 186 people, therefore no conclusions can be drawn for the entire Republic of Croatia. Another limitation refers to the time frame in which the research was conducted - only one month. A longer period of time would lead to a larger number of respondents and thus the results would be more relevant. The third limitation of the research refers to the fact that the survey questionnaire was posted on the Internet and the answers to the questions were collected exclusively through that means.

Among the demographic characteristics of the respondents, one of the limitations is gender. The majority of respondents are women, 129 of them (69.4%), while there are 54 (29%) male respondents and 3 people (1.6%) who did not want to state their gender.

## **6. Conclusion**

The Western lifestyle, which can be observed in countries such as the United States of America and Western European countries, has a significant influence on consumers around the world, including in the Republic of Croatia. This culture has a great influence on the behavior of Croatian consumers and can be observed in different aspects. One of the examples of how the western lifestyle affects consumers in Croatia is in the field of fashion. Western countries often set fashion trends and this is reflected in the way Croats dress. Also, the Western lifestyle is closely related to the consumption of fast food and drinks and the purchase of products and services that are popular in Western countries such as smartphones, technology or luxury brands of clothing and shoes. Consumers in Croatia are also more and more inclined to shop online, which is also the influence of the western lifestyle, especially during the COVID-19 pandemic



and after, because people (consumers) realized that they don't have to spend time walking around stores, but can do their shopping from the comfort of your home. This paper points to the importance of lifestyle in understanding consumer behavior in the West and points out that consumption and consumer culture are an inseparable part of Western civilization. Consumer culture can be seen as a process of socialization, where the individual is taught how to buy, consume and use products in accordance with social norms and values. This culture includes the ways in which consumers understand, select, use and decide to buy products.

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# The Strategy of Sustainable Tourism Resource Development under Sufficiency Economy Principle in Karen Community Maesapok Village, Thailand

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## Abstract

The tourism industry was a leading sector that drove Thailand's economy each year. However, the COVID-19 pandemic in early 2020 caused some decline in the tourism sector and thus not less than 6% decline in the economy. Although the tourism industry is recovering, only 25% of the number of tourists are coming back as compared to those prior to 2020. Given that the mainstream, general visitors are only slowly returning to the country; alternative tourist attractions may need to be focused and offered so that alternative or selective groups of visitors might be attracted enough to revisit Thailand sooner. One of the alternative tourisms is community-based tourism which is becoming more and more popular in recent years. In response to this, Karen community of Maesapok Village in Chiang Mai province in Thailand was selected as the case study because the area provided good environment for community tourism in which the tourism resource had been developed under Sufficiency Economy Principles (SEP) comprising Moderation (Living without Greed or Extravagance), Reasonableness (Analytical Thinking and Evaluation) and Self-Immunity (Risk Management and Self-Protection).

The main objectives of the study are: (1) to apply the principles of the sufficiency economy to support tourism resource development in the Karen community of Maesapok village in Chiang Mai, and (2) to develop a strategy for sustainable tourism resources development under the SEP in the Karen community of Maesapok village in Chiang Mai. The sample of study consisted of three main groups using purposive sampling technique including community leaders, local government officials, people working in local tourism businesses, tourism experts from educational institutions and private businesses and residents and members of local occupational groups in Maesapok village in Chiang Mai. In addition, a number of tourists observed and were interviewed during the data collection process. The participatory action research (PAR) was implemented to promote cooperation and participation among the involve parties in the process of the strategy development based on SEP involving four steps: planning, action, observation, and reflection, as a content analytical technique. Accordingly, this research study seeks to develop a strategy capable of developing tourism resources in the ethnic community through the involvement of community members themselves. Such the strategy would also provide protection for the local environmental resources and would respect local traditions and culture. Furthermore, the principles of the sufficiency economy can be incorporated as the key to ensure sustainable development which might allow tourism to generate consistent benefits for ethnic communities. However, each occupational group should be strengthened and adequately prepared before welcoming an influx of tourists following the covid -19 situation. The strategy under SEP would assist communities in readying themselves for the post-covid tourism recovery. In addition, collaboration with relevant departments is necessary to enhance skills and allocate a sufficient budget to improve the overall production quality. Tourism products should primarily focus on meeting the satisfaction and preferences of tourists. Therefore, it is a challenge for community tourism destinations to create and deliver new goods, services, and ideas at a fast rate of speed in order to make room for new consumer needs that will necessitate a sustainable innovation management response in the future and achieve in sustainable development goals (SDGs).

**Keywords:** Sufficiency economy principles, community tourism resources, sustainable development goals

## 1. Introduction

*\*The Sufficiency Economy Principles: SEP*

The recent edition of the Second National Tourism Development Plan covering the years 2017 to 2021 had the goal of strengthening Thailand's tourism strategy through long term planning. The Ministry of Tourism and Sports spearheaded this initiative in order to tackle industry challenges and uphold Thailand's reputation as a top-notch destination. One objective was to

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elevate the quality of tourism offerings while another aimed at diversifying the range of experiences to visitors thereby continuously improving the sector (The Ministry of Tourism and Sports, 2017). Moreover, this plan emphasizes the promotion and support of Thai culture, traditions and identity, as parts of the tourist experience. The tourism sector plays a role in the economy of Thailand, as it contributes amounts of money to the country. This achievement attracted investments that greatly benefited the economy. Over the years, this industry has witnessed growth. Unfortunately, its progress was disrupted by the Covid 19 pandemic in early 2020.

According to the 2017 report from the Office of the National Economic and Social Development Board, there has been an increase in the number of tourist attractions in Thailand. hilltribe villages were used as tourist attractions. Several specific areas were explored including marketing, the growth of the tourism industry, funding strategies for tourism initiatives, the use of tourism to boost incomes and foster self-sufficiency conservation programs, resource management practices, eco-tourism and promoting sustainability in terms of local resource utilization (OECD, 2019). However, there are still challenges when it comes to implementing tourism across the country (OECD, 2019). The overall experience was lacking due to a lack of understanding and insufficient environmental and social management. There was a lack of collaboration among stakeholders resulting in mismanaged tourism. With the growth of tourism, mass tourism exceeded the capacity of tourist infrastructure. It is now crucial to manage this situation in order to minimize any impact on the environment, natural resources and cultural resources that support the tourist industry.

Under the guidance of the King Rama IX King Bhumibol Adulyadej, Thailand has embraced the Sufficiency Economy Principles (SEP) comprising Moderation (Living without Greed or Extravagance), Reasonableness (Analytical Thinking and Evaluation) and Self-Immunity (Risk Management and Self-Protection) across domains of national development. The government has placed importance on promoting these policies as evident, in the 9th 11th National Economic and Social Development Plan. This plan aims to incorporate these principles into resilient national development efforts (Government Public Relations Department of Thailand, 2007). By embracing SEP at the community level, communities can enhance their human resources potential for the betterment of society at levels. SEP empowers communities to build resilience against challenges they may encounter due to globalization consequences (UNDP, 2007). It is believed that adhering to SEP encourages community members to adopt the desired standards (Kusumawali, 2010).

In the areas that make up a part of Thailand's agricultural sector, there is a focus on sufficiency economy principles, which encourage the adoption of techniques to effectively manage changes caused by external factors (Seubsman, Kelly and Sleight, 2013). To support the growth of tourism in these communities, it is crucial to enhance the management of resources through these principles thereby benefiting businesses on tourism (Choochat, 2010). For quite some time now, Thailand has been integrating strategies into its development plans that prioritize a up approach rather than top-down management with self-sustainability as the main objective. In today's Thailand community-based tourism projects are gaining popularity. However, it is essential to mitigate any harm caused by such projects and ensure that local residents can maintain their cultural pride while earning income. One challenge lies in the fact that community members often face barriers when participating in tourism development initiatives due to Thai norms, like social structures and patronage systems.

This study accordingly seeks a strategy of tourism resource development under SEP in the Karen community of Maesapok village in Chiang Mai. This study aimed to provide a framework with special reference to SEP which guided sustainable development in the Karen

community. The Karen people, are a hill tribe group residing in Thailand. They make up 50% of all hill tribe populations living within the country’s borders. Primarily, dwelling in regions and forests they sustain themselves through small scale rice farming. Most of the Karen community resides in Chiang Mai province. All of these have constituted as an attraction for tourists. Various travel companies organise tours to visit their villages such as Maesapok village located in Maewin subdistrict of Chiang Mai which is the focus of this study. What makes Maesapok village a unique community is that the community is exclusively inhabited by Karen people who rely on subsistence agriculture and tourism for their livelihoods. The village’s natural resources attract visitors while its rich Karen cultural heritage serves as a drawcard leading to the development of tourism offerings. The village is well suited for both eco-tourism and cultural tourism experiences while closely aligning SEP. In addition, it demonstrates networking capabilities that facilitate collaboration among its residents. However, tourism in Maesapok does have its downsides. One example is that certain travel companies bring tourists to the village for activities like trekking or exploring sites. Unfortunately, the locals themselves do not gain much from these visits and have participation in the experience being offered. The villagers are less involved in tourist activities or are hired with low incomes. Another crucial weakness of this Karen village is the locals still need necessary tourism knowledge and practical skills in management. Other local products or local cultural activities are also ignored.

Based on a sufficiency economy leading to the tourism development strategy that can improve the residents’ quality of life by optimizing local economic benefits, protecting the natural and built environment, and providing a high-quality experience for visitors in Karen community in Maesapok village, Chiangmai province, Thailand. The main objectives of the study are: (1) to explore the potential for tourism of Maesapok village in Chiang Mai, (2) to apply the principles of the sufficiency economy to support tourism resource development in the Karen community of Maesapok village in Chiang Mai, and (3) to develop a strategy for sustainable tourism resources development under the SEP in the Karen community of Maesapok village in Chiang Mai. The strategy also can inspire the community to prepare for the return of tourists after COVID-19 and specifically SEP is a key mechanism to guide sustainable development that might offer advantages to the community in the current tourism scenario in Chiangmai. It could serve as a guiding principle to result in further sustainable development in the future. The findings will make a contribution to the improvement of sustainable tourism practices benefiting neighborhood communities and tourists.

## 2. Literature Review

### 2.1 Principle of Sufficiency Economy for Sustainable Development

Thailand under the guidance of the King Rama IX King Bhumibol Adulyadej embraced the Sufficiency Economy, which its principles emphasize the importance of avoiding excessive consumption and focusing on the well-being of the community as a whole. The Sufficiency Economy philosophy encourages individuals and the nation to strive for self-reliance and to prioritize sustainable development. The following principles has been suggested by many authors (Kantabutra, 2008; Kittiprapas, 2015; UNDP, 2007; NESDB, 2007; Piboolsravut, 2004; Senanarong, 2004; Choochat, 2010, Arpanantikul et al., 2013). **Moderation** conveys the idea of a middle ground between necessity and extravagance, between backwardness and impossible dreams. People on the middle path live without overindulgence. Living in moderation can reduce the utilization of natural resources and prevent contamination of the environment. **Reasonableness** relates to the decision concerning the level of sufficiency that must be made rationally with consideration for the factors involved and careful anticipation of the outcomes that may be expected from such actions. The reasonableness concept also includes accumulated knowledge and experience, along with analytic capability, self-awareness, foresight,

compassion, and empathy. **Self-immunity** describes the characteristic of having a built-in resilience and consideration for changes used to plan and protect oneself from negative external impacts. **Knowledge** is similar to wisdom, as it encompasses accumulating information with the insight to understand its meaning and the care or prudence needed to put it into use. **Morality** indicates not only virtue, ethical behavior, honesty, and straight forwardness, but also tolerance, perseverance, and a readiness to work hard.

Consequently, since the 11th National Economic and Social Development Plan, there has been a strong focus on incorporating these principles to foster resilient and sustainable national development (Government Public Relations Department of Thailand 2007). SEP offer an approach to development that can be practically applied in scenarios (Government Public Relations Department of Thailand, 2007). Thailand has endeavored to implement these principles not in communities but also in business and government sectors. On a scale, SEP can empower communities by enhancing their human resources potential for the benefit of society at community, regional, national and international levels (Indaratna, 2013). By embracing SEP, communities gain resilience against challenges they may face due to phenomena like globalisation (UNDP, 2007). It is believed that adhering to desired standards becomes an outcome when communities follow the SEP (Kusumawali , 2010).

In the areas of Thailand, where agriculture plays a role the sufficiency economy approach encourages the adoption of techniques to help communities adapt to external changes (Seubsman , Kelly Sleigh, 2013 ). By implementing this approach, communities can effectively manage their resources and support businesses in the tourism sector (Choochat , 2010; Riyanto , Oktaviani and Supriono, 2023). Thailand has long recognized the importance of adopting a up approach to development than relying on top-down management. The focus is on achieving self-sustainability. Nowadays community-based tourism projects are gaining popularity in Thailand. However, it is crucial to minimize any impact on the environment caused by these projects while ensuring that locals can take pride in their culture and generate income. One challenge is that community members often face barriers when participating in tourism development schemes due to Thai norms such as hierarchy and patronage systems.

## **2.2 Linkage between Sufficiency Economy Principle (SEP) and the Sustainable Development Goals (SDGs)**

The Sustainable Development Goals (SDGs) comprise a set of 17 objectives aimed at promoting development. These goals were put forth by the United Nations to serve as a guiding framework, for adopting practices. Following the introduction of the SDGs Thailand's Prime Minister Prayut Chan-O-Cha approached the 2030 Agenda with a perspective centered around Sufficiency Economy Principles (SEP); he emphasized that sustainability is closely linked to modesty which involves assessing sufficiency levels while considering factors and their potential impacts. When making choices and taking actions it is important to consider both knowledge and morality as factors; the SEP not only enhances human well-being but also plays a significant role in poverty reduction by reducing vulnerabilities empowering individuals and shaping their lives (Seubsman, Kelly and Sleigh, 2013). A network improvement method primarily based totally on SEP refers back to the want for public hearings. In growing the prototype of public hearings, it's miles essential to invite the villagers whether or not they want the intervention this is designed thru taking note of the human beings earlier than fixing their problems (Ministry of Foreign Affairs, 2017). During SEP practice, to construct a robust body of workers for sustainable profits, human useful resource improvement specialists ought to make sure that the developmental steps are evolved and stimulated from within, and aren't imposed from outside.

