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Acknowledgement



Prof. Dr.
Gëzim Karapici
Editor-in-Chief

Welcome to the CIT Review Journal.

Dear authors, reviewers and readers of the CIT Review Journal,
On behalf of the Editorial Board, I am very pleased to announce that this publication will mark the launch of the CIT Review Journal (CRJ) identified with an International Standard Serial Number (ISSN).

CRJ is the official publication of The Canadian Institute of Technology, an academic institution devoted to the study and promotion of knowledge. The journal's publication will be semi-annual, respectively in May and November. CRJ provides a forum for sharing publications on scientific research, review articles, and editorials in the field of Economics, Business, Information Technology, Engineering and Humanities. The primary goal of our endeavour is to publish significant, innovative and original research that advances the frontiers of science. We have brought together a high profile and qualified expert group of Associate Editors and Editorial Board Members who will ensure an efficient publishing process and high quality research.

We are now welcoming submissions for the journal's May Issue and have every reason to believe that CRJ will become a key platform for researchers, benefiting an international community.

Best wishes,
Gëzim Karapici

A Virtual Instrument for Electrical Motor Speed Measurement Using Arduino and Labview

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ABSTRACT

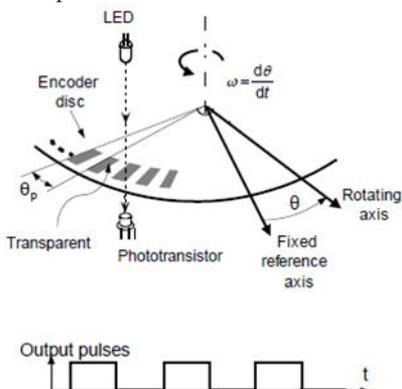
The speed measurement in real-time of the electrical motors is very important not only for monitoring and analysis purpose, but also for the speed control of them. Nowadays virtual instruments are becoming familiar to academic institutes and universities because they are replacing high cost instruments in the development and test laboratories. The most well-known software for virtual instrument development is LabVIEW from National Instruments. It is compatible with a large DAQ cards from different vendors, but in general these are not so cheap and consequently rise the cost of custom-built instrument. This last decade has grown a considerable number of development boards based on microcontrollers. Arduino is one of the most popular platforms. It can acquire and control like a DAQ but it is also a low cost device. In this work we will present step by step how to create and test a customized speed measurement instrument for electrical motors based on LabVIEW, Arduino Nano and an incremental encoder.

Keywords: Speed measurement, virtual instrument, LabVIEW, Arduino, low cost

1. Introduction

The incremental encoder is a device used to generate pulses if its shaft rotates. The number of the generated pulses is proportional to the angular position of the shaft. This type of encoder is one of the most used as position transducers. The principle of the incremental encoder is shown in fig. 1. Together with the shaft there is rotating a transparent disc with a circular graduation-track realized as a periodic sequence of transparent and non-transparent radial zones which modulates the light beams emitted by a light emitted diode on one side of the disc, on the fix part of the encoder. [1].

Fig. 1 Illustration of the incremental encoder working principle



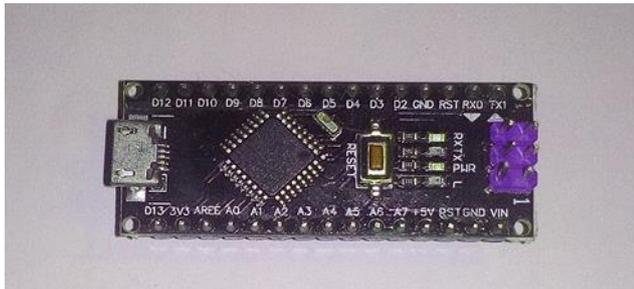
The measurement of the angular velocity of the electrical machine shaft can be achieved using incremental encoders because their number of pulses per revolution is always known as an encoder parameter. In this kind of measurement an important thing is to take care to know the precise time period in which a certain number of pulses are measured. Then dividing the number of pulses per time period provides the angular velocity of the motor shaft.

Now days exist several types of multifunctional DAQ (Data Acquisition) devices which can be used as counters. National Instruments is one of the most well-known producers in the world. They can be easily configured to act as counters by using the software created by National Instruments, called LabVIEW. [2]

LabVIEW is released by National Instruments, for the first time in 1986 for Apple Macintosh. It was conceived as a programming environment for hardware control. The introduction of an interface between a PC and the instrument controlled by it was the main target. This graphical interface simulates the controlled instrument on the computer monitor. But LabVIEW is also a graphical programming language, sometimes called “G code”. Applications created in LabVIEW are called “Virtual Instruments” [3]. Nowadays LabVIEW is also compatible with Windows, Linux and other operating systems. [4]

This last decade has grown a considerable number of development boards based on microcontrollers. Arduino is one of the most popular platforms. It can acquire and control like a DAQ but it is also a low cost device. [5] One of the cheapest atmega328p microcontroller used in arduino board is the so called Arduino Nano. This board has a very small size and almost identical in parameters with Arduino UNO, the most well-known worldwide board from arduino boards family. The Arduino Nano board is illustrated in fig. 2.

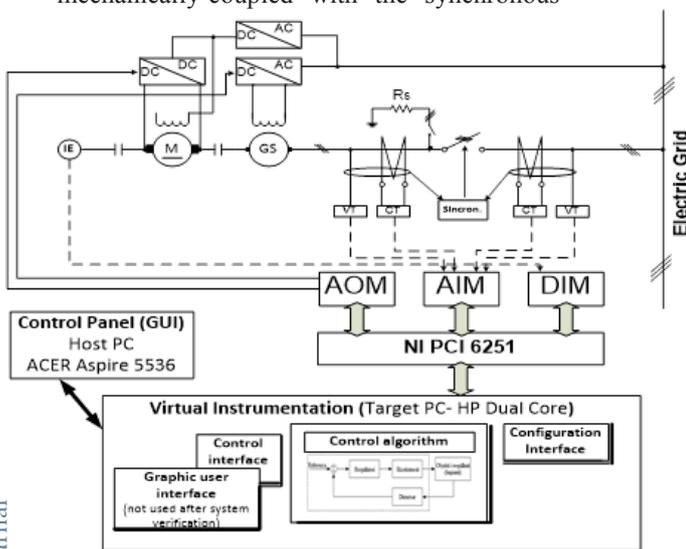
Fig. 2 Arduino Nano



The combination of an incremental encoder, Arduino Nano and LabVIEW software to create a speed measurement virtual instrument will be shown step by step in the next section of this work.