This highlights the connection between SEP and SDGs as both initiatives strive towards achieving an overarching objective. There is a connection between the SEP and the SDGs. By striving for progress while maintaining a sense of balance, sustainable well-being can be achieved in all aspects of life economic, environmental, societal and cultural. This requires meeting quality knowledge and moral virtue conditions as implementing three management principles. Each of the 17 SDGs aligns with one of these four pillars (Thailand Sustainable Development Foundation, 2018). Ultimately, the SEP aims to foster resilience against consumerism and various global systemic risks such as economic crises caused by the COVID-19 pandemic, environmental degradation, climate change and other challenges. Given these concerns, the SEP aims to explore innovative solutions at the level taking into account the unique cultural and geographic aspects of each area (Prayukvong , Huttasin and Foster, 2015 ). This approach known as a up strategy strives to find a balance between meeting people's needs and protecting the environment in order to effectively address challenges. It is important to note that self- sufficiency does not mean disregarding goals. Rather, it focuses on enhancing skills as a means to escape the middle-income trap and foster an economy driven by advanced technology and innovation. In sum, the SEP and its framework are fully in line with these SDGs. The principles of moderation, rationality and prudence along with knowledge and morality form the foundation of the SEP. Its aim is to demonstrate that people can coexist peacefully and safely in a society and environment that can be sustained. This way of life represents not only self-sufficiency but also self-reliance which means being able to handle and manage the negative impacts of globalisation (Pantasen et al., 2003).

### **2.3 Sufficiency Economy and Sustainable Tourism Development**

Experts have raised concerns that community tourism may not always lead to outcomes (Dotrimensi, Astiar, Apriliani, Rensianae and Aderini, 2023; Riyanto, Oktaviani and Supriono, 2023). A report by WTO&UNEP in 2005 highlighted that while mass tourism can bring benefits, it can also have impacts on the environment and local communities if not properly managed. This emphasizes the importance of tourism management to minimize these effects and promote outcomes, while considering the needs and desires of local communities. Achieving sustainability in tourism requires following principles such as long-term growth preserving resources and meeting the needs of both tourists and local residents (Noroozi, 2023). Similarly, SEP Energy Policy aligns with development concepts like risk reduction adopting a life cycle perspective and respecting limits. To determine if SEP can effectively enhance community-based tourism management for desired outcomes (Chartrungruang, 2011), it is crucial to assess its alignment with WTO's (2007) principles for tourism development. Minimizing risks and taking measures are aspects of sustainable tourism development. When there is evidence regarding the impacts of a development or action it is advisable to approach it, the precautionary principle underlines the importance of implementing measures to prevent any damage than attempting to fix it (WTO, 2007). Likewise, proponents of SEP emphasize the importance of integrating resilience into our strategies allowing us to endure shifts shield against disruptions and adeptly handle circumstances.

In sum, the primary focus of developing community-based tourism is to achieve objectives such as generating income and employment opportunities promoting participation and raising awareness about the importance of preserving culture and the environment as part of sustainable development (Fikriyah, Surjono and Siregar , 2023 ). Although sustainability is a goal in tourism development, some theories suggest that community tourism alone may not always lead to outcomes (Noroozi , 2023). Therefore, alternative approaches should be explored to unlock the potential of communities. Additionally, to generating immediate economic benefits, it also has long-term advantages for the local economy, ecosystems, and social fabric.

## **2.4 Tourism Resource Development in Ethnic Community**

Tourism product development bringing new and revolutionary merchandise, experiences, and offerings to the marketplace for travelers to shop for that may take many forms. Making extra merchandise to be had to travelers will boom the period of time, boom the quantity of cash they spend, and inspire new and repeat visitors. In addition, attention of Price, Product quality, Service, Staff quality, Product capabilities and Flexibility also can assist role the tourism product and enterprise as it may be very essential for them to face out from the competitors (New west territory authorities, 2022). In the improvement of cultural sources into tourism merchandise, it's miles essential to bear in mind many aspects. Studies on ethnic tourism have shed mild on its impacts, tourism making plans, authenticity, ethnic network empowerment and sustainable improvement amongst different topics (Wang, et al., 2020). The monetary pursuits of the dominant society might also additionally develop ‘genuine’ tourism merchandise and marketplace the ‘exotic’ photograph of indigenous peoples being inspired extra via way of means of profit in place of via way of means of any real subject approximately supplying the ones peoples in a touchy and simply manner (Matteucci et al., 2022). The loss of authenticity in overall performance generates numerous problems. For example, there's the strength structures, in that there's a failure to authorize (Cave, 2003). A loss of authorization can best arise with an implicit or passive view approximately the authenticity of the cultural product at a part of different actors which include travelers or authorities. Traditional ethnic festivals, pilgrimages, and historic occasions were applied to create an photograph of genuine ethnic traditions (Oakes, 1998; Sofield & Li, 2007).

Community tourism withinside the ethnic regions additionally have diverse varieties of problems and challenges. In Thailand, more than one projects have been instituted on the network degree with nearby authorities’ facilitation and support, wherein network contributors have been invited to take part, however the effects of such empowerment efforts tended to emphasis short-time period returns on the subject of positive political agendas and just a few influential clans participated in network improvement. (Intarucorn, 2003, as noted in Nuttavuthisit et al., 2014). All nearby stakeholders must take part in tourism making plans which wishes to be evolved at the start of pro-bad improvement plans from the grassroots to worldwide levels (Theerapappisit, 2009). Ethnic tourism, a spot but impactful phase of the wider tourism industry, specializes in the wealthy tapestry of cultures, traditions, and histories of indigenous and ethnic groups. Thailand, with its various ethnic communities, gives a completely unique proposition for ethnic tourism. The "Karen" network in Maesapok village, Chiang Mai province, stands as a testimony to the wealthy cultural background and traditions that Thailand boasts. Thailand combines sufficiency economic system ideas with ethnic tourism improvement to create a genuine, sustainable, and at the same time useful revel in for travelers and nearby communities. These projects via way of means of Thailand exemplify its willpower to keeping cultural background and fostering sustainable monetary growth (Arpanantikul, Phuphaibul, & Khuwawatsamrit, 2017). Ensuring that tourism improvement is each moral and sustainable isn't always only a duty however a necessity. From the ideas laid out via way of means of Mason (2008) and Telfer and Sharpley, R. (2007). the pointers of Vanagas and Jagminas (2011), the consensus is clear: for tourism to be useful, it ought to be rooted in moral practices, sustainable strategies, and real network participation. Promoting ethnic tourism aligns seamlessly with the SEP's tenets. By emphasising nearby traditions, customs, and approaches of life, ethnic tourism guarantees that visitors get a genuine revel in, fostering mutual respect, understanding, and appreciation. Moreover, via way of means of selling ethnic tourism, Thailand guarantees that the monetary advantages of tourism without delay attain those communities, fostering sustainable monetary improvement and lowering socio-monetary disparities (Arpanantikul, Phuphaibul, & Khuwawatsamrit, 2017).



### 3. Data collection and Research Method

#### 3.1 Research Methodology

The qualitative data obtained were analyzed using PAR technique which is a participatory action research in accordance with Kemmis and McTaggart (1988) and Coghlan and Brannick (2001) involving four steps: planning, action, observation, and reflection, as a content analytical technique. In the participatory action research processes, some of the major stakeholder engagement techniques were applied to collect the data such as public meetings, training sessions and workshops, focus groups, task forces, group planning processes and surveys. In community meetings, the participants were asked to brainstorm about any and all aspects of tourism and tourism resources in their community. Focus groups brought together small groups of stakeholders to discuss issues of concern whereby views were shared and in-depth information was provided. The research tools and methodologies were used to accomplish these objectives while supporting the development of community tourism resource.

This study focuses on qualitative approaches through the processes of Participatory Action Research (PAR) with the community representatives and the participants. Focus group discussions, interviews, and questionnaires are the main research methods to implement the pilot project A for tourism human resource development under the sufficiency economy in the Karen community, Maesapok village. The research process includes planning and designing the pilot projects B for tourism resource development, the pilot project implementation, and the outcome assessment of the pilot projects based on the SEP.

#### 3.2 The Sample Site and The Sample Population

The research was undertaken with community involvement, particularly focusing on the Karen community in Maesapok village, Chiang Mai province. Maesapok village is within the Maewin sub-district of the Maewang district in northern Thailand. The village spans a place of 29.725 sq. km. and has been domestic to the Karen network for over 1/2 of a millennium. It is nestled in the highlands of the Obkhan National Park, boasting lush landscapes, verdant forests, picturesque waterfalls, and serene streams.

The sample population of study consisted of Karen residents and stakeholders in Maesapok village as the sample population. All 30 people in the main sample group were selected as the research participants by using purposive sampling. They are community leaders (3 people), local tourism entrepreneurs and workers (6 people), the local government officers (3 people), the representatives of Karen residents and the representatives of local occupation groups (12 people), the tourism experts from local education institution and private sector who have related experience to tourism in this area (6 people). Furthermore, a group of volunteer tourists who are willing to join in the Karen tourism pilot project of this research as the observers of this research as well. The detail of the population and related research activities is shown in Table 1.

**Table 1:** The Sample Group and Research Activities

| Population  | Research Activities                        | Period      |
|---|--|-------------|
| 1. Community leaders of Maesapok (3 people, Local tourism entrepreneurs and workers (6 people) , The local government officers (3 people) , The representatives of the Karen and the representatives of local occupation groups ( 12 people ) | Meeting<br>(Research project Introduction) | 21 Mar 2020 |

| <b>Population</b>   | <b>Research Activities</b>  | <b>Period</b>            |
|---|---|--------------------------|
| 2. Community leaders of Maesapok (3 people, Local tourism entrepreneurs and workers (6 people), The local government officers (3 people), The representatives of the Karen and the representatives of local occupation groups (12 people)       | Meeting and Focus Group Discussion<br>(Tourism Potentiality)  | 16 May 2020              |
| 3. The Maesapok village headman<br>The spiritual leader of Karen<br>The president of Hub - Maewin club<br>The head of Karen weaving textile group<br>The trekking tourist guide in Maewin sub - district  | In - depth interview<br>(Tourism Potentiality)  | 16 May 2020              |
| 4. Community leaders of Maesapok (3 people, Local tourism entrepreneurs and workers (6 people ) , The local government officers (3 people ) , The representatives of the Karen and the representatives of local occupation groups ( 12 people ) | Meeting and Focus group discussion<br>(The appropriate sufficiency economy principles and practices for the tourism resource development of the Karen community in Maesapok village)              | 30 May 2020              |
| 5. The participants in the pilot project A are Karen people and local people in Maewin sub-district who are willing to participate in the project (50 people)   | - Tourism workshop training<br>- The survey of the satisfaction and opinion on tourism workshop training (Questionnaires)   | 19-21 Aug 2020           |
| 6. The participants in the pilot project B are the president of Hub Maewin Club (1 people), Members of Karen Weaving Textile group (8 people), Members of Maesapok Farming group (10 people) Members of Trekking Tour group (13 people)         | Meeting, Focus group discussion and brainstorming for the pilot project of tourism resources development (Setting up the divisions of working groups and planning for the project implementation) | 9 Jan 2021               |
| 7. Members of Karen Weaving Textile group (8 people) and Karen women (25 people)  | - The Implementation of the Pilot Project B by Karen Weaving Textile group  | 20 Jan 2021 –31 Mar 2022 |
| 8. Members of Karen Weaving Textile group (8 people) and Karen women (6 people)   | - The assessment of the project (Group meeting and discussion to ask for feedbacks from the group members)  | 13 Mar 2022              |
| 9. Members of Karen Weaving Textile group (8 people)<br>The president and the member of Hub Maewin Club (2 people) Tourist (5 people)   | - The assessment of the project (Group meeting and discussion to ask for feedbacks from the group members, along with the interviews with tourists)   | 14 Mar 2022              |
| 10. The experts from the public and private sectors (5 people ) , students from Chiang Mai Rajabhat University (12 people), and general people (6 people)   | - The survey on experts' and volunteering tourists' opinions by questionnaires  | 30 Mar 2022              |

| <b>Population</b>  | <b>Research Activities</b>   | <b>Period</b>               |
|--|--|-----------------------------|
| 11. Members of Farming group (10 people) The president and the member of Hub Maewin Club (2 people)  | - The Implementation of the Pilot Project B by Farming group for the development of tourism resources<br>Farming group   | 20 Jan 2021 –31<br>Mar 2022 |
| 12. Members of Farming group (10 people) The president and the member of Hub Maewin Club (2 people) The experts from the public and private sectors (5 people)   | - The assessment of the project (Observation of the group's implementation, as well as group meeting and discussion to ask for feedbacks from the group members) | 4 Apr 2022                  |
| 13. Members of Trekking Tour group (13 people)   | - The Implementation of the Pilot Project B by Trekking Tour group for the development of tourism resources  | 20 Jan 2021 –31<br>Mar 2022 |
| 14. Volunteer tourists (18 people) that are the experts from the public and private sectors (3 people ), Students from Chiang Mai Rajabhat University (10 people), and representatives from other sectors of the community (5 people)  | - The assessment of the project (The survey of volunteering tourist satisfaction through questionnaires and additional interviews with their representatives)    | 25 Apr 2022                 |
| 15. The representatives of Karen Weaving Textile group (3 people) The representatives of Farming group (2 people)<br>The representatives of Trekking Tour group (3 people)<br>The president and the member of Hub Maewin Club (2 people)<br>The experts from the public sectors (3 people)<br>The local government officers (2 people) | - Meeting and Focus group discussion (Conclusion of the pilot project)<br>- Brainstorming (The strategy for tourism resource development)                        | 21 Jun 2022                 |

#### **4. Discussion of Results**

##### **4.1 The Appropriate Sufficiency Economy Principles and Practices for the Tourism Resource Development of the Karen community in Maesapok village**

This research's framework is rooted in a comprehensive theoretical exploration, aiming to devise a strategy for tourism resource development through community participation. SEP were proposed to the participants for discussion with the intention of implementing them in the planning and operation of the tourism pilot project in Maesapok. The participants chose the SEP approaches for their tourism resource development considering some approaches as unsuitable and unnecessary for Maesapok. The results can be described in table 2 as follows.

**Table 2:** Sufficiency Economy Approaches for Tourism Resource Development in Maesapok

| SEP  | Practical Approaches   | Apply | Reasons   |
|--|--|-------|---|
| <b>Moderation:</b><br>Living in without being greedy or extravagant (middle path), awareness of basic needs and potential for development without any overexploitation of local natural and culture resources                    | 1. To manage appropriate tourism to local livelihood and community potentiality                    | ✓     | - Maesapok should develop the tribal cultural products such weaving textile, agricultural products into tourism products activities.  |
|  | 2. To preserve local cultures for tourism without excessive modification                           | ✓     | - Maesapok should combine their livelihood and wisdom with nature and culture tourism and foster visitors’ appreciation and respect to local way of life  |
|  | 3. To promote energy and resources saving in the tourism operation                                 | ✓     | - Maesapok could use reducing, reusing, and recycling help the community, and the environment by saving money, energy, and natural resources.   |
|  | 4. To carry on the traditional occupations; tourism sector should be minor jobs                    | ✓     | - Karen people can maintain their livelihood and their local culture of coexistence with nature that they could work in tourism as the minor job and the small business.  |
| <b>Reasonableness:</b><br>The analytical thinking through knowledge or past experiences to make a decision reasonably in planning and solving its problem, evaluation of the risks and the impacts on other people and community | 5. To limit the tourist numbers and tourism activities causing a negative impact on the community  | ✓     | - Maesapok should identify clearly about the number of tourists in joining their tourism activities and the duration of activity in order to avoid negative impacts on tribal socio-cultural and environment.<br>- In during Covid-19 pandemic situation, Maesapok have to provide the tourism measures to reduce the risk of infection and organizing safe and hygienic activities when the village reopening. |
|  | 6. To provide or increase protected areas in the tourism   | x     | Maesapok village area is under the supervision of Obkhan National Park of the Department of Forestry.   |
|  | 7. To focus on producing products and services respond to the domestic market first                | x     | - Tourism products and activities in Maesapok should be served in accordance with the demands of both domestic tourists and international tourists in the present.  |
|  | 8. To set up the rules or practical guidelines for the tourism resources protection                | ✓     | - Maesapok need the guideline to preserve and promote tribal culture such Karen weaving textile, traditional house, Karen believes and role of the forest guardians   |
|  | 9. To continuously evaluate the tourism impacts  | x     | - This approach is difficult for the villagers to conduct a valid assessment on tourism impact.   |
| <b>Self-immunity:</b><br>The ability in risk management without relying much on the help from other people or being able to protect oneself against uncontrolled situations  | 10. To produce and promote several types of tourism products and activities                        | ✓     | - Maesapok could create the several community tourism types and activities such agro-tourism, cultural tourism, eco-tourism, creative tourism or volunteer tourism.   |
|  | 11. To use local labors in tourism works and use local raw materials in tourism product production | ✓     | - Maesapok has to encourage the local people role as the tribal instructor or tour leader in the community. For example, the trekking route through Karen village and natural scenery could be managed the trekking tour for conservation by community.<br>- Maesapok can use local raw materials and develop local resources into tourism products   |
|  | 12. To increase the local participation and networks in sustainable tourism development            | ✓     | - Maesapok should built the tourism network in human resource development with educational institutions in Chiangmai province   |

|   |  |   |   |
|---|--|---|---|
|   |  |   | - Maesapok should work and built a collaborative together to develop tourism projects and create long-term development networks with related party agencies from government , and private sector  |
| <b>Knowledge:</b> Taking wisdoms, knowledge or academic approaches into consideration for any further applications in planning and operating or problem solving | <b>13.</b> To provide learning experiences to tourists                             | ✓ | - The local government and educational institute can support the Karen people to promote and develop their educational tourism program  |
|   | <b>14.</b> To study the local wisdom and culture for tourism development           | ✓ | - Local government has to promote Karen people should study their own cultural knowledge to empower themselves in tourism management and service.   |
|   | <b>15.</b> To support community capacity building for tourism development          | ✓ | - Maesapok should promote and increase the role in tourism workers and leaders in among Karen people. The villagers should have the ability to become the cultural tribal teachers and the tour leaders in the community.   |
| <b>Morality:</b> Promotion of virtues or moral behaviors e.g. honesty, tolerance, and hard-working for the public interest and distribution                     | <b>16.</b> To operate tourism business honestly and fairly to tourists             | ✓ | - Maesapok should come up with a plan to set prices and models of tourism activities that are fair to tourists as well.   |
|   | <b>17.</b> To distribute benefits and income honestly and fairly to the community  | ✓ | - Local entrepreneurs and tourism workers in Maesapok should be paid appropriately for their jobs.  |
|   | <b>18.</b> To promote moral sense and ethical behavior in among hosts and tourists | ✓ | - Tourism workshop training should provide the content and activities to enhance the ethical thinking and practicing and to promote service mind, being good host and the pride in tribal culture.<br>- Activities in conservation and tourism development in Maesapok should encourage tourists and residents to participate more.<br>- Tourism resource development in Maesapok should engage in corporate social responsibility activities such as community development and environment protection or other public interests. |

**Source:** original for this study

In the focus group discussion, the approaches of Reasonableness principle “to provide or increase protected areas in the community tourism” for tourism in Maesapok is not necessary to practice this approach because the area of Maewin sub-district and Maesapok village are in Obkhan National Park with the supervision of the Department of Forestry. Thus, the area is divided appropriately into the protected zone and the public zone. The natural resources in the protected zone are well preserved under the Legal measures of national parks, the public zone is defined for only the residence, and the agriculture but the village should set up the tourism regulations for tourists instead. Similarly, “to focus on producing products and services respond to the domestic market first” is also not follow this way because tourism products and activities in Maesapok should be served in accordance with the demands of both domestic tourists and international tourists in the present. Furthermore, the approach of reasonableness “to continuously evaluate the tourism impacts”, they think this approach is difficult for the villagers to conduct a valid assessment on tourism impact because the tourism impacts need the effective evaluation by the experts from several organizations.

However, the participants considered all five principles of sufficiency economy and most of their approaches in practices to apply in tourism resource development in Maesapok as in the table 2. In the research activities, the participants are asked to brainstorm about all aspects of tourism and tourism resources in their community. Focus groups bring together small groups

of stakeholders to discuss issues of concern whereby views are shared, and in-depth information is provided. The research projects included workshop training for tourism knowledge and skill development and community participation in natural and cultural resource development, whereby the residents and stakeholders can share their ideas and perspectives including setting task force members to accomplish the action in the research project.

#### **4.2. The Pilot Project A: Human Resource Development: from workshop training to the implementation**

This study focused on implementing and evaluating two pilot projects in the tourism sector. The first project called the Maesapok Workshop Training aimed to equip residents of Mae Sapok Village with the knowledge and skills for tourism. The objective was to address the lack of expertise that hinders tourism development in the area. This initiative aligns with studies that have identified a lack of knowledge and skills as barriers to tourism development (Aref, 2009; Chili and Ngxongo , 2017; Prachanant , 2012). In tourism literature, community capacity is often used to describe the local's abilities and knowledge related to tourism. It refers to their competence levels and skills required for establishing and achieving objectives (Balint and Mashinya, 2006). However, community capacity does not depend on skills but on social capital. A crucial aspect highlighted by Hounslow (2002). Social capital refers to the resources that individuals can access based on their connections with others (Woodhouse, 2006). Woodhouse (2006) further emphasizes that social capital includes both connections within society and the level of trust and cohesion present. Consequently, it plays a role in facilitating activities for communities (Balint, 2006). Therefore, this training aims not to provide knowledge but foster connections, among the residents of Maesapok Village who are part of Karen community. The sufficiency economy principle focuses on human resources as the center of sustainable development. It can formulate mutually supportive and reinforcing policies, programmes, and projects that collectively and directly promote growth that is strategic Human resource development can be in line with SE by working together with governmental agencies, local community leaders, management teams, and academicians, HRD professional (Pruetipibultham, 2010).

Building community capabilities is also in line with the strategies used by SEPs to promote tourism development. Therefore, through this research process, MSAO and Maesapok village cooperated with Chiangmai Rajabhat University to organize a tourism workshop training project in the Maewin sub-district. This training was held for five days in August 2021 at MSAO station. MSAO had limited the number of participants in the training to 50 people from Maesapok and nearby villages in the sub-district. This project was managed by experts in various related tourism fields. This training consisted of four topics and practical activities including community-based tourism, sufficiency economy principles providing insightful commentary, managing community tours and basic English for catering to tourists. According to the research findings, the human resource development project by providing workshop in Maesapok village helped the participants to gain skills related to community tourism and the concept of SEP allowing them to be able to implement three working activities which is a strategy for tourism resource development in pilot project B.

**Figure 1:** the courses in workshop training were raised from community requirements based on the SEP principles (Self-immunity, Knowledge, Morality).

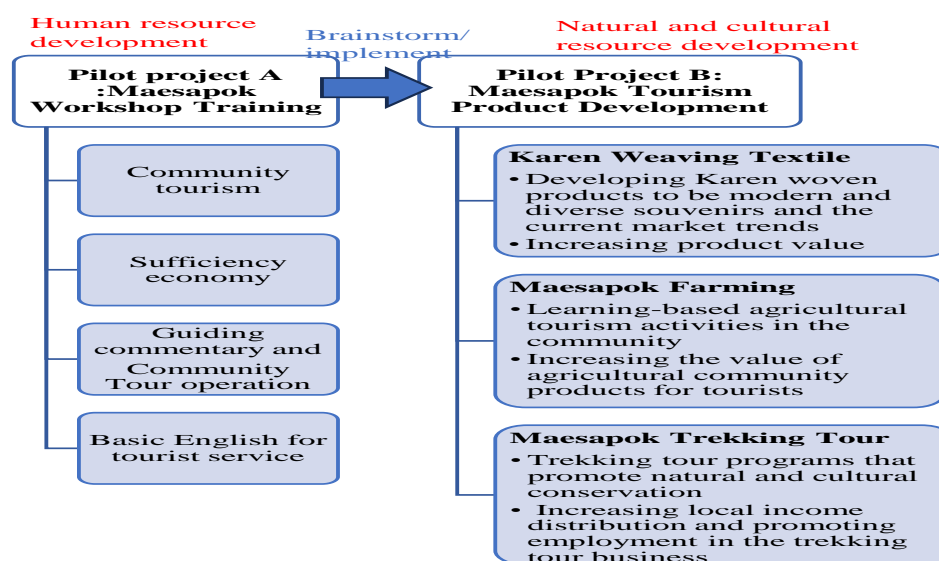


Figure 1: The human resource development (workshop training) leads to tourism product development (pilot project B) following SEP

The *community tourism course* allowed the participants to understand the concept and objectives of community tourism so they could present their tourism activities and working groups in Maesapok. As a result, the participants could develop their unique natural resources and cultural resources in Maesapok into more sustainable tourism activities in pilot project B. Together with the knowledge from the *sufficiency economy course*, the participants were equipped with the application of SEP which enabled them to integrate the sufficiency economy concepts in those tourism activities to add value to the products and services under ethical practices. By using the SEP framework in tourism activities, the local people were not self-centered but also thought about the benefits of other people and resources in a more holistic view. For example, they developed the Maesapok trekking tour with the objectives of promoting natural and cultural resources, as well as raising income for the locals and providing knowledge and quality tours to the tourists making the program more sustainable. Moreover, skills from the course of *Guiding commentary and Community Tour operation* are useful for creating tourism activities to become more interesting to tourists. For example, traditional farming was developed to become learning-based agricultural tourism by providing knowledge to tourists. Although the *Basic English for Tourist Service course* benefited only some groups of participants as most of them do not speak English, it allows those people to be able to communicate with foreign tourists with the basic conversation. Importantly, the workshop training activity also provides an opportunity for community members and stakeholders to participate in decision-making to select the appropriate approaches in their local resource management and community tourism development.

#### 4.3 Pilot Project B: Cultural and Natural Resources Development into Tourism Products.

After attending the workshop training in the first pilot project, the participants were able to create pilot project B that will serve as a strategy for developing community tourism resources under SEP. Karen people and stakeholders need to take a part in planning and operating their cultural and natural resources development into tourism products. The researcher and all 32 participants jointly brainstormed to set up pilot project B for tourism resource development in Maesapok following a sufficiency economy approach based on background, problems, current

situations, and community requirements. Finally, there were three sections of the working group consisting of Maesapok Farming Group, Karen Textile Weaving Group and Maesapok Trekking Tour Group. The members of the working group discussed the current situations and problems before brainstorming ideas to implement an initiative based on the sufficiency economy approach following the principles of sufficiency economy as follows.

**Group 1. Maesapok Trekking Tour (13 members)**

The members of the forest tourism group believe that the trekking programs in Mae Sapok Village should be developed to generate income for the villagers and boost ecotourism, thus promoting the value of natural resources and tribal cultures. This can be achieved by providing knowledge and organizing conservation-promoting activities.

**Group 2. Karen Weaving Textile (8 members)**

According to the fact that the designs and patterns of Karen woven products in Mae Sapok Village are traditional and old-fashioned, they do not appeal to many tourists. As a result, there is a need to explore new ways to develop the potential of woven products in the community to add value to the product based on the sufficiency economy approach.

**Group 3. Maesapok Farming (10 members)**

Promoting rice and rice farming would enable most villagers to contribute to the development and reap the benefits. The produce to promote tourism should be an attractive signature of the community. During COVID-19, the community should start a plan or an initiative to develop the agricultural occupation of the Karen in the village so that the community can become self-reliant in both the agriculture and tourism sectors in the future.