2. Related work

The objective of the speed measurement instrument is to measure the angular speed in rev/min of the DC motor mechanically-coupled with the synchronous



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generator as shown in fig. 3. The motor speed has to be monitored and also to be controlled in order to fulfill the synchronous generator needs as an electrical power generation producer. Its rated speed is 1500 rev/min and this value is the first thing to keep in mind before building the instrument. It means that in the instrumenting point of view the speed measurement instrument must have an error lower than the frequency deviation allowed for the synchronous generator around the rated speed value of the DC motor.

Fig. 3 Overall block diagram of the synchronous generator control and monitoring system [6]

As it can be seen from fig. 3, the information on the speed value of the motor-generator system is obtained through an encoder. In this case, the incremental encoder used, is shown in fig. 4. Of course, we can use several techniques for counting the pulses that generate this encoder. It can be done with the help of analogue circuits or with the help of A/D and D/A cards. [6]

The incremental encoder (IE) used, is that shown in figure 4. It gives 1024 pulses/revolution with a magnitude depending on the power supply we choose. We will feed it with a constant DC voltage of 5Volts since the max voltage allowed in the Arduino Nano inputs is this value.

Fig. 4 The 1024 pulses/rev incremental encoder used in this work



3. Proposed method

To measure the number of pulses coming from the encoder when the DC motor shaft is rotating we will use Arduino Nano. But first we have to check for an interface between Arduino and LabVIEW. If it doesn't exist, we can't easily build the virtual instrument for the speed measurement of the DC motor.

National Instruments has created The LabVIEW Interface for Arduino (LIFA) Toolkit. It is a FREE download that allows developers to acquire data from the Arduino microcontroller and process it in the LabVIEW Graphical Programming environment. [7]

It is a good start, but reading more for LIFA we can see that it is not flexible as the DAQmx for the National Instruments DAQ devices (they cost several times more than Arduino). It can only be used to show values coming from arduino from the serial communication port. So, we must rely on the arduino capabilities to do the most of the work for the speed measurement instrument.

One way is to use arduino as a frequency counter. Using Arduino Nano (UNO) we can measure up to 40 kHz pulse signals with a 5V magnitude. The pulseIn () function can count pulses with time period ranging from 10 μ S to 3 minutes. This function counts the number of pulses (HIGH or LOW) coming to a particular pin of the arduino. The general syntax of this function is pulseIn(pin, value, time) where pin is the name of the pin, value is either HIGH or LOW and time is time for which the function to wait for a pulse. The function returns zero if there is no valid pulse with in the specified time. [8]

If we do some calculations we can see that for the rated speed of 1500rev/min the encoder gives a 25, 6 kHz pulse train. It is lower than the arduino maximum counting frequency (40 kHz). So, we will measure the pulse train frequency coming from the encoder during the DC motor shaft rotation and send this value to the LabVIEW environment through serial port with the help of LIFA. Then we will convert it back to the angular speed and will show the value on the virtual instrument front panel.

4. Arduino frequency counter programming and test

The frequency counter code can be found in details in reference [8]. We will show here only a frame of this code during the program uploading to Arduino Nano. The arduino programming environment is called Arduino IDE (Integrated Development Environment) where some of atmel microcontrollers can be programmed easily using C programming language.

Figures 5 shows the Arduino IDE during the successful code uploading in Arduino Nano for incremental encoder pulse frequency counting and fig. 6 shows the experiment for the frequency measurement when the pulse train is generated by another Arduino Nano with a fixed known frequency. It is only indicative because the instrument accuracy can be checked later with a precision digital frequency instrument.

Fig. 5 Arduino Nano code uploading

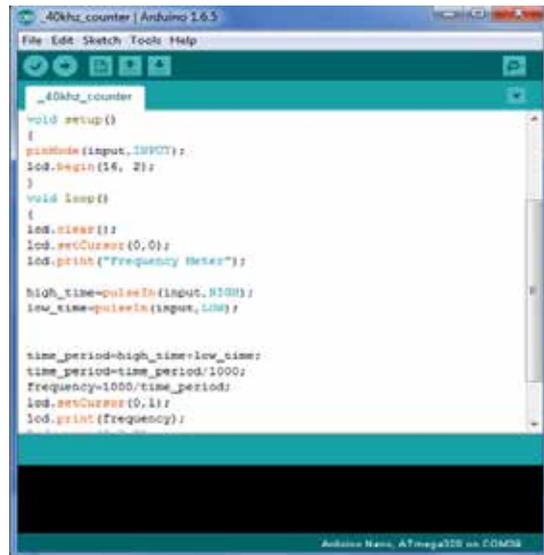
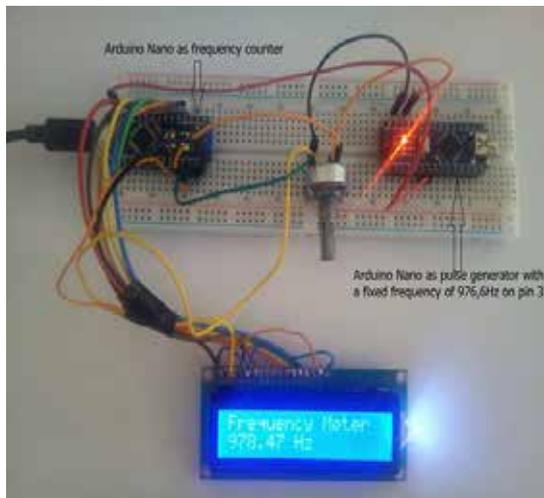


Fig. 6 Frequency measurement on Arduino Nano



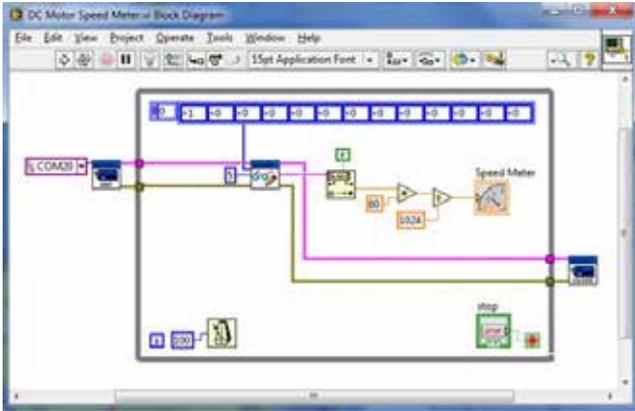
5. Virtual Instrument for speed measurement in LabVIEW

Before we build the virtual instrument for the DC motor speed measurement we have to add the LIFA program to the frequency counter program in order to give to LabVIEW the possibility to get the desired measured value from Arduino in real-time through the serial communication port.