**Table 3: Implementation of the pilot project B based on the SEP concept**

| SEP                   | Implementation of Group 1. Maesapok Trekking Tour  |
|-----------------------|--|
| <b>Moderation</b>     | <ul style="list-style-type: none"> <li>- Designing trekking tour programs to promote natural and cultural conservation</li> <li>- Encouraging people in the community to work in or contribute to the tourism industry as a part-time job</li> </ul>   |
| <b>Reasonableness</b> | <ul style="list-style-type: none"> <li>- Limiting the number of tourists in a forest tour program to prevent negative impacts on the community</li> <li>- Setting regulations and rules for tourists to comply with during the tour program in the community</li> </ul>  |
| <b>Self-immunity</b>  | <ul style="list-style-type: none"> <li>- Designing various attractive tour programs for tourists</li> <li>- Encouraging everyone in the community to contribute to forest tour programs</li> <li>- Collaborating with local educational institutions to develop the personnel's potential and enhance marketing for the tourism industry in the community</li> </ul> |
| SEP                   | Implementation of Group 2. Karen Weaving Textile   |
| <b>Moderation</b>     | <ul style="list-style-type: none"> <li>- Designing learning-based agricultural tourism activities that fit with the lifestyles of the community</li> <li>- Presenting an agricultural tourism experience that is environmentally friendly and energy-saving</li> <li>- Promoting Karen organic rice as a signature product of the community</li> </ul>               |
| <b>Reasonableness</b> | <ul style="list-style-type: none"> <li>- Limiting the number of tourists, duration of activities, and time to prevent negative impacts on the villagers' lives</li> </ul>  |
| <b>Self-immunity</b>  | <ul style="list-style-type: none"> <li>- Designing agricultural tourism activities that provide both knowledge and entertainment for tourists</li> <li>- Recruiting farmers who want to participate in developing Karen rice products as a signature product of the community</li> </ul>   |



| <b>SEP</b>           | <b>Implementation of Group 1. Maesapok Trekking Tour</b>   |
|----------------------|--|
| <b>Knowledge</b>     | - Offering experience-based agricultural tourism activities<br>- Training farmers to be tour guides in the community   |
| <b>Morality</b>      | - Developing quality products and selling them at a reasonable price<br>- Encouraging environmental conservation among tourists  |
| <b>SEP</b>           | <b>Implementation of Group 3. Maesapok Farming</b>   |
| <b>Moderation</b>    | - Incorporating traditional Karen weaving techniques and natural dyes<br>- Managing the production based on traditional tribal cultures  |
| <b>Self-immunity</b> | - Boosting sales by providing a wide range of products<br>- Sourcing natural materials available in the community<br>- Recruiting the villagers to establish an official Mae Sapok female weaver group |
| <b>Knowledge</b>     | - Demonstrating the weaving process and explaining cultural knowledge to tourists<br>- Studying traditional wisdom to develop new types of products  |
| <b>Morality</b>      | - Controlling the quality of products and setting suitable prices<br>- Encouraging the conservation of tribal cultures among tourists  |

Source: original for this study

Recognising the need to reclaim their heritage and provide a more authentic experience to tourists, the community came together under the guidance of SEP. The focus was to develop tourism resources rooted in the sufficiency economy approach. As a result, three major working groups were formed: Karen Textile Weaving, Maesapok Farming, and Maesapok Trekking Tour. For the Maesapok Trekking Tour, the emphasis was on creating a trekking ecotourism programme that showcased both the beauty of nature and the richness of tribal culture. The culmination of these efforts, through active community participation, is the development of tourism products that not only showcase the village's unique offerings but also promote sustainable practices that benefit both the community and the environment. However, like any developmental endeavour, challenges arise. Balancing tourism demand with preservation, ensuring equitable distribution of tourism revenues, and managing external influences are ongoing concerns. Yet, with the foundation of SEP and a focus on sustainable development, Maesapok village is well-positioned to navigate these challenges, ensuring that their growth is holistic, inclusive, and sustainable for next generations.

#### **4.4 The Development of the Strategy for Sustainable Tourism Resource Development in Karen Community Maesapok village, Thailand**

The tourism resource development strategies in Maesapok village within the Karen community aims to achieve objectives through project management based on the Integrated Strategy Model developed by Jean Fahmy in 2012. Fahmys's model serves as a framework for creating a tourism promotion plan for Maesapok Village. This research aims to promote tourism in Maesapok Village based on SEP and ensure stable development at all levels from individuals and families within the Karen community to the entire village. The vision is for Maesapok to become a model for tourism resource development among Karen communities and ethnic groups by 2025. This is to empower residents with employment and income opportunities through tourism resource development under SEP while preserving culture, lifestyle and environment. Furthermore, this study aims to provide tourists, with an enriching experience of tourism. To enhance community involvement in the development of tourism the following strategies were recommended by the participants:

1. Focus on language proficiency in both Thai and English for residents of Maesapok village. Regular training and assessments should be conducted in collaboration with universities or authorities.

2. Organize training sessions and meetings to educate locals, about the concept of community tourism and Sufficiency Economy Principles (SEP) comprising Moderation (Living without Greed or Extravagance), Reasonableness (Analytical Thinking and Evaluation) and Self-Immunity (Risk Management and Self - Protection) ensuring they stay updated with skills and knowledge.
3. Improve the production process of souvenirs to meet established standards at every stage.
4. Ensure that souvenirs are trendy and aligned with market demand.
5. Souvenirs should represent the characteristics of Maesapok village.
6. Encourage a cooperative approach where tourists can participate in the souvenir making process adding more value to the souvenirs, and
7. Enhance branding and packaging to increase the value and attractiveness of the souvenirs.

SEP advocates for community involvement in tourism through the establishment of dedicated working groups. Networking within the SEP framework fosters a protective environment (Ubonsri & Pannun, 2013). Indaratna (2013) posits that SEP challenges conventional business norms, urging a shift towards moderation and ethical practices to safeguard natural and cultural assets. An integrated tourism approach is the most effective route to sustainability (Greg & Derek, 2003). The principles of the sufficiency economy offer an alternative pathway to sustainable development without compromising environmental and cultural integrity. This research posits that SEP can guide a strategy for sustainable tourism resource development in Maesapok village that should be recognised as follows.

**Moderation:** Strategies include managing tourism in a manner that's suitable for local livelihoods preserving local cultures promoting energy and resource conservation and maintaining traditional occupations. These strategies are considered feasible as they align with the principle of moderation. Can contribute to tourism development.

**Reasonableness:** Strategies involve controlling tourist numbers to mitigate impacts on the community protected areas for tourism activities and implementing guidelines for protecting tourism resources. While some strategies align well with reasonableness others may pose challenges for villagers to implement effectively such as evaluating the impacts of tourism.

**Self-Immunity:** Strategies encompass creating and promoting types of tourism products utilizing labor and materials and enhancing local participation and networks in sustainable tourism development. These strategies foster self-immunity and resilience, against challenges while remaining attainable.

**Knowledge:** Promoting tourism, in Maesapok Village involves strategies that focus on knowledge, wisdom and academic approaches. These strategies include providing experiences for tourists studying the culture and traditions and supporting the community's capacity for tourism development. By emphasizing the importance of knowledge and education these strategies aim to ensure practices in tourism.

**Morality:** Another aspect of promoting tourism is through the promotion of virtues and ethical behavior. This includes operating tourism businesses with honesty and fairness ensuring a distribution of benefits to the community and fostering a sense of moral responsibility among both hosts and tourists.

In summary implementing the SEP in Maesapok Village for tourism development involves promoting moderation, reasonableness, self-immunity, knowledge acquisition and fostering values. While many of these approaches are considered achievable and beneficial, for the community's well-being some challenges may arise during implementation and evaluation processes. This research explores the relationship between Sufficiency Economy Philosophy (SEP) and sustainable development objectives in Thai tourism. It highlights the potential of

SEP principles in guiding the Karen community towards sustainable tourism resource management. The Global Sustainable Tourism Council's 2020 Destination Criteria serve as a benchmark for sustainable tourism, focusing on sustainable management, socio-economic sustainability, cultural sustainability, and environmental sustainability. By adhering to SEP principles, tourism development can achieve Sustainable Development Goals, fostering economic ties, mitigating impacts, and enhancing socio-cultural health. In this analysis, the research examined the feasibility of achieving Development Goals (SDGs) in relation to the proposed strategies (as mentioned in the previous section) for sustainable tourism development in Maesapok Village. A summary of the findings in relation to SDGs can be described as follows.

1. No poverty (SDG 1); While the strategies do not specifically target poverty eradication, they can effectively reduce poverty by promoting tourism, which generates income for the community. It is achievable.
2. Zero Hunger (SDG 2); The recommended strategies indirectly support zero hunger by fostering growth and encouraging self-farming and gardening projects that can provide food for consumption. It is achievable.
3. Health and well-being (SDG 3); Economic growth derived from tourism can contribute to the well-being of villagers. However, achieving health may require measures such as ensuring access to essential healthcare services and preventive medicine. The guidelines suggest prioritising access to healthcare services and preventive medicine.
4. Quality education (SDG 4); Achieving widespread quality education may pose challenges. There are workshop training projects to enhance knowledge and skills in tourism development. Collaboration with government authorities is recommended to ensure access to education.
5. Gender equality (SDG 5); The strategies may not be applicable to any attempt to achieve gender equality but the pilot project of Karen weaving textile development is a part of the strategy's mission for tourism employment promotion for locals. In particular, ethnic women empowerment are able to earn a self-sufficient income and support their families.
6. Clean water and sanitation (SDG 6); Although there is currently no plan in place for addressing this goal, it is recommended to consider adopting water treatment technologies in the future.
7. Affordable and clean energy (SDG 7); At present, there is no existing strategy to tackle this goal. However, it may be worth considering government subsidies to promote the use of energy.
8. Decent Economic growth (SDG 8); There are strategies that can contribute to the improvement of work and economic growth in Maesapok. These strategies are achievable.
9. Industry, innovation and infrastructure (SDG 9); While the focus primarily lies on tourism, there is potential for enhancing innovation through concepts like data utilisation and online promotion.
10. Reduced inequalities (SDG 10); The strategies do not offer any analysis on how achievable. It is to reduce inequalities with the suggested strategies. The community may need to have a formal agreement to distribute income equally between outside operators and the community. Government assistance should be given equal importance to tourism work among all groups of the population and all occupations of the community.
11. Sustainable Communities (SDG 11); The recommended strategies as a support the development of sustainable cities and communities by emphasizing community-based tourism. These goals are attainable.

12. Responsible. Production (SDG 12); Encouraging training programs for farming and gardening promotes consumption and production. These goals can be achieved.

13. Climate action (SDG 13); The overall impact of these strategies can directly contribute positively towards climate change mitigation. These goals are attainable.

17. When it comes to partnerships for the goals (SDG 17), the strategies primarily focus on collaborating with stakeholders and the community. These goals seem achievable.

To sum up, the strategies proposed for tourism development in Maesapok Village have the potential to make a contribution towards several SDGs. However, some aspects require attention and specific guidelines for implementation. It is worth noting that this is the phase of development and a gradual step by step approach is recommended to avoid overwhelming the community.

### **Recommendations for Actions based on Research Findings**

To ensure tourism development in Maesapok Village, it is advisable to adopt approaches that align with the Sufficiency Economy Principles (SEP). Some actionable recommendations to effectively implement these principles are presented as follows.

#### ***Emphasize Moderation (Living without Greed or Extravagance)***

- Encourage the development and promotion of products such as weaving textiles and agricultural goods as part of the village's tourism offerings. This will not showcase the community's cultural heritage but also create income opportunities.
- Prioritize the preservation of local cultures for tourism purposes while avoiding excessive modifications. It is important to share practices, rituals and customs with tourists in a respectful manner.
- Promote energy and resource saving practices within tourism operations by emphasizing the importance of reducing, reusing and recycling materials. This approach conserves resources while also reducing costs for the community.

#### ***Foster Reasonableness (Analytical Thinking and Evaluation);***

- Integrate occupations into the tourism sector by providing job opportunities for the Karen people. This will help sustain their livelihoods while highlighting their coexistence with nature.

Furthermore, recommendations aim to support tourism growth in Maesapok Village by embracing practices that respect local culture, conserve resources and promote economic opportunities for the community are provided as follows.

***Manage Tourist Numbers and Activities*** ; It is important to establish guidelines to handle the number of tourists and their activities. This will ensure that negative impacts, on the community, culture and environment are minimized . Additionally, during the COVID 19 it is crucial to implement measures that prioritize hygienic tourism practices.

***Protected Areas for Tourism*** ; Collaboration with relevant authorities such as Obkhan National Park should be encouraged to designate specific areas within Maesapok solely for tourism purposes. This step will help protect and preserve the beauty and cultural resources of the region.

***Focus on Domestic Market*** ; While international tourists are important it is recommended to prioritize catering to tourists. Understanding their needs and preferences can greatly contribute to boosting tourism.

***Guidelines for Protecting Tourism Resources*** ; It is essential to develop guidelines that enforce the protection of tourism resources in Maesapok. These guidelines should focus on preserving cultural heritage elements like Karen weaving textiles, traditional houses Karen beliefs, as recognizing the role of forest guardians.

***Diversify Tourism Products and Activities***; To reduce reliance on a segment of tourism it is advisable to create and promote types of tourism products and activities. This can include options, like tourism, cultural tourism, eco-tourism, creative tourism or volunteer-based opportunities.

## **5. Conclusion**

When applied to Maesapok village's tourism initiatives, SEP principles guided the community to transform their indigenous resources into sustainable tourism products without compromising their environmental and cultural integrity. The strategy for tourism resource development under SEP in Maesapok could be as the alternative guideline for sustainable community tourism development.

To promote tourism in Maesapok, it is important to involve people and utilize local resources. Encouraging the participation of community members, as instructors or tour leaders can create unique and environmentally friendly tourism products. Additionally collaborating with institutions in Chiangmai province will help establish a network focused on developing human resources for the tourism industry. Building partnerships with both government and private sectors will ensure long term growth and development. In order to provide enriching experiences for tourists working closely with governments and educational institutions is crucial. This collaboration can support the creation of tourism programs that allow visitors to learn about the culture, environment and traditions of the region.

Empowering the Karen people in tourism management and service is also important. By promoting the study of their knowledge individuals can become cultural tribal teachers or tour leaders within their own community. Promoting honesty and fairness in all aspects of tourism business operations should be a priority. This includes developing pricing models that're transparent and treating tourists fairly. It is equally essential to ensure that local entrepreneurs and workers in the tourism industry receive compensation for their contributions. Implementing mechanisms, for income distribution will help achieve this goal.

By implementing these measures, it will create tourism practices that not benefit visitors but also empower local communities economically and culturally. To promote a sense and encourage behavior it is important to incorporate ethical thinking and practices into the training sessions of tourism workshops. It would be beneficial to foster a service-oriented mindset, among hosts and tourists with an emphasis on respecting the traditions of the tribal communities. Additionally engaging in activities that promote responsibility, such as community development projects and environmental protection initiatives can greatly contribute to these efforts. Maesapok Village can further align itself with SEP. Adopt its approaches that support sustainable tourism development. This approach ensures that while cultural heritage is preserved the well-being of both the community and visitors is enhanced. To ensure effectiveness it is crucial to involve participation from the community relevant authorities and stakeholders, in undertaking these actions collaboratively.

## **Suggestion for Future Research**

Based on the discussions and findings of the study we have identified recommendations for research and action. Firstly, it is important to conduct an assessment of the long term impact that the pilot projects in Maesapok Village have had on stability, cultural preservation and social well-being. Additionally, the next research should explore ways to promote gender equality

within the development of tourism by empowering women and addressing any challenges they may face. It is crucial to address issues related to water, sanitation clean energy by focusing on research and development projects that offer accessible solutions. There needs to be some strategies in place to tackle inequalities prepare for shocks like COVID-19 pandemic and establish evaluation frameworks. Moreover, integrating education and cultural preservation into tourism plans fostering partnerships and collaborations among stakeholders studying tourist behavior patterns as developing leadership and governance skills within the community are key elements for sustainable tourism development. Maesapok could be as the pilot community in the tourism resource potentiality development and the sample of successful ethnic tourism development for other areas.

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# **Analysis of the Correlation between the Use of the E-visitor Information System and the Number of Registered Tourists: A Case Study of Zadar County**

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## **Abstract**

This paper provides an introduction to the use of technologies in tourism and the legislative framework that regulates tourist registration. The legislative framework has facilitated the introduction of the E-visitor information system, which was introduced in the Republic of Croatia in 2016 and is used for registering tourists in all types of accommodation facilities. The movement of tourists in Zadar County is shown through a comparative analysis of secondary data, namely statistical reports from the Zadar County Tourist Board from 2015 to 2023. The trends in tourist movement in Zadar County are derived from these reports. In addition to the statistical processing of tourist registration movements before and after the introduction of the E-Visitor system, and finding the impact of using advanced technologies on the number of registered tourists, this paper also examines user satisfaction with E-Visitor in Zadar County. During the research, respondents could, in addition to evaluating the E-visitor system, also make suggestions for its improvement. The research was conducted with the help of Internet and ICT technologies, i.e., using an online survey questionnaire. The goals of this paper are to show the relevance, role, and impact of information systems in the tourism sector, provide an overview and analysis of reports on tourist traffic in Zadar County for the period from 2015 to 2023 based on the introduction of the E-visitor system, and examine, determine and analyze the attitudes of Zadar County accommodation service providers about the positive and negative effects of online guest registration via E-visitor. The results of the research are statistically analyzed through various statistical procedures, with their purpose being to show how much and how the use of the E-visitor system affects the number of tourist registrations in Zadar County.

**Keywords:** ICT, e-visitor information system, tourists, registrations

## **1. Introduction**

The widespread use of the internet and information technologies has marked the 21st century. Digitization has encompassed all spheres of human life, and technology is present in all economic sectors. Through the digitization and automation of business processes, greater efficiency and effectiveness are achieved, ultimately resulting in savings.

Over the past two decades, new technologies have become fully integrated in tourism sector, which is evident in the computerization of almost all processes. Large information systems in tourism provide the possibility of tracking tourist movements worldwide, as well as trends that characterize this sector. This is possible with the help of various search tools that combine information systems and analyze “Big Data”. Information and communication technologies (ICT) have revolutionized the way tourism businesses operate and how tourists experience their travels. From online booking systems and virtual tours to mobile apps and social media platforms for sharing travel experiences, ICT has transformed every aspect of tourism. They play a pivotal role in enhancing long-distance communication and providing tourists with information about their desired destinations and accommodations.

Moreover, these technologies also enable industry professionals and institutions to monitor trends and the movement of tourists across various locations. Many tourist destinations worldwide have digitized their tourist registration processes. For instance, Croatia has implemented an ICT solution known as E-visitor for tourist registration. This system has

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simplified the registration process for both accommodation service providers and tourist boards, who can now more easily analyze and interpret the data received. Furthermore, the E-visitor system is integrated with public authorities, significantly streamlining the organization of tourist data.

A total of 1,800,000 arrivals were recorded in 2017, marking an 11% increase from the previous year and an 18% rise in overnight stays, surpassing the projected increase of 3%. The E-visitor system, implemented since 2016, has demonstrated considerable success. Its introduction has coincided with a substantial surge in both tourist arrivals and overnight stays in Zadar County. This can be attributed to the streamlined record-keeping process and the capability to incorporate all landlords into the statistical data gathered by tourist boards. As the E-visitor system is relatively new, research is being conducted to gauge the satisfaction levels of accommodation providers with this system. The aim is to identify its real-world advantages, potential constraints, and opportunities for enhancing its practical application.

The research objectives are as follows:

- provide an overview and analysis of the tourism traffic reports of Zadar County in the period from 2015 to 2023 based on the introduction of the E-visitor system
- examine, determine and analyze the attitudes of accommodation service providers in Zadar County about the positive and negative effects of online guest registration via E-visitor

The paper attempted to answer the following research questions:

1. Does E-visitor facilitate the tracking of tourist activities in Zadar County?
2. Does E-visitor facilitate guest registration for accommodation service providers in Zadar County?
3. Does the introduction of E-visitor increase the number of tourist traffic in Zadar County?

For the purpose of this study, tourist movements in Zadar County were analyzed, and the difference in the number of arrivals and overnight stays with the introduction of the E-visitor system was determined. The method of surveying using standardized questions formed in the form of a survey was used to collect primary data, based on which the attitudes of accommodation service providers in Zadar County about the positive and negative effects of introducing the system of online guest registration via E-visitor could be examined, determined and analyzed.

The rapid development of the internet has accelerated the construction of tourist information. Written forms have been replaced by digital records, and the world has already moved from the period of digitization to the period of acceleration.

In their work, Wenjie and Changguo (2016) emphasize that: „...initially hotels, airlines, travel agencies and other tourism service providers moved their own offline business to the internet, forming a unique travel service platform, later a one-stop service platform like food, accommodation, travel, shopping, entertainment etc. which flourished at home and abroad, relying on the support of network technology.“ This type of grouping of tourist services has made it easier for tourists to browse and choose them for their journey.

Services are becoming more personalized, and in the era of big data, tourism is beginning to transition from sightseeing to travel experience. Tourists’ reliance on travel agents is shifting towards online self-help, which is becoming increasingly apparent, and their demand for

convenient access to information is higher. To keep pace with these changes, it is necessary to collect all data valuable to the tourism industry.

Data mining is a technique that can extract valuable information from a plethora of data. In present times, mining the following data becomes increasingly important:

- Valuable tourist information (search history)
- Information about potential travelers
- Information for optimizing tourist routes
- Information about behavior, interests, and hobbies for recommending tourist projects and destinations.

In this context, Big Data mining can be viewed as a market research technique. As the demands of tourists are increasing today, these and similar techniques can easily lead to interesting information useful for the tourism offer.

## **2. Legal Framework for Tourist Registration in the Republic of Croatia**

In Croatia, the legal framework for registering tourists encompasses both the Law on Sojourn Tax and a regulation detailing how to maintain a tourist register and what should be included in a tourist board application form. These pieces of legislation cover all aspects mentioned in their respective titles.

The Law on Sojourn Tax regulates: “...the obligation to pay the sojourn tax, the method of determining the amount of the sojourn tax, the distribution of collected sojourn tax funds, deadlines and methods of collection and payment of the sojourn tax, registration and deregistration of tourists, and other issues of importance for collecting and distributing the sojourn tax and recording tourist nights.” (Narodne novine, 2008)

The “Sojourn Tax” serves as a financial resource for tourist boards, which is then allocated based on each individual board’s requirements. The Sojourn Tax is paid by:

1. „Individuals who use accommodation services in a tourist municipality or city where they do not reside, in an accommodation facility where hospitality activities are performed;
2. Travelers who use overnight services on a nautical tourism vessel (charter, cruising);
3. Individuals who provide accommodation services in a household or farm;
4. The owner of a holiday home or apartment in a tourist municipality or city, which is not considered an accommodation facility under this Law, for themselves and all persons staying in that house or apartment;
5. The owner of a vessel that is not considered a nautical tourism vessel under this Law, for themselves and all persons staying on that vessel for tourist purposes.“ (Narodne novine, 2008)

The amount that the landlord pays is tied to the number of nights booked. The Law published in the national official bulletin called „Narodne novine“ states that for each night achieved, a sojourn tax is paid, which also applies to foreign citizens, unless otherwise stated in the Law. Also, there are exceptions, i.e., exemptions from payment and those for whom the sojourn tax is paid at 50% of the amount. The payment of the fee is possible according to the nights achieved or lump sum, and obligations and due dates of payment can be read in more detail in the Law. The funds are distributed between the tourist board of the city or municipality, tourist board of

the county and the national tourist board according to a certain key. In another official document, i.e., the Regulation, what is stated in the title of the document itself is defined.

From January 1, 2016, this regulation has been in effect. One of its provisions states that: “...the list of tourists, registration and deregistration are carried out through the eVisitor system as the central electronic system for registering and deregistering tourists in the Republic of Croatia.” (Narodne novine, 2015) Until then, all tourist registrations were filled out using a standard form and were delivered in printed or electronic form to the competent Tourist Boards.

### **3. E-visitor**

In the Republic of Croatia, there has been an obligation to register guests since 1991. This obligation was fulfilled by filling out written forms and delivering them to the local tourist board until 2016. With the introduction of E-visitor, the forms have been digitized and guest registration is faster and simpler. Also, the likelihood of error is reduced as once entered data is only shared through the system. It is certainly important to educate users about the obligations and possibilities of the system so that they enter data in a timely and valid manner.

The E-visitor system was introduced in Croatia in 2016, and it represents: “... a unique information system for registering and deregistering tourists that functionally connects all tourist boards in the Republic of Croatia. The eVisitor system is used to collect and process data on accommodation service providers and their accommodation facilities in the Republic of Croatia, for the purpose of registering and deregistering tourists by accommodation service providers, calculating and controlling the collection of sojourn tax, processing and analyzing data necessary for reporting for statistical purposes, and mutual cooperation of public authorities in performing legal tasks.” (HTZ, 2021)

The E-visitor system has several objectives:

- „Collection and processing of data on accommodation service providers
- Registration and deregistration of tourists
- Calculation and control of sojourn tax collection
- Processing and analysis of data and reporting for statistical purposes
- Mutual cooperation of public authorities in performing legal tasks
- Destination management.“ (HTZ, 2021)

To gain access to the E-visitor system, an individual or a legal entity must request login credentials from their local tourist board. The E-visitor system allows users to log in via the e-Citizen system, using a username, password, and a TAN list. Alternatively, they can connect electronically using an API interface that links the E-visitor system with a specific hotel or agency’s reservation system. The E-visitor homepage displays local events, notifications from the tourist board, current tourists, and on the right side, it shows the weather forecast and the current debt status. The debt status indicates the amount due to the tourist board for the fee. Settings can be found in the upper right corner. Clicking on them reveals user data, login credentials (with the option to change them), and additional persons. The TAN list is a set of numbers used for extra verification during login. Additional persons are accounts that the main user can add, who can use the account to register tourists. In this case, the main user is accountable for each additional person on their account.

Since its introduction in 2016, the E-visitor System has consolidated data from multiple public authorities in Croatia. The eVisitor system shares data with other public authorities that have a legal basis for it within the limits allowed by law and their scope of work. (HTZ, 2021)

Public authorities connected with the E-visitor are: State Bureau of Statistics, Ministry of Internal Affairs, Customs Administration, Tourist Inspection and FINA (National Financial Agency).

The State Bureau of Statistics, in accordance with its legal obligations, receives data on tourists, facilities, obligors, obligors, in the territory of the Republic of Croatia from the E-visitor. Reports are submitted to the State Bureau of Statistics, which then reviews them, uses them and prepares them for the public and forwards them through the envisaged channels, all in accordance with legal regulation and agreed terms. There is a possibility that the data of the State Bureau of Statistics and E-visitor have some differences, but this is attributed to differences in the methodology used to obtain data as well as the way it is counted and the moment when the data was taken. (HTZ, 2021)

The Ministry of Internal Affairs, on the other hand, needs to review the registration of foreigners in Croatia. The E-visitor system provides a secure and direct registration of foreign individuals in the database of the Ministry of Internal Affairs. The E-visitor system reports all data to the Ministry of Internal Affairs system several times a day. The authority of the Ministry of Internal Affairs staff allow them access to the E-visitor in order to perform their tasks and obligations according to the instructions of superiors and/or job description. Just like the Ministry of Internal Affairs, the Customs Administration has tasks that it must perform, and through the E-visitor system, it can detect various misdemeanor actions and apply to responsible persons. The Tourist Inspection, just like the Customs Administration, has its software solution on the E-visitor.

The Tourist Inspection has developed a special software solution that allows them to easily and effectively overview all the data necessary for performing their tasks. Just like the Customs Administration, the Inspection can access the data of any obligor at any time without prior consultation with the tourist boards, all with the aim of performing their tasks. By connecting with FINA, obligors can easily review the maturity of their obligations on the E-visitor user account. The main office of the Croatian Tourist Board has taken over the responsibility for the cost of retrieving data on obligors and their payments. Before that, this cost was calculated separately for each local tourist board.