After this process we build the instrument using the Arduino Library in LabVIEW. The virtual instrument block diagram is shown on fig. 7. We have processed the output to have the speed instead of pulse frequency. It is to be known that the measurement of the train pulses frequency in arduino is done ever 0,5sec and the update in LabVIEW every 100ms. Arduino write the frequency value

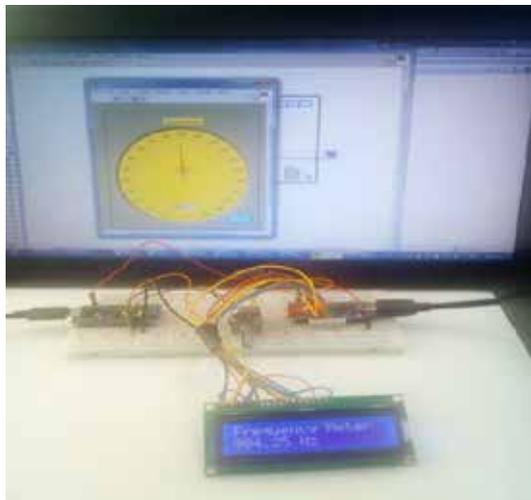
through the serial port with a baudrate of 115200 and LabVIEW read this value with the same baudrate.

Fig. 7 Virtual Instrument for Speed measurement block diagram through LIFA



In figure 8 it is shown the virtual instrument for electrical motor shaft speed measurement through encoder, Arduino Nano and LabVIEW. In this experiment the conversation from frequency to speed is bypassed to show the accuracy of the displayed value measured by Arduino Nano in real-time in the Speed Measurement Virtual Instrument.

Fig. 8 Virtual Instrument for Speed measurement experiment through LIFA



6. Conclusion

In this paper we showed that we can achieve also virtual instrumentation combining LabVIEW with low cost devices like Arduino.

The Speed measurement Virtual Instrument proposed is not only a low cost device, but also very flexible. In few minutes we can add some codes in its block diagram to store the measured values. This is very important for studies related to the electrical motor behavior in different situations when its load changes.

The update rate of the instrument is about 0.5 sec, but since the motor speed cannot change too fast, because its mechanical inertia, we can say that the measurements are performed in real-time.

This instrument is the first step in implementing the digital speed control design of the electrical motors in electric drives laboratories.

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Academic Freedom and the Commercialization of Universities

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ABSTRACT

This paper explores the cultural and organizational dimensions of academic life that lay the foundations for academic freedom.

Method: Collection of information and performance comparisons on the geopolitics of knowledge and how the hegemony of Western thinking frames imposes constraints on academic freedom. We will also explore the ways in which Cartesian rationalism underpins contemporary understanding of what constitutes valid knowledge, and how this can and does act as a constraint in what we come to know and study.

Results: To briefly review the relationship between university autonomy and academic freedom and the impact of increased commercialization on scholarly independence, particularly how the increasing casualization of employment limits the freedom of academics to teach critically and publish freely.

Conclusion: We examine the social class biases in how higher education is organized, and how class exclusions are themselves constraints on being an academic or a student in a university. Finally, the paper illustrates the importance of distinguishing between the institutional autonomy of the university, the personal and professional freedoms of individual academics, and each of these from subject autonomy, namely the freedom of scholars to create and maintain new disciplinary fields, especially fields of scholarship that are critical and challenging of prevailing academic doctrines.

Keywords: *academic life, academic freedom, university autonomy*

1. Introduction

The expansion of higher education over the last 30 years has not only radically altered the intake into higher education, but it has also changed the character of higher education itself. Greatly increased participation rates have been accompanied by institutional stratification, both intra- and internationally, not only between universities and other degree- and diploma-awarding institutions, but also between universities themselves. University colleges and universities are differentiated in terms of both their educational and research status, differentiations that are worsen with the growth of global ranking systems. While the differentiations between universities, and between these and other colleges of higher education, are socially significant, the issue of academic freedom arises in all

cases. It is not the exclusive concern of those working in universities.

2. Related Work

While countries vary in the degree to which they sell their higher education services internationally, with the UK and Australia being especially direct in their marketization (Marginson 2007, Ball 2012), private higher education is big business: it was worth an estimated \$400 milliard globally, and approximately 25% of all higher education students were in private colleges in the late 2000s (Nuthall 2008). Even when universities are publicly funded and regulated, there is a growing expectation that they will destroy their state income from the sale of educational services (US Department of Education and Skills 2011). Not surprisingly, therefore, recent private higher education expansion is overwhelmingly in the private-for-profit

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higher education sector, especially in the USA, but also in countries as diverse as Brazil, Korea and Poland (Douglass 2012). When university autonomy is championed, as it is in Europe, it is a bounded autonomy subject to political accountability (Nokkala & Bacevic 2014).

3. The subject of our work

The privilege of academic freedom is granted to scholars on the assumption that they will be guided by an ethical imperative to pursue the advancement of knowledge, while recognizing the contested character of what constitutes 'truth' or 'knowledge' in scientific terms (Harding 1991, 2006, Kuhn 1962).

The mores of science possess a methodological rationale but they are binding, not only because they are procedurally efficient, but because they are believed right and good. They are moral as well as technical prescriptions (Merton 1973, p. 270).

To realize its purposes of advancing knowledge, Merton identified 'four sets of institutional imperatives' which should govern the operation of scientific and scholarly research: 'universalism, communism, disinterestedness and organized skepticism' (Merton 1973, p. 270).

...it is clear that graduates in the natural sciences increasingly can find employment only in corporate labs; mostly, they are working for defense contractors, for pharmaceutical companies, or in electronic or biotech industries. And the university science departments, which historically isolated themselves from commercial interests and now and then from national state interests, today can claim little such autonomy. Their values are commercial and national state values (Harding 2006, p. 8).

Moreover, universities are big business, and education and research are tradable commodities. In research terms, universities provide opportunities to develop patents and commercialize products as scientific discoveries are increasingly defined as private properties (particularly since the passing of the Bayh-Dole Act in the USA in 1980). Scientific achievements are seen as opportunities for creating a competitive advantage rather than a means of serving the public good in a disinterested manner (Münch & Schäfer 2013).

Moreover, state funding to public universities is increasingly conditional on meeting government targets and demands, both directly in terms of the types of student education prioritized, and indirectly in terms of grant aid for highly selective fields and market-led research (Department of Education and Skills 2011, Department of Jobs, Enterprise and Innovation 2011). Academics who have the 'freedom' to research new ideas or to introduce new subjects are increasingly confined to fields of scholarship that are supported by government, which, in turn, are strongly influenced by business interests, especially those in science and technology. The impact of

commercial interests is reflected especially in the funding of research. None of the subjects in the Arts Humanities and Social Sciences were listed as priority funding areas in the Research Prioritization report for Ireland in 2011. Not only are science and technology prioritized for research funding, but within these fields, very specific areas are targeted.