#### **4. Empirical Analysis**

Zadar County, located along Croatia’s coast, has been witnessing a consistent rise in tourist arrivals and overnight stays during the summer months, year after year. An examination of the reports from Croatia’s State Bureau of Statistics reveals a growth trend in both arrivals and overnight stays from 2015 to 2020 within Zadar County. However, there was a notable exception in 2020 due to the COVID-19 pandemic which led to a decrease. Between 2015 and 2019, Zadar County held the fifth position for tourist arrivals, improving to fourth place in 2020. The counties leading in tourist arrivals include Istria, Split-Dalmatia, Primorje-Gorski Kotar, and Dubrovnik-Neretva. A similar pattern is observed with overnight stays as well. From 2015 to 2019, there was an increasing trend in overnight stays with Zadar County ranking fourth. The counties recording the highest number of overnight stays are Istria, Split-Dalmatia, and Primorje-Gorski Kotar. (State Bureau of Statistics, 2022)

Table 1 presents a yearly breakdown of tourist arrivals and overnight stays in Zadar County. A notable decline is observed in 2020, with a decrease of 119.05% in arrivals and an 80% drop in overnight stays compared to 2019. In both 2015 and 2016, Zadar emerged as the leading tourist hub in terms of both arrivals and overnight stays. According to the statistical analysis of tourist traffic in 2017, there was an increase of 11% in arrivals and an increase of 18% in overnight stays from the previous year, surpassing the projected growth of just 3% for both metrics. In the subsequent year, 2018, Zadar County continued to see growth with a rise of 6% in arrivals

and overnight stays compared to figures from 2017. The data reveals a substantial surge in reported overnight stays and arrivals in 2017 relative to those from 2016. This surge is attributed to the introduction of the E-Visitor system in 2016, making data from 2017 a valuable resource for understanding the impact of this digital guest registration system.

In Zadar County, most overnight stays occur in private accommodations or household facilities. This type of accommodation has seen a growing trend over the selected period, with the exception of 2020. Following the onset of the Covid pandemic in 2020, there has been a marked increase in tourist arrivals and overnight stays. In 2019, private accommodations accounted for a significant 42% of all overnight stays. Zadar County is somewhat lacking in hotel accommodations, with the majority of hotel stays recorded by the Zadar Tourist Board. Conversely, the Zadar region is known as a camping destination, with Nin and Zaton Tourist Boards accounting for most of it. The number of stays at campsites has generally been increasing, except for a dip in 2020. Thanks to affordable flights, hostels are becoming increasingly popular in the county, particularly among younger visitors. In 2019 and 2020, overnight stays in mountain lodges and those from Robinson tourism were included in the hostel/resort category. Nautical tourism or floating objects make up a small percentage of the total overnight stays in the county. This share fluctuates between 5% and 6%, but it rose to 16.54% in 2020 due to a significant decrease in overnight stays in other facilities. Most overnight stays on floating objects occur in Biograd and Bibinje.

**Table 1:** The number of arrivals and overnight stays in Zadar county from 2015 to 2023.

|  | 2015      | 2016      | 2017      | 2018      | 2019      | 2020      | 2021      | 2022      | 2023      |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Hotels and tourist resorts</b>                    | 1.553.927 | 1.396.403 | 1.463.070 | 1.403.935 | 1.413.653 | 509.152   | 984.857   | 1.244.629 | 1.024.291 |
| <b>Camps</b>   | 1.953.377 | 1.952.777 | 2.082.606 | 2.094.551 | 2.160.711 | 1.125.972 | 2.118.872 | 2.408.903 | 2.036.522 |
| <b>Household facilities (private accommodation)</b>  | 4.435.309 | 4.831.899 | 5.651.722 | 6.064.365 | 6.252.112 | 3.449.080 | 4.501.839 | 5.547.212 | 4921.614  |
| <b>Hostels</b>                                       | 122.499   | 91.662    | 94.513    | 91.247    | 90.422    | 14.937    | 700.928   | 907.873   | 731.976   |
| <b>Floating objects (nautical)</b>                   | 645.869   | 686.896   | 668.815   | 668.203   | 738.538   | 414.319   | 692.113   | 772.509   | 556.231   |
| <b>Non-commercial accommodation (weekend houses)</b> | 2.005.954 | 2.607.706 | 3.738.162 | 4.146.998 | 4.450.955 | 423.285   | 3.670.424 | 3.982.906 | 3.693.961 |
| <b>Facilities on family farms (rural household)</b>  | -         | -         | -         | 11.933    | 16.658    | 13.936    | 21.273    | 20.674    | 19.929    |
| <b>Other</b>   | -         | -         | -         | 4.657     | 5.127     | 3.163     | 2.166     | 1.473     | 804       |

**Source:** Statistical analysis of tourist traffic from 2015 to 2023, [www.zadar.hr](http://www.zadar.hr)

Non-commercial accommodations or weekend houses have recently become particularly attractive and have seen an increasing trend in overnight stays. This category includes holiday homes, apartments, and rooms for rent owned by legal entities. From 2018 onwards, facilities on family farms have started to appear. These also show a growth trend and are particularly interesting due to their included gastronomic offerings. A total of 11 tourist boards in the county have registered family farms offering accommodation services. Like family farms and other types of accommodation, categorization has evolved over time. From 2018 onwards, there’s a category called “other” which includes organized camping arrivals/overnight stays and accommodations in taverns and restaurants. The least number of overnight stays are recorded in other types of accommodations.

Table 2 provides a display of chain indices for tourist arrivals and overnight stays in Zadar County from 2015 to 2023. The chain indices for 2020, a year marked by the onset of the pandemic, are highlighted in red in the sixth column. A substantial decline is evident during this period, particularly in terms of tourists staying at hotels and weekend houses. However, a rebound and robust growth are observed in 2021. The final column, also highlighted in red, is based on data from the first eight months of 2023. A careful review of the data from Table 1 suggests that by the end of 2023, we could see performance levels comparable to or potentially exceeding those of 2016, indicating a recovery from the pandemic’s impact by 2023.

**Table 2:** Display of chain indices of arrivals and overnight stays in Zadar County from 2015 to 2023

|  | 2016/2015 | 2017/2016 | 2018/2017 | 2019/2018 | 2020/2019 | 2021/2020 | 2022/2021 | 2023/2022 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>Hotels and tourist resorts</b>                    | 90        | 105       | 96        | 101       | 36        | 193       | 126       | 82        |
| <b>Camps</b>   | 100       | 107       | 101       | 103       | 52        | 188       | 114       | 85        |
| <b>Household facilities (private accommodation)</b>  | 109       | 117       | 107       | 103       | 55        | 131       | 123       | 89        |
| <b>Hostels</b>                                       | 75        | 103       | 97        | 99        | 17        | 4.693     | 130       | 81        |
| <b>Floating objects (nautical)</b>                   | 106       | 97        | 100       | 111       | 56        | 167       | 112       | 72        |
| <b>Non-commercial accommodation (weekend houses)</b> | 130       | 143       | 111       | 107       | 10        | 867       | 109       | 93        |
| <b>Facilities on family farms (rural households)</b> | -         | -         | -         | 84        | 153       | 153       | 97        | 96        |
| <b>Other</b>   | -         | -         | -         | 110       | 62        | 68        | 68        | 55        |

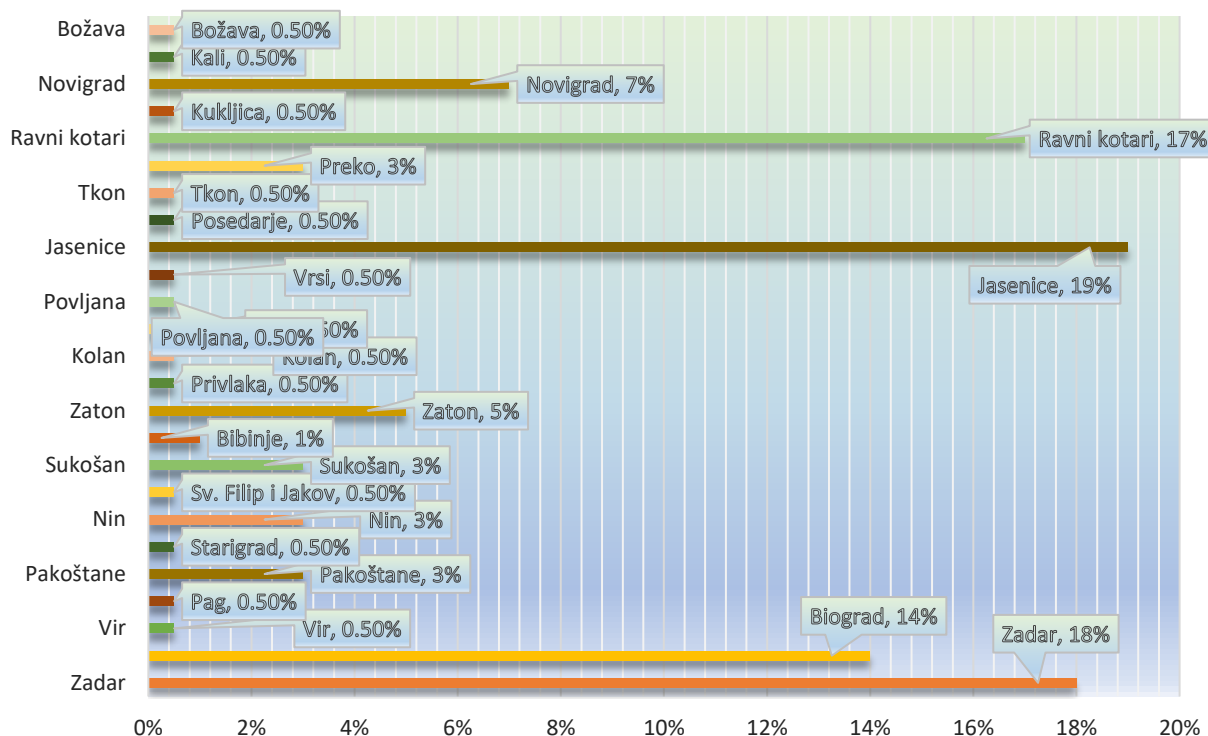
**Source:** Author's work

An online survey was conducted among accommodation renters in Zadar County with the aim of gathering information and assessing satisfaction with the use of E-visitor. Two specific questions were also posed to staff members of 11 tourist boards in Zadar County. A combined approach, namely qualitative and quantitative research methods, were used in data processing. To gather information about attitudes and satisfaction, an online survey was sent to respondents, which took them on average up to 5 minutes to complete. The total number of respondents who participated in the survey was 161, of which 153 use E-visitor and have an accommodation facility in Zadar County. The figure of 153 respondents will be used for further data interpretation. The survey used open-ended and closed-ended questions, measurement scales, dichotomous (YES/NO) questions, and multiple-choice questions. On the other hand, staff members of the tourist boards in Zadar County were asked to answer two specific open-ended questions.

Almost two-thirds (63.4%) of the respondents were women. Furthermore, 56.2% of the respondents were middle-aged, between 30 and 53 years old, and there were even 23.5% older than 60. The data suggests that older people have also become involved and computerized for the purpose of registering tourists. The majority of respondents come from Zadar, as much as 27%, followed by Biograd na Moru with 14 respondents, Maslenica with 11, and so on. 16



respondents come from the rest of Croatia, mostly Zagreb and Zagreb County, while 2 respondents come from abroad, namely Serbia and Germany. Almost 60% of respondents represent only 1 accommodation facility, 24% represent 2 facilities, 10% represent 3 facilities, and only 6% represent 4 or more facilities. Most of these accommodation facilities are located in Biograd (14%), then Zadar (13%), Maslenica (9%), Zaton (6%), and Jasenice, Benkovac and Rovanjaska (5%). Almost 60% of the accommodation facilities covered by this research are located in these 6 locations. Graph 6 shows the 13 tourist boards to which the 160 accommodation facilities belong. Most facilities fall under the Jasenice tourist board, then Zadar, Ravni kotari, Biograd, etc.



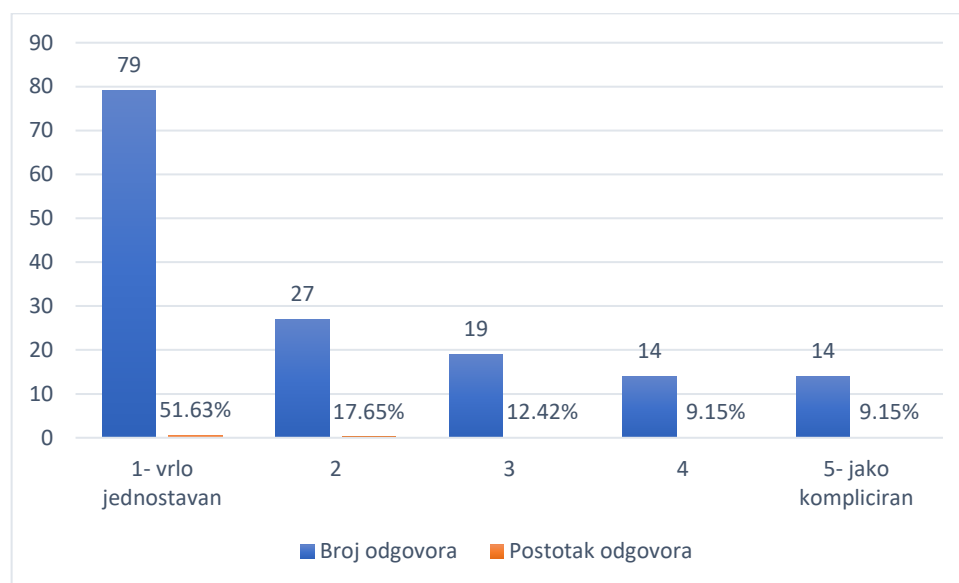
**Figure 1:** Which Tourist board does your accommodation facility belong to?

**Source:** Author's work

Regarding the structure, or categorization of accommodation facilities, the results of this research do not deviate significantly from the real structure of Croatian accommodation offer and private accommodation still has the largest share in accommodation. As many as 136 out of 156 facilities covered by this research (87.2%) are private accommodations. 96% of respondents believe that E-visitor has facilitated tourist registration. E-visitor has mandatory input fields, which only allow tourist registration when filled out: identity document, document number, surname, name, gender, city, country, citizenship, country and date of birth, stay from and to, category of payers of the sojourn tax, organization of arrival and type of service. These mandatory categories allow greater precision/detail in data entry. One of the options of E-visitor is keeping a Guest Book. If the renter enters all visitors in E-visitor, they are not obliged to keep another Guest Book in some other form. 63% of respondents keep a guest book in E-visitor, 27% do not keep it and 10% do not know or it is assumed that these 10% represent some renter on their E-visitor account.

A renter can extract the data they want from their account according to several parameters such as: object, country, date, type of tourist, and type of payment. 63% of respondents use this option, 30% do not use it and 7% do not know. The explanation for these results may lie in the

fact that about 60% of renters represent only one accommodation facility and probably know who, when, and for how long visits their facilities.