The positioning of higher education as a net contributor to the economy rather than a public service was accelerated by the austerity plans imposed by the International Monetary Fund, European Central Bank (ECB) and European Commission. Private bank debt was translated into sovereign debt under pressure from the ECB in particular, the net effect of which was to greatly reduce funding to higher education for both students and staff. This led to a series of increases in student fees (which are the second highest in Europe next to the UK; European).

4. Proposed Method

Collection of information and performance comparisons on the geopolitics of knowledge and how the hegemony of Western thinking frames imposes constraints on academic freedom. We will also explore the ways in which Cartesian rationalism underpins contemporary understanding of what constitutes valid knowledge, and how this can and does act as a constraint in what we come to know and study.

5. Results and Discussion

To briefly review the relationship between university autonomy and academic freedom and freedom and the impact of increased commercialization on scholarly independence, particularly how the increasing casualization of employment limits the freedom of academics to teach critically and publish freely.

6. Conclusion

We examine the social class biases in how higher education is organized, and how class exclusions are themselves constraints on being an academic or a student in a university. Finally, the paper illustrates the importance of distinguishing between the institutional autonomy of the university, the personal and professional freedoms of individual academics, and each of these from subject autonomy, namely the freedom of scholars to create and maintain new disciplinary fields, especially fields of scholarship that are critical and challenging of prevailing academic doctrines.

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Artificial Intelligence & Cyber Security: an Odd and Perfect Match

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ABSTRACT

What if we were able to predict when a cyber-attack is going to occur and prevent it before it actually happens? Is this not a revolutionary idea for computer security? Cyber security is a major challenge in today's world, as government agencies, institutions and individuals are suffering from an increasing range of digital attacks, which evolve rapidly and adapt quickly to new technologies.

In dealing with such complex threats, traditional security systems rely heavily on a set of rules created by human experts. They monitor electronic systems for abnormal behavior and react in case of attacks. These types of defense mechanisms, however, are ineffective when combating against evolving cyber threats, due to their inability to respond well to previously unknown attacks.

This paper argues that integrating artificial intelligence techniques into security frameworks will improve their performance significantly. Dynamic and complex digital threats demand for robust, flexible, and adaptable systems capable of making intelligent decisions. The goal is to create security systems that will learn by experience and autonomously improve with exposure to threats over time.

Keywords: *Cyber security, artificial intelligence, intelligent systems*

1. Introduction

The sweeping advances in information technology have made the world an interconnected network. The growing trend of internet use has fundamentally changed communication and services. This digital revolution, however, has not escaped the attention of malicious attackers who are using cyberspace to commit numerous crimes. These attacks that target individuals, institutions and even states, can have tremendous consequences.

The field of computer security aims to provide a set of defense mechanisms that preserve the integrity, availability and confidentiality of the digital information. The cyber world faces complex security challenges. The rapid increase of cyber activity and the use of high-volume data make security systems that rely on physical devices such as sensors and detectors not effective. Cyber-crimes are not bound by any geographical constraint. Not only can

malicious intruders attack from any location, but they can attack multiple systems simultaneously causing widespread harm.

Traditional security approaches rely on hard-wired logic and rule-based algorithms. They focus on monitoring electronic systems and reacting in case of an attack. When a security violation is manifested, the system will react based on a pre-constructed set of rules. If the type of the cyber-attack is unknown to the system, it will automatically shut down and restart in safe mode. These types of defense mechanisms have become increasingly ineffective when combating against evolving cyber-attacks, since they are not able to adapt to previously unknown threats.

In order to be successful against dynamic cyber-attacks, security systems need to be flexible, adaptable, robust, and be able to make intelligent decisions in real time (Chen & Wang, 2005), (Dasgupta, 2009). They should detect a wide variety of threats, and most importantly, have the ability to

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predict which entry points the attackers will exploit. These innovative systems rely on learning capabilities to effectively fight cyber crimes (Helano & Nogueira, 2006). An intelligent security system is able of learning by itself and creates new defense procedures by relying on past experiences. The goal is to create security systems that will autonomously improve with exposure to threats over time.

This paper proposes to explore learning techniques from the artificial intelligence field. Computational intelligence methods have been successfully used in many dynamic decision making environments to build efficient and robust systems. With the significant increase of cyber attacks and their continuous sophistication, the only plausible way of combating them is by using intelligent semi-autonomous agents that are able to detect, evaluate, defend, and prevent cyber attacks (Stytz, Lichtblau & Banks, 2005). Integrating artificial intelligence techniques in computer security frameworks would allow efficiently handling extensive amounts of data and using that information to analyze events in order to make correct decisions (Patel, 2012). The coupling of these two traditionally disparate fields will enhance cyber security, especially in crime detection and prevention.

The rest of this paper is organized as follows. Section 2 provides an overview of the cyber security field, discusses the various types of digital attacks and the major challenges faced by security systems. Section 3 presents artificial intelligence techniques that are the most relevant to the computer security community. The use and applications of these techniques in combating cyber threats is discussed in section 4. Section 5 overviews a novel approach that combines the best of humans and machines to prevent and predict cyber attacks. Concluding remarks are presented in section 6.

2. Computer Security and Cyber Crimes

The field of computer security aims to *protect information systems by preserving the integrity, availability and confidentiality of information resources such as hardware, software, data, and telecommunications*. Commonly known as the CIA-Triad, this definition captures the most fundamental issues in computer security. *Confidentiality* refers to preventing unauthorized parties from having access to the information stored in a computer system. *Integrity* preservation means allowing only authorized users to access the data. This restriction requires users to identify themselves before being granted access. *Availability* requires that computer systems work promptly and service is not denied to authorized users (Guttman & Roback, 1995)

A cyber attack that exposes to risk each of these properties can have dramatic consequences. A recent survey (OAS,

2017) reveals that the major number of digital threats (60%) aims to compromise the confidentiality of the information. 30% of vulnerabilities represent a threat against integrity of data, while 10% of cyber attacks impose risks to the availability of information and services, as shown in Figure 1.

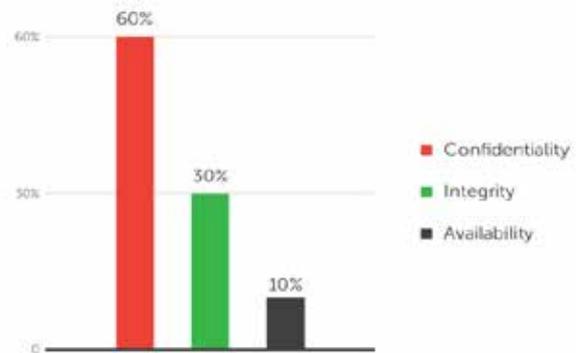


Figure 1: Vulnerability reach: the graph reveals which information property

2.1. Challenges in Computer Security Systems

Building effective security systems is a challenging task. Impenetrable cyber defense frameworks need to be secure in many levels. The most trivial case refers to physical security, which requires that the system does not present any vulnerability that can be exploited by abnormal physical operations. Hardware and firmware protection must also be defended from malicious attackers. However, the most important type of security is the network and information security, which consists on preventing any type of digital attack targeting the information stored in computer systems by stealing, modifying, or deleting it. Efficient security systems should prevent a wide range of dangerous attacks.

The rapid development of technology has had a significant impact in the growth of cyber crimes. New and sophisticated types of threats have emerged as a result of technological change. The interconnectedness of computer systems has provided a global infrastructure that has been exploited by malicious attackers to their advantage. Individuals, institutions and even states have continuously suffered cyber attacks (Poonia, Bhardwaj & Dangayach, 2011). The rise in size and scope of digital attacks poses a serious global threat. Defending against such complex intrusions requires intelligent responses.

2.1.1. Cyber Actors and Types of Cyber Crimes

Digital crime can be defined as a *criminal activity that is facilitated or committed using a computer, the network, or a hardware device* (Gordon & Ford, 2006). Malicious intruders have encapsulated the scope of their attacks into the so called DAD-Triad (Disclosure -- Alteration --

Denial) (Solomon & Chapple, 2005). Disclosure means breaking the confidentiality of information by gaining unauthorized access to confidential data. Alteration consists of any change in the data or information that is performed without granted permission. Denial occurs when authorized users are prohibited to access legitimate data and information. Although there is no clear distinction between cyber attackers who perform these malicious operations, the following categorization provides more insight

- *Hackers and hacktivists*, who aim to gain unauthorized access and carry out disruptive actions to achieve financial, political or social goals.
- *Organized criminals* use cyber attacks primarily for financial gain. They usually have a deep understanding of security issues and are fast to adapt to technological changes. They exploit security gaps to carry out attacks that can have significant consequences.
- *Nation states* are the most sophisticated and dangerous group. Their attacks are well coordinated and usually target large institutions or governmental agencies. If carried out successfully, these malicious attacks might cause widespread harm and put in eminent danger the security of the nation.

A recent survey(OAS, 2017) has shown that the government and energy sectors are the top two industries that experience digital threats, followed by communications and finance and banking, as shown in Figure 2. Cyber threat actors exploit the weakest link in the security system by using a variety of intrusion techniques. Organizations are dealing with an increase number of phishing attacks other than the use of unpatched vulnerabilities and denial of service attacks. Figure 3 provides a more detailed view of the most common cyber attacks. A discussion follows.

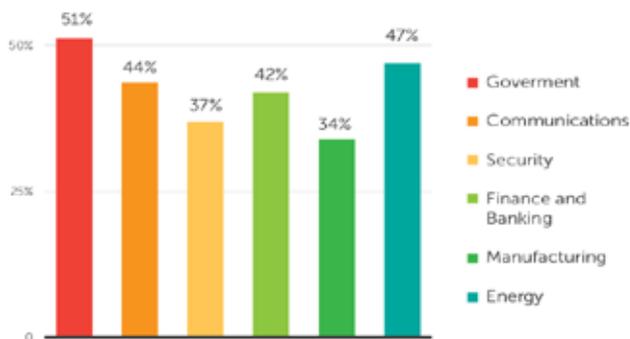


Figure 2: The most common types of cyber attack methods that have been used against organizations

2.2. Malicious Activity

Any type of malicious activity that attacks software, hardware or human vulnerabilities can cause significant damage. Cyber threat actors use diverse techniques to steal information, or even worse, modify or delete it. Major concerns are raised by security experts who consider the

use of cloud-based systems, portable storage devices, and other technological facilities as tools that can undermine

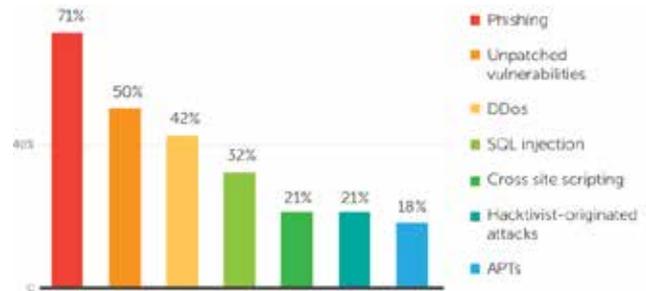


Figure 3: Percentage of organizations that experienced attempts to have information

the security of a computer system if not used properly. Humans are also widely considered as a vulnerability that can cause irreparable damage, either intentionally or unintentionally.

2.2.1. Denial of Access

Denial of service attacks intend to compromise the availability of a computer system. Cyber threat actors overflow the system with counterfeit requests in order to prevent access from authorized users. The increasing number of denial of service attacks has made them a continuous threat for security systems. A recent survey showed that almost half (46% percent) of the reported organizations have frequently experienced denial of service attacks (Martin, 2015). A similar form of attack known as *ransomware* blocks a user from accessing the system and requires a "fee" payment before releasing access.

2.2.2 Malware

Many diverse intrusive software such as computer viruses, worms, Trojan horses, and spyware, among others, are referred to as malware. They pose significant threats for security systems, as they can take various forms such as executable code, scripts or active content. Malware rely on simplicity in use and effectiveness when deployed to cause large damage. The information gathered by these intrusive agents can subsequently be used for fraud or financial gain.

2.2.3. Phishing

A simple, yet dangerous cyber crime technique, phishing attempts to acquire sensitive information by posing as a known and trusted entity. It is a continuous threat for security systems and has further increased in scope by the extensive use of social media. Phishing is typically carried out by email spoofing or instant messaging, and it directs users to enter details at a fake website which looks almost identical to the legitimate one.

2.2.4 Social Engineering

By exploiting human interaction, malicious attackers manipulate people to break normal security procedures. Commonly referred to as social engineering technique, this type of attack can have significant consequences, especially when coupled with malware deployment or other forms of digital attacks.

3. Artificial Intelligence

Artificial intelligence (AI) is the field of study that aims to create computer systems that are capable of intelligent behavior. Its core objective is to solve problems that cannot be solved without applying intelligence. An artificial intelligence based system is composed of three main components: i) representation (store knowledge), ii) reasoning (apply knowledge to solve problems) and iii) learning (acquire new knowledge through experience). Significant advances in AI have led to successful applications in diverse fields including transportation, medicine, military operations, robotics, entertainment, and computer security among others (Russell & Norvig, 2003)

3.1 The Need for Intelligent Cyber Security Systems

The combination of artificial intelligence and computer security is considered an odd match for many researchers. The field of AI focuses on developing intelligent agents that are able to execute more efficiently tasks that are naturally performed by a human. Computer security on the other hand, aims to fixing leaks in computer systems infrastructures. The rapid development of technology has significantly increased the risk of cyber attacks, both in size and scope. Undesirable intrusions pose eminent dangers that can have dramatic consequences. The growth in complexity and sophistication of malicious attacks demands for intelligent responses.

The field of artificial intelligence provides a framework for building automated systems capable of intelligent behavior. Recent advances have made possible to deal with big data in an efficient matter. Artificial intelligence systems are robust, flexible and able to learn models from the data while discovering meaningful patterns. Furthermore, a fundamental property of artificial intelligence systems is their ability to continuously improve themselves and perform well in unknown scenarios. Security systems can greatly benefit from such automated systems to build defense frameworks that are robust, effective, and require less human intervention.

Adaptability is another key reason that brought artificial intelligence and computer security closer to each other. Digital threats are rapidly evolving from simple password

guessing to multiple complex threats occurring simultaneously. To deal with sophisticated cyber crimes, computer security systems should be able to adapt to the rapid technological change and its effects on digital crimes.

Artificial intelligence methods are well suited to address these challenges. AI-based systems have the capability to change their behavior accordingly with respect to changes in the environment. By learning a model of the data, intelligent agents are able to deduce reasonable conclusions when encountering previously unseen scenarios. This property is fundamentally important in the cyber security world, especially in detecting unknown threats and being able to predict when cyber attacks might occur.

3.2 Artificial Intelligence in Computer Security

This section provides an overview of the artificial intelligence techniques that have found successful applications in the field of computer security.

3.2.1 Machine Learning

The goal of machine learning is to develop systems that learn by experience, similarly as humans do. Given a knowledge base, a machine learning algorithm improves its performance by acquiring new knowledge and discovering new ways to apply the existing intelligence (Russell & Norvig, 2003). Extensive research is focused on investigating this family of methods, as they have been proven successful in tackling a diverse spectrum of problems. Applications range from learning parameters that explain certain data to complex forms of symbolic learning. Machine learning is used extensively in adapting computer systems to learn desired behaviors (Ghosh, Michael & Schatz, 2000)

The two main fields of machine learning are supervised and unsupervised learning. The former aims to build systems that are able to make predictions based on evidence, while performing efficiently in the presence of uncertainty. A supervised learning algorithm is adaptive, i.e., it searches to identify patterns in the data and learn from those observations, while improving its performance when exposed to more data. Given an input, the trained model can make reasonable predictions to respond to previously unseen scenarios. An unsupervised learning algorithm, on the other hand, aims to reach the same objective, but without relying on labeled data. Rather, its intent is to infer hidden structures in the data and explain key features.

3.2.2. Artificial Neural Networks

Inspired by biological neural networks, an artificial neural network can be considered as a system of interconnected *neurons* that exchange messages with one another to infer

knowledge from large datasets. By allowing to perform decision-making in parallel, neural networks significantly reduce the speed of operations. The connections between neurons can be associated with numerical weights that can be tuned based on experience, making neural nets adaptive and capable of learning (Russell & Norvig, 2003). Section 4.2 discusses a set of applications that take explore these properties to respond to sophisticated cyber attacks.

3.2.3 Intelligent Agents

Intelligent agents are computer systems capable of behaving intelligently while performing various tasks. The most desired characteristics of such systems, especially in the field of cyber security, are the ability to react proactively to digital threats. A security system requires intelligent agents to identify cyber attacks, to plan the response accordingly and to act efficiently.

3.2.4 Search

Search is a universal method of addressing a problem that can be applied successfully in many fields. When a computer system encounters a previously unknown threat, it can rely on a search method to generate solution candidates. Searching techniques decide whether a proposed candidate satisfies the requirements for a solution. The efficiency of a search method is significantly correlated with the knowledge the system possesses. When additional information can be acquired to guide the search, the performance of the algorithm is drastically improved. Search is present in almost every intelligent agent, and plays a critical role in the performance of the entire system.

3.2.5 Constraint Resolving

The constraint resolving problem is an artificial intelligence technique that aims to find solutions that satisfy certain imposed constraints (Kumar, 1992). These problems are complex and enforce difficult challenges because constraints can have diverse characteristics. Due to the extensive amount of search required, most methods take into consideration only specific information. Constraint solving can be used effectively to perform event analysis in cyber security systems

3.3 Challenges of Intelligent Cyber Security Systems

This paper aims to provide useful insight on the importance of incorporating artificial intelligence techniques in the field of computer security. The goal is to develop security systems that are capable of learning autonomously to detect and prevent cyber attacks. Recent advances made by the AI research community have opened a wide range of possibilities that can significantly improve security systems. However, the current intelligent agents face complex challenges, especially when dealing with the

sophistications, unpredictability and dangerousness of cyber attacks.

In order for an intelligent system to be able to detect and prevent undesired intrusions, it must build a solid model of what is acceptable behavior and what is a cyber attack. The system must be able to clearly distinguish one from the other. To achieve this objective, it must train itself through a wide-ranging training set. The challenge arises in datasets containing very diverse types of activities, thus making clustering and classification a difficult task, or in cases where there is no clear distinction between various types of activity. Furthermore, any change in the system's normal patterns must lead to necessary update of the knowledge base.

Another key difficulty is reflected in the accuracy of intelligent systems to minimize the number of false positive alarms. If a detection and prevention system inaccurately classifies a legitimate activity malicious, the results can be disturbing because it will attempt to stop the activity or change it. Since normal and acceptable behavior can easily change, automated security systems might misjudge atypical control sequences and incorrectly classify those causing false alarms.

4. Applications of Artificial Intelligence in Cyber Security Systems

The road towards intelligent systems that accurately detect and prevent cyber threats remains a challenging one. However, recent advances in the field of artificial intelligence open up many interesting opportunities for building efficient security systems. The goal of this section is to provide an overview of different approaches that incorporate intelligent behavior to address complex cyber threats.

4.1 Intrusion Detection Systems

The goal of an Intrusion Detection System (IDS) is to monitor computer systems for unauthorized activity. An IDS must be able not only to detect malicious intrusions, but also to counter-react in a timely manner. Furthermore, an intrusion detection system must operate in the background, i.e., even when an anomaly is detected, the system cannot be shut down as it might interrupt legitimate users performing their transactions.