**Figure 2:** Display of the simplicity of using E-visitor rating

**Source:** Author's work

As seen in Figure 2, respondents rated the use of E-visitor as simple, with only 9.15% of respondents finding the system complicated. It is assumed that this 9.15% of respondents who find the system complicated may be skeptical about using new technologies, but this was not examined using known scales.

A total of 18 respondents gave suggestions for improving the E-visitor service, and these are some of the more important ones:

- **Official forms for (self)registration of guests** - With this form, the tourist would register themselves, thereby speeding up the registration process. Here it is necessary to pay attention to GDPR as well as that the mandatory input fields are directly connected with those in E-visitor.
- **Database of regular guests** - By creating a database of regular guests, faster registration would be enabled, i.e., the system itself would pull other data necessary for registration by personal identification number.
- **A system upgrade to foreign names/titles.**

With the aim of making the research more comprehensive, the number of respondents was expanded to 11 employees of local tourist boards in Zadar County. They had to answer 2 specific open-ended questions:

- Do information and communication technologies (in the context of E-visitor) help in standardizing statistical data about tourists?
- Do you think that renters are more precise, i.e., do they report tourists more since the introduction of E-Visitor?

All 11 employees of the tourist boards responded positively to the first question. They all agree that ICT helps in standardizing statistical data about tourists. The majority of respondents believe that the E-visitor system allows for the generation of various reports for the needs of institutions within and outside the tourism sector, and provides precise statistical data about

tourists. Almost 64% of respondents believe that the introduction of E-visitor better and more accurately represents the situation and is adapted to end users. The system is very easy to access from any place and at any time if they have internet access. In any case, adaptation and patience of tourist board employees were needed during the “training” of users. Great emphasis was placed on older users, but it is stated that younger renters often violate their obligation to register a guest within 24 hours. Similarly, neglect of obligations is seen among holiday home owners who were not sufficiently engaged in registration even before the introduction of E-visitor. The remaining 36% of tourist board employees do not agree with the fact that E-visitor has introduced major changes in terms of user timeliness, on the contrary, they believe that responsibility lies with the individual who, for example, is not informationally literate but still regularly fulfills their obligations by registering at the local tourist board.

## 5. Conclusions

Information systems in the modern world represent a very important resource for entities that manage them. These systems are the brain of a modern company, and the technology used for their collection and processing represents a tool. With the digitization and computerization of processes, data accumulates. Large databases of this data are called Big Data. Entities and companies that recognize Big Data as an important and valuable source of information can adapt and improve their business, make better decisions faster, generate higher sales of their products and services, and ultimately improve relationships with partners and customers. The Croatian Bureau of Statistics is a database of large data collected from all sectors of the economy.

The tourism sector also contributes to the influx of data into the CBS database. Since 2016, all accommodation renters have been obliged to register tourists in the E-visitor system. E-visitor is a digital information system that brings together a number of tourism entities as well as state institutions that need insight into the same data. These institutions provide information to users through E-visitor. E-visitor is a useful tool for HTZ and other public authorities to gain insight into the limitations of Croatia as a destination as well as opportunities arising from them.

The conducted research shows overall satisfaction with this innovation in Croatian tourism and has also brought out a number of suggestions for improvement. Since the introduction of E-visitor in 2016, Zadar County has recorded an increase in the number of reported arrivals and overnight stays. If we take 2016 as the year of introduction of E-Visitor, 2017 was relevant for insight into the real effects of applying this system for guest registration. In 2017, 11% more arrivals and 18% more overnight stays were achieved, while an increase of 3% in arrivals and overnight stays was planned. Regarding suggestions for improvement, the research brought out the 3 most important ones: official forms for (self)registration of guests, a database of regular guests, and an upgrade of the system to foreign names/titles. Employees of local tourist boards also rate E-visitor positively and believe that it has standardized and accelerated the processing of statistical data and that accommodation renters are more precise and that the actual situation of arrivals and overnight stays is better represented. From the chain indices of the number of overnight stays in accommodation units, an increase in the number of tourist registrations is visible on average:

- about 7% (hotels, camps, vessels);
- about 8% (weekend houses and objects on farm households);
- about 15% (households).

The data shows a significant drop in registrations in 2020 due to the COVID crisis, as well as a significant increase in the number of registrations in 2021 after the COVID crisis. These two years were not taken into account when calculating the previous growth in registrations.

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# Investors Psych and the Stock Price Volatility on Nigerian Exchange Limited (NGX): Pre, During and Post Covid-19 Era

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## Abstract

Investors' attitude and reasoning have been severely altered by the COVID-19 pandemic which had an intolerable stock price volatility effect on the Nigerian stock market and other markets across the globe. This study aimed at analysing the link effect of investors' psyche on stock price volatility in the Nigerian stock market between March, 2018 and September, 2023 covering three eras; pre COVID-19, during COVID-19 and post COVID-19. This study employed Sentimental Index (SMI) investors psyche factors and stock price volatility. The study revealed that investors psyche factors before, during and post COVID-19 pandemic have significant influenced on stock price volatility on the Nigerian stock market differently, with lesser stock price volatility at pre COVID-19, while stock price volatility was severe during the COVID-19 period due to trauma experienced by investors and restrictions in movement. There was weak stock price volatility and increase in stock returns at post COVID-19. The study concluded that investors psyche determined stock price volatility in the Nigerian stock market. The study therefore, recommended that the regulators of the Nigerian stock market should increase disclosure of stock market information to include the level of volatility and returns at all times to enable investors take an informed investment decision.

**Keywords:** Covid-19 pandemic, investors' psych, stock price, prospect theory, volatility

## 1. Introduction

Across the globe, stock exchange market creates interaction platform among stock market participants such as regulators, stock brokers and listed companies to facilitate financial intermediations that enable movement of funds from surplus unit to deficit unit at reasonable cost of transactions efficiently.

The stock market is vital for raising capital for publicly traded companies worldwide. Moreover, the stock market is a crucial part of the financial system of an economy. One of the major features of stock market is volatility in stock markets caused by up and down in stock prices resulting from market forces associated with the stock market. Volatility in stocks occur before, during and after emergence of Covid-19 pandemic; but the dramatic swings of stock prices known as stock price volatility was high during and after Covid-19 due to psychological trauma of sit at home, scare of Covid-19 spread and contagious, downturn in stock prices and collapsed of some companies during and after Covid-19 pandemic shock (Naseem, Mohsin, Hui, Liyan, & Penglai, 2021).

One of the dark world's most populated countries, Nigeria had its first case of Covid-19 reported on February 27, 2020. As of July 24, 2020, Nigeria had recorded 39,539 cases of Covid-19, including 22,135 active cases, approximately 16,559 discharged patients and 845 deaths. By January 13, 2021, the number of reported cases had risen to 249,586; 3,092 deaths had been reported, while 220,839 patients had been recovered.

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During covid-19, several governments measures to curb the spread were enacted that effectively shut down the economy. As a result, many stock investors, firms and organisations were forced to close their doors, this led to sharp stock volatility and the banking industry saw a decline in returns which in turn scare away investor stock in markets (Worldometer Report, 2022). Therefore, any intelligent individual investor must be able to mentally calculate how to maximise their returns on stock market investments. Unfortunately, the investor psyche has been agitated by the age of the worldwide pandemic (Covid-19 pandemic), resulting in skewed judgement concerning the market analysis of indices (Naseem, Mohsin, Hui, Liyan, & Penglai, 2021; Raifu, Kumeka, & Aminu, 2021).

There has been widespread mental distress among investors in industrialised, emerging, and developing stock exchange markets from the beginning of the Covid-19 epidemic. In this context, investor anxiety is a symptom of a broader pattern of internal (worries, increased anxiety, dysthymia), and external (economic, political, social); and psych imbalance (anxiety, tension, fear, unpleasant experiences, or occurrences). Similarly, Bagus, Pena-Ramos, and Sanchez-Bayon (2021) noted that mass panic, post-traumatic stress disorder, obsessive-compulsive disorder, and generalized anxiety disorder have resulted from the psych effect of Covid-19’, which in turn has led to a misalignment of market information with global market reality, sharp stock price volatility and a consequent reduction in expected stock returns.

One of the goals of global investors is to achieve a specific rate of return on their stock investments, but the worldwide lockdown caused by Covid-19 waves has made this goal more challenging to achieve. The majority of time before advent of Covid-19 for most corporate leaders and stock market investors were spent working. However, they spent much of Covid-19 at home, as concerns about the status of the financial markets, the pressure to make investment decisions, and the mental health of family members kept them from venturing out (Li, Wang, Xue, & Zhao, & Zhu, 2020). Everything including people’s health were jeopardized including nations stock markets by the Covid-19 explosion (Huang & Zheng, 2020; Wang, Yang, & Li, 2022). Investor psychology (emotions) and the degree to which an individual is optimistic or pessimistic about the future value of stocks may shift as a person integrates into a particular social structure. Thus, the extreme swings in market sentiment (mood) throughout the pandemic, stock prices or returns have plummeted in most countries worldwide.

Investors’ emotional and psychological thinking has been adversely skewed towards sound criteria for investment selection due to the economic lockdown, mobility restrictions, and closing of offices and institutions before the covid-19 outbreak. As a result, stock investors have become more cautious since the advent of the epidemic of Covid-19 that has hit stock markets throughout the world, from the United States and the United Kingdom to France and China, Japan, Turkey, South Africa, Tunisia, Nigeria, and other rising and developing economies (Dertli & Eryuzlu, 2020), leading high level of stock volatility, decrease in investment in stock markets and associated returns. As a result, investors in Nigerian stocks feel emotional or psychological trepidation, and they put off making new purchases on the stock market. This study was motivated by the fact that investors worldwide, including those in the Nigeria stock market, have been facing new emotional and psychological difficulties in interpreting stock market indices due to the Covid-19 epidemic. Thus, challenges, problems and empirical gap identified motivated hypotheses developed in this study.

## 2. Literature Review and Hypotheses Development

The study conceptually viewed investors' psych in terms of investor's patterns of behaviour, including their attitudes, motivations, and choices towards stock investment, all of which fall under the umbrellas of behavioural finance and contemporary financial theory. Investor psych focused on the investors' reasoning on how they perceive the market consciously and unconsciously in their favour. Accordingly, stock price volatility is the rise and fall of stock prices which affect returns from securities traded.

Empirically, Ahmed (2020) focused on the nexus heuristic driven biases and investment decision-making. Finding revealed that heuristic driven biases measure like under-confidence bias adversely affect quality of short and long terms investment decisions in emerging markets. Saivasan and Lokhande (2022) examined link effect between risk propensity, behavioural biases and demographic factors on equity investors' risk perception. Finding revealed that risk propensity, behavioural biases and demographic factors significantly influenced equity investors' risk perception. Wang, Zhang, Ahmed, and Muhammed-Shah (2021) investigate how investment behaviour affect financial markets with moderation of COVID-19 in the UK. Their study employed partial least square and found that COVID-19 moderate the connection between risk perception, general risk and financial risk to tolerance as well as profitability significantly determined by both general risk and financial risk to tolerance in the UK. However, these aforementioned reviewed studies failed to establish volatility in stock prices caused by investor's psyche before, during and after COVID-19.

Also, Moueed and Hunjra (2020) established that investors' psyches matter while making stock market investments. Experts in the financial sector were known to follow stock market reported projections, but they sometimes use guesses which trigger high level of stock volatility and returns (Naseem, Mohsin, Hui, Liyan, & Penglai, 2021; Riaz & Hunjra, 2015). Therefore, it is reasonable to empirically established that investors are susceptible to the psychological factors affected by events like SARS, Swine Flu, and Covid-19 (Ali, Alam, & Rizvi, 2020; Conlon & McGee, 2020). Similarly, Ichev and Marinc (2018) found that during the Ebola outbreak, investor apprehension led to lower market returns. Kiruba and Vasantha (2021), Li et al. (2020) and Xiang, Yang, Li, Zhang, Zhang, and Cheung (2020), investigated what factors led investors to make financial investments. Anxiety, risk aversion, risk propensity, market volatility worries, herd behaviour, herd immunity, and the current situation reports were all proxies for psychological behaviour in the study. The research results showed that investors' choices during the Covid-19 epidemic were affected by their emotional reactions to news about the virus, herd behaviour, risk aversion, and vaccinations. Li et al. (2020) and Xiang et al. (2020), and Saivasan and Lokhande (2022) further argued that previous market returns are significant sentiment predictors and that investors' emotional state is a counter-cyclical predictor of market movement. Conversely, they also found that when investors' moods have a negative (positive) effect on stocks, it tends to be more noticeable in the case of firms that are relatively simple to value.

Lan, Huang, and Yan (2020) empirically discovered ample proof that the pre-announcement abnormal performance is caused by investor emotions which in turn adversely affected market index return. According to the data, investor sentiment is the primary factor in the intelligent mispricing of earnings contributions that ultimately leads to stock market mispricing (Cheema, Man, & Szulczyk, 2020; Mian & Sankaraguruswamy, 2012). Despite how the financial crisis has altered the environment

apart from market forces, there is a favourable association between attitudes and returns (Ryu, Ryu, & Yang, 2020). Investors can take more mental and emotional strain than the general public. Anxiety over Covid-19 has been on the rise in recent weeks, and it's not only because of the rapid growth of the epidemic. The financial news, the media, and amplifiers have all played a role. In the post-covid-19 period, when few empirical research has been undertaken in Nigeria, this study helps fill a vacuum in the literature by investigating the impact of investor psych on stock return at Covid-19 period. Also, to the best of researcher's knowledge, no known studies have been conducted within the Nigerian contexts on how investors psych affect stock price volatility pre, during and post Covid-19 Era in the Nigerian Exchange Limited (NGX). Resulting from empirical gap identified, the study hypothesised that;

**H1:** Investors' psych factors have no significant volatile influence on stock prices before the Covid-19 pandemic era

**H2:** Investors' psych factors have no significant volatile effect on stock prices during the Covid-19 pandemic era

**H3:** Investors' psych factors have no significant volatile influence on stock prices after the Covid-19 pandemic era

The study is grounded in the idea of expected utility developed by Kahneman and Tversky (1988). Loss-aversion theory is another name for this concept, which centres on the psychology of decision-making in the face of uncertainty and catastrophic events like the Covid-19 epidemic. The prospect theory was created by Kahneman and Tversky (1988) to describe the mental processes behind economic decisions. They gave it a fresh spin by introducing cumulative prospect theory, which considers how risk and uncertainty at the time of investment choice could impact returns on investment. For example, investors nervous about the future may miss lucrative opportunities because they worry about the Covid-19 epidemic. Cheema, Man, and Szulczyk (2020) state that a person's propensity to invest may be influenced by risk aversion, confidence in the financial instrument, and overall perception of risk. Previous studies have used prospect theory to investigate the link between human psychology and financial markets, including those by Cheema et al. (2020), Ullah et al., Ullah, Elahi, Pinglu, and Subhani (2020), and Wei-Shan Hu, Lee, and Chen (2018). In light of these and other relevant prior research, prospect theory was used as the study's guiding theoretical framework to achieved objective of the study.