To efficiently prevent cyber attacks, an IDS inspects all network activity and identifies suspicious patterns that might signal an attempt to break the security system. It relies on artificial intelligence techniques to deal with large datasets by using classification algorithms. A dataset containing millions of normal behavior log data is used as a baseline comparison to identify anomalies (Manninen, 2014)

An intrusion detection system analyzes individual packets flowing in the network to detect abnormalities that have already passed the firewall. Traditional IDS systems react passively, i.e., when a security breach occurs the system logs the information and raises an alert. Then, the responsible people judge the seriousness of the alert and act upon it (Anifowose & Eludiora, 2012)

The main problem with this passive approach is that it fails when encountering sophisticated cyber threats that attack quickly. To avoid damage, intelligence-based intrusion detection systems behave pro-actively. The objective is not only to detect and report threats, but to take instantaneous measures against attacks. Artificial intelligence is used to rapidly detect cyber threats, even unknown ones, and respond to the suspicious activity by logging off the user, backup the data, and reprogramming the firewall to block network traffic from the suspected malicious source.

4.2. Artificial Neural Networks

Extensive research is focused on the use of artificial neural networks in the field of cyber security. They have been successfully applied in intrusion detection and intrusion prevention systems (Bai, Wu, Wang, Yang & Wenbin, 2006), (Barika, Hadjar & El Kadhi, 2009), (Phillips, Link, Smith & Weiland, 2010) in detecting denial of service attacks (Ahmad, Abdullah, & A Ighamdi, 2009), in identifying computer worm (Moskovitch, Nissim, Stopel, Feher, Englert & Elovici, 2007), spam (Wu, 2009), and malware classification (Shankarapani, Kancherla, Ramamoorthy, Movva & Mukkamala 2010)

Recent advances have made possible the development of third generation neural nets, which allow for fast and effective neural networks that more closely mimic the behavior of biological neurons. The ability to adjust well in changing environments has made neural nets a very suitable candidate in preventing complex cyber threats.

For instance, (Chen, 2008) is an efficient security system whose main task is to collect and analyze distributed information, to coordinate network activities, to detect suspicious operations and to react immediately by automatically initiating countermeasures. This security system has been tested in a wide range of scenarios, and has demonstrated to be effective against TCP-targeted distributed denial of service attacks. Another intrusion detection system that uses neural network is described in {Linda}. It is able to accurately detect malicious intrusion attempts in the network communications.

4.3 Intelligent Agents

In the field of cyber security, intelligent agents are used to gather data, share timely and accurate information, and cooperate effectively to plan and implement appropriate

responses in case of cyber attacks. Many applications use intelligent agents in combating against various digital threats taking advantage of properties like mobility, adaptability in unknown situations, and collaborative nature.

Notable progress is made in using intelligent agents to defend against denial of service attacks. The work shown in (Kotenko & Ulanov, 2007) introduces the notion of cyber *police*, which consists of a team of agents cooperating to detect and prevent denial of service threats. Combining intelligent agents with neural networks is another promising research direction that would lead into the development of hybrid intrusion detection systems (Herrero, Corchado & Pellicer, 2007).

Another successful application is the design of a multi-agent system for detecting computer worms. It uses intelligent agents to identify worms that occupy considerable amounts of bandwidths and cause router crashes. Once these malicious attackers are discovered, the system automatically counter-reacts. Experimental validation of this approach has demonstrated its effectiveness at the high worm infection rates (Gou, Jin, & Zhao, 2008).

Intelligent agents are used in other work to protect normal behavior from intrusive attacks, and to implement the necessary strategies to address unknown risky events in distributed electric power grids (Bitter, Elizondo & Watson, 2010)

A more general approach aims to protect a computer system from threats of any kind. Based on intelligent multi-agent modeling and simulation, this method encourages groups of intelligent agents to cooperate and change their behavior according to the network condition and severity of attacks. If a successful method of communication is integrated, then the security system is able to perform orders of magnitude more efficiently than a single agent (Kotenko & Ulanov, 2007)

5. AI²: Artificial Intelligence Squared: Combining Humans and Machines

This section discusses a very recent security system that aims to combine the best of human and machines into building robust and efficient defense mechanisms against any type of cyber threat. Named AI², this new framework merges *artificial intelligence* with *analyst intuition* in order to shield against digital crimes and to learn to detect previously unseen attacks (Kalyan, Ignacio, Alfredo, Vamsi, Costas & Ke, 2016)

5.3. Experimental Validation

To test the validity of this approach, it was conducted a series of well-designed experiments. The system gathers extensive amounts of data for a period of three month from an e-commerce platform. The dataset included 40 million log lines each day, for a total of 3.6 billion. Figure 4 presents the progress of the system after only 12 weeks of use. As it can be observed, the system is able to rapidly improve the attack detection rates (*recall*), while continuously reducing the number of cases presented to the human expert (daily investigation budget *k*).

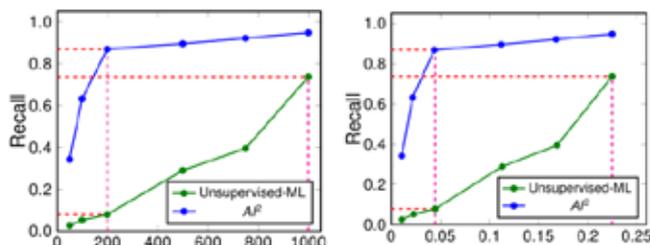


Figure 5: Recall versus investigation budget and recall versus false positive rate after 3 months of deployment

The AI^2 system is able to achieve a 86.8% detection rate by rapidly learning to improve its performance. It drastically reduced the number of cases presented to the human expert by going as low as 200 daily events. Fixing the daily investigation budget at 200 keeps the false positive rate at 4.4%. If this budget is increased up to 1000, then the learning algorithm is able to reduce the rate of false positive alarms by a factor of 5.

Though the detection score is not perfect, the improvement is significant. The artificial intelligence framework provides valuable information for the human analyst. Rather than reviewing thousands of events per day, he or she only needs to check a few hundred. The objective of this security system is not to replace human experts, but rather to create a coexisting environment that combines the best of people and machines.

6. Discussion

Cyber security is an interdisciplinary area that focuses on minimizing the risks associated with compromising the confidentiality, integrity, and availability of information in computer systems. This paper discussed the major types of cyber actors, threats, and the risks associated with them. The digital revolution taking place in the last decade has given rise to difficult challenges in protecting against digital crime. The complexity of modern computer systems and the diversity of digital attacks, require intelligent, adaptive, and intelligent solutions. The field of artificial intelligence provides a framework that allows building

effective security systems that are capable of autonomously learning to improve their performance, and to adapt well to previously unseen scenarios.

This paper presented the advances made so far by the applications of artificial intelligence techniques in the field of cyber security. We discussed various methods for combating digital crime, their current limitations and the desired characteristics of intelligent systems. A very recent approach that merges advanced machine learning methods with human expert knowledge was presented as a case study. This method combines the best of machines and people to build intelligent security systems that are able to detect cyber threats at a high rate and maintain a low-level of false positive alarms.

Dealing with sophisticated and constantly evolving cyber threats demands for intelligent responses. The integration of artificial intelligence techniques into security systems has the potential to become an impenetrable line of defense against such dangerous threats, and a key mechanism for preventing new types of attacks.

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Aspects of Decision Making in Albanian SME

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ABSTRACT

In this study is examined decision making aspects in Albanian SME. Most researchers have posited that these decision making influence in many aspects of organizations including communication, structure, behavior and performance. In the study, the effects of decision making in SME performance and other indicators are questioned. In this study are used different methods and analyses. This study has different objectives and aims (like structure of situations and types of decisions in Albanian SME), techniques to gathering different information and however study has some limitations. Scale model is used to evaluate the connection between indicators.

There are two hypotheses: first, decision making affect or not performance and second, if its logical connection between managerial levels and types of decision making. Hypotheses are tested using data obtained from small and medium sized companies in different areas in Albania with questionnaire forms. Various analyzes of the SPSS program have been conducted to test the hypotheses and most of the results have been found to be consistent with the literature. The nature of decision-making in SMEs has been studied by the levels, types, and extent of employee engagement. Finally there are in this study findings, results, conclusions and recommendations for further research.

Keywords: *Decision Making, SME, performance, situations, scale of evaluation, types and categories of decisions*

1. Review of theory: Decision making

Decision-making refers to the taking of choices between alternative courses of action - which may also involve inaction. While it can be argued that management is decision-making, half the decisions taken by managers within organizations fail (Ireland & Miller, 2004; Nutt, 2002; Nutt, 1999). Therefore, the increase in effectiveness in decision-making is an important part of maximizing your effectiveness at work. This chapter will help to understand how to make decisions alone or in a group, avoiding the usual pitfalls of decision-making.

Despite the widespread nature of decisions, not all decisions have major implications or even require much thought. Direct decisions are called programmed decisions; these are the decisions that often take place to develop an automated response to them. The automatic response we use to make these decisions is called a decision. If a problem or situation is repeated it can be considered a programmed decision. To deal with this problem, SME

may have a policy that every time they receive a valid customer complaint, the client must receive a product or service, which represents a rule of thumb. Taking strategic, tactical and operational decisions is an integral part of the planning function in the P-O-L-C model (planning-organization-leader-controlling). Below, tabular and organized we are concretizing with some examples the decisions according to the levels and persons involved in these kinds of decision-making.

Table No.1. The levels of decisions, examples and persons involved in relevant decision-making

Levels of decisions	Examples of decisions	Prominent persons or groups
Strategic decisions	Can we merge or join another company?	Top Management
	Can we introduce a new product line or service?	CEO
	Can we reduce the size of our organization?	Board of Directors
Tactical	What can we do to ease the work of the two	

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decisions	companies to work together after thawing? How can we successfully market a new product or service line? How will the organization and processes progress when we decrease?	Managers, Management of middle level
Operational decisions	How often can I communicate with young associates? What should I tell my customers about the new product line or service? How can I balance my new job requirement?	Employee

Table No.2. Decision Categorization

Decision Type	Description
Routine	The same situation appears and circumstances select a previously proven action path.
Emergency	When some situations are unprecedented, they have not happened before, then you can make decisions as soon as the event appears.
Evidence and error	It is considered that the changes in the plan will be postponed and will be the result of the evidence. These tests will succeed in completing the plans continually before putting it fully into practice.
Steps taken (or steps)	Before making a decision on a previous problem or steps, the results of previous steps must be confirmed.
Strategic Solutions	Set on goals and objectives and conceptualize these with specific plans, with subversions and is one of the most important tasks of a manager.
Operational decisions	Especially related to the problems of people, including people's movements and housing. of this nature.
Irrevocable	Is the decision that has been taken cannot be restored as you agree to the sale or purchase of the company.
Reversible	That is, the decision can be completely changed before or after the action has been agreed.
Delayed decisions	or as otherwise called deferred-it prevents you from making decisions at an incorrect time before all the facts are known
Experimental:	The decision is not final until the first results are shown and that they are enjoyable. In these cases, positive feedback is required before you proceed to the flow of action

There are different situations of decision making process. The fourth biggest and most usefully in organization are certainty, uncertainty, risk and chaos (or dual meaning).

2. Review of theory: Performance

Methods for measuring performance those past twenty years have changed quite a bit. The importance of non-financial methods for measuring performance has also increased. The Balanced Presentation Method provides a series of overall financial and non-financial performance measurements of organizations. The performance outcomes of the reviewed SMEs are done precisely with this method. The balanced approach method is based on four perspectives: financial, customer, internal process, and

growth. There are also other methods that use one or two perspectives, but the use of four of them makes the study more accurate and more reliable. The financial perspective of balanced presentation shows the organization's growth, profit and risk strategy being considered from the perspective of all stakeholders in the organization. The customer's perspective identifies value-creating and differentiation strategies from the customer's point of view. The internal perspective captures strategic advantages for different business processes that create customer satisfaction and stakeholders in the organization.

The learning and growth perspective includes the skills and skills of employees, innovation and technology, as well as the climate that supports the change and growth of the organization. In each perspective there may be different measurements of performance in types and numbers. In this study, the performance results of SMEs are classified in four perspectives as in Table No.3.

Table No.3. Classification of SME Performance Results Based on the Balanced Presentation Method

Financial	Client	Process	Increasing
Total sales Benefit (Profit / Sell)	Market Sharing Product quality /services Communicating with clients	Flexibility in production Production design Innovation in Business Improving the organization's structure under current conditions	Flexibility in production Production design Innovation in Business Improving the organization's structure under current conditions
Reduce production Effective and low cost distribution			

3. Methodology

The object of study are SMEs in Albania. Offered in study Approximately 100 SMEs were randomly selected from a database. Managers are directly involved to decision making process. The poll was sent by email, face to face or mail, etc.

Limitations: Data limitations because not all SMEs available and time availability.

The study asked the effects of institutionalization of organizations as a continuation of a previous work but specified in the decision-making variable as a sixth institutionalization. To analyze the relationship between institutionalization and performance outcomes and the study of the nature of decision-making in SMEs, the following steps were pursued