### 3. Data and Method

All Share Index (ASI) and investor psych (investors' sentimental factors measured via stock turnover (STOV), market capitalization (MC), verified covid-19 cases (VCC), and mortalities rate from covid-19 (MCD) using daily data from a secondary sourced, which followed an *ex-post facto* research design. The research design comprised of daily data and two years of pre Covid-19 (March 2018 to February 2020); and two years during Covid-19 (March, 2020 to February 2022) as well as one year and seven months after Covid-19 (March, 2022 to September, 16, 2023 i.e 1 year and 7 Months) since Covid-19 recorded in Nigeria around 27th of February, 2020.

This research used daily data with the ARCH, GARCH and EGARCH distribution estimators. In addition, the study used data collected daily between March 2019 and June 2022 from the factbooks from the Nigerian Stock Exchange and a report from the Nigerian Centre for Disease Control. Considering the objective and anchored theory, the model specification for the study was stated below;



ASI = f(Investors’ Psych (IP))

ASI = f(Investors’ Sentimental Index (ISI))

**Pre-COVID-19 Era Model**

ASI = f(STOV, MC)

$$ASI = \alpha_0 + \tau_1 STOV + \lambda_2 MC + \varepsilon_i \quad \text{Eqn 1}$$

**During and Post-COVID-19 Era Model**

ASI = f(STOV, MC, VCC, MCD)

$$ASI = \alpha_0 + \tau_1 STOV + \lambda_2 MC + \gamma_3 VCC + \theta_4 MCD + \varepsilon_i \quad \text{Eqn 2}$$

Where;

- ASI was proxied for stock return, while stock turnover (STOV), market capitalization (MC), variations in verified covid-19 cases (VCC), and mortalities rate from covid-19 (MCD); and  $\varepsilon_i$  = Error Term.

**4. Empirical Analysis**

The first stage in computing the stock price volatility and psych factors (sentimental index through STOV, MC, VCC, and MCD) model is to determine if the daily series displays the ARCH effect among study variables using daily data.

**Table 1: ARCH test**

| Statistic     | Pre-Covid -19 Era |        |        | During Covid -19 Era |        |        |        |        | After Covid -19 Era |        |        |        |        |
|---------------|-------------------|--------|--------|----------------------|--------|--------|--------|--------|---------------------|--------|--------|--------|--------|
|               | ASI               | STOV   | MC     | ASI                  | STOV   | MC     | VCC    | MCD    | ASI                 | STOV   | MC     | VCC    | MCD    |
| F-statistic   | 18.232            | 27.963 | 32.963 | 23.963               | 42.983 | 25.983 | 62.963 | 21.932 | 42.987              | 20.467 | 56.935 | 78.093 | 52.909 |
| Obs*R-squared | 7.853             | 17.953 | 19.963 | 12.213               | 21.983 | 12.093 | 30.732 | 10.211 | 21.943              | 9.748  | 25.093 | 36.093 | 20.983 |
| P-value       | 0.000             | 0.000  | 0.000  | 0.000                | 0.000  | 0.001  | 0.000  | 0.002  | 0.000               | 0.000  | 0.000  | 0.000  | 0.000  |

**Source:** Authors’ Computation (2023) Level of Significance @ 5%

The F-statistic and Obs\*R-squared statistics, together with their respective values and p-values, were displayed in the ARCH test findings. Table 1 revealed that the ASI, STOV, MC, VCC, and MCD all demonstrate volatility with p-values lower than 5% ( $p < 0.05$ ). Since the results are statistically significant, the no-ARCH effect null hypothesis was rejected. The findings imply that the investigated variables (ASI, STOV, MC, VCC, and MCD) are highly volatile due to an ARCH effect.

**Table 2: EGARCH result for hypothesis one**

| Variable                 | Coefficient | Std. Error | z-Statistic | Prob.  |
|--------------------------|-------------|------------|-------------|--------|
| Mean Equation            |             |            |             |        |
| C                        | 1.065380    | 0.326718   | 1.29015     | 0.0019 |
| MC                       | 6.398701    | 0.190865   | 2.90643     | 0.0000 |
| STOV                     | 2.754311    | 0.97542    | 4.972561    | 0.0001 |
| Variance Equation        |             |            |             |        |
| Constant                 | 0.878477    | 0.088586   | 6.028975    | 0.0021 |
| ARCH ( $\alpha$ )        | 0.219415    | 0.069777   | 6.459085    | 0.0019 |
| GARCH ( $\beta$ )        | 0.685227    | 0.089005   | 5.853531    | 0.0000 |
| Leverage Effect (EGARCH) | -0.631201   | 0.080952   | -2.417816   | 0.0062 |
| Durbin-Watson stat       | 2.010121    |            |             |        |

**Dependent Variable: ASI**

Level of Significance @ 5%

**Source:** Authors’ Computation (2023)

The volatility persistence which is measured by the sum of ARCH( $\alpha$ ) and GARCH( $\beta$ ) ( $\alpha + \beta$ ) coefficients was confirmed in Table 2 which stood at 0.904642. The finding also revealed that volatility takes a long time to attenuate or persistent in the Nigeria stock market thus created high level of stock price volatility caused by volatility in sentimental factors such as previous volatilities of stock turnover and level of market capitalization in the Nigerian stock market.

Similarly, the absolute value of  $(\alpha+\beta)$  determined speed of mean reversion. The higher the absolute sum value of  $(\alpha+\beta)$  is, the slower the mean reversion and vice -versa. Thus, from Table 1 above within the period of March 2018 to February 25, 2020 experienced the longest mean reversion since the absolute sum value of  $(\alpha+\beta)$  is close to 1.

Furthermore, information asymmetry and leverage coefficients (EGARCH) were statistically significant. This suggests that the information effect is asymmetric, meaning that both good and bad information (or news) have a large impact on the volatility of Nigerian stock returns. This revealed that bad news was negative at (-0.631201) and significantly increased stock price volatility indicating that bad news was more destabilizing than good news. The EGARCH depicted that if the asymmetry term is negative, negative shocks have a higher influence on stock price, stock turnover, and market capitalisation volatility than positive shocks of the same magnitude; implies that investors are more susceptible to bad news than favorable news resulting in large and consistent fluctuation in stock returns. Thus, this indicated that null hypothesis one should be rejected. Past studies like Ahmad, 2020; Conlon & McGee, 2020; Ichev & Marinc, 2018; Kiruba & Vasantha, 2021; Lan, Huang & Yan, 2020; Saivasan and Lokhande (2022), Xiang, Yang, Li, Zhang, Zhang, & Cheung, 2020 aligned with study finding.

**Table 3:** EGARCH result for hypotheses two and three

| Variable                          | Hypothesis Two |            |             |         | Hypothesis Three  |            |             |         |
|-----------------------------------|----------------|------------|-------------|---------|-------------------|------------|-------------|---------|
|                                   | Coefficient    | Std. Error | z-Statistic | P-value | Coefficient       | Std. Error | z-Statistic | P-value |
| Mean Equation                     |                |            |             |         | Mean Equation     |            |             |         |
| <b>C</b>                          | 3.034440       | 0.028396   | 1.29015     | 0.0729  | 2.186310          | 0.036728   | 3.054231    | 0.0019  |
| <b>MC</b>                         | 6.493521       | 0.041700   | 2.89332     | 0.0000  | 7.464325          | 1.278961   | 5.452198    | 0.0000  |
| <b>STOV</b>                       | -1.54372       | 0.489826   | -5.38722    | 0.0000  | 1.956743          | 0.645364   | 6.784372    | 0.0001  |
| <b>VCC</b>                        | -2.64212       | 0.005362   | -6.83521    | 0.0001  | -2.567843         | 0.05674    | -10.83521   | 0.0001  |
| <b>MCD</b>                        | -1.83622       | 0.736212   | -5.73210    | 0.0000  | -3.784321         | 0.77653    | -8.79870    | 0.0000  |
| Variance Equation                 |                |            |             |         | Variance Equation |            |             |         |
| <b>Constant</b>                   | -0.878477      | 0.088586   | -9.91668    | 0.0000  | 0.768522          | 0.034676   | 4.893527    | 0.0000  |
| <b>ARCH (<math>\alpha</math>)</b> | 0.419485       | 0.069777   | 6.585016    | 0.0000  | 0.106576          | 0.067453   | 4.576432    | 0.0000  |
| <b>GARCH (<math>\beta</math>)</b> | 0.515107       | 0.052105   | 2.249503    | 0.0115  | 0.417547          | 0.075436   | 8.764269    | 0.0115  |
| <b>Leverage Effect (EGARCH)</b>   | -0.173281      | 0.095994   | -2.41781    | 0.0562  | 0.752611          | 0.023789   | -3.412816   | 0.0012  |
| <b>Durbin-Watson stat</b>         | 2.389165       |            |             |         | 1.95629           |            |             |         |

**Source:** Authors’ Computation (2023) Level of Significance @5%

**Dependent Variable:** ASI

From Table 3, the volatility persistence was measured by sum of ARCH( $\alpha$ ) and GARCH( $\beta$ ) ( $\alpha+\beta$ ) coefficients which mounted at 0.934592 close to one (1). This indicated that volatility was very high and lasted for long time period during the Covid-19 era in the Nigerian stock market due to Covid-19 psychological trauma reflected in the STOV and MC which caused high level of stock price volatility. Similarly, the absolute value of  $(\alpha+\beta)$  determined speed of mean reversion. The higher the absolute sum value of  $(\alpha+\beta)$  is, the slower the mean reversion and vice -versa. Thus, from Table 3 above within the period of Covid-19 (March, 2020 to February 2022) experienced the longest mean reversion since the absolute sum value of  $(\alpha+\beta)$  is close to 1.

Furthermore, the probability values for the coefficients of information asymmetry and leverage (EGARCH) were statistically significant. This suggests that the information effect is asymmetric, meaning that both good and bad information (or news) have a large impact on the volatility of stock returns in Nigeria. This revealed that bad news was negative at (-0.173) and significantly increased stock price volatility due to previous volatility from stock turnover and market capitalisation, indicating an asymmetric or leverage effect in which bad news had a more destabilizing effect on stock price volatility than good news during the Covid-19 period.

This means that a negative shock has a higher influence on stock price, stock turnover, and market capitalisation volatility than a same magnitude positive shock. The significance of negative shocks persistence, also known as volatility asymmetry, implies that investors are more susceptible to bad news than positive news during the Covid-19 period as a result of psychological trauma experienced during the Covid-19 period. This means that the volatility spillover mechanism is asymmetric, resulting in large and consistent volatility in stock prices. Thus, this indicated that null hypothesis two should be rejected. Studies such as (Lan, Huang & Yan, 2020; Saivasan & Lokhande, 2022), supported this study finding, thus, null hypothesis two rejected.

Whereas, in the same table 3, for period after covid-19, coefficient of  $(\alpha+\beta)$  was 0.524123 less than one (1). This indicated that volatility was very weak and lasted for short time period after the Covid-19 era in the Nigerian stock market due to control Covid-19 pandemic and availability of drug to manage Covid -19 which eventually and drastically reduced psychological trauma that may cause by covid-19 and therefore reduced volatility in stock prices, STOV and MC in the Nigerian stock market. Similarly, the absolute value of  $(\alpha+\beta)$  determined speed of mean reversion. The higher the absolute sum value of  $(\alpha+\beta)$  is, the slower the mean reversion and vice -versa. Thus, from Table 3 above after the period of Covid-19 experienced fastest mean reversion since the absolute sum value of  $(\alpha+\beta)$  is less than 1.

Also, the leverage (EGARCH) exhibits good news at (+0.752611) and significantly create weak volatility in stock price due to previous slowdown in stock turnover and market capitalization volatilities, thus there is symmetric or positive leverage effect where good news had a more stabilizing effect on stock price volatility than bad news after Covid-19 period. This implies that after Covid-19 period as a result fade out of psychological trauma experienced caused by covid-19. Thus, this study rejected null hypothesis three formulated in this study. This research's conclusion that investors avoid the stock market at times of worldwide pandemic or global shock out of a concern for their safety is consistent with the leading theory examined in the study, prospect theory.

## 5. Conclusion and Policy Recommendations

The study concluded that before, during and after covid-19 eras, there exist high and persistent volatility but the speed of volatility is higher and highly persistence in the era of Covid-19 due psychological trauma investors experienced while after the era covid-19 pandemic, the volatility persistence is low with high stock return. The study further concluded that during the peak of Covid-19 period, there was hike in trauma and imbalance psych among stock investors which had triggered high volatile in stock prices and returns within the period of Covid-19. Based on the findings, the study recommended that stock market regulators should design effective market information transparency policies and present an accurate situation of the market indices to the public at all time so that individual stock market investors can be guided against the psych pressure from market misinformation during outbreak of pandemic diseases or financial crisis.

While investors face with continued difficulties related to covid-19, our analysis only covers the period between (March 2018 to February 2020), during Covid-19 (March, 2020 to February

2022) and after Covid-19 (March, 2022 to September, 16, 2023). Unfortunately, the study could not extrapolate the study’s results to other time periods or years. In addition, there is diversity in the make-up and structure of investors’ underlying psychological processes of reasoning and observation. As a result, it is improbable that stock market investors’ decisions about psycho factors or investors’ emotional index model are consistent or universal.

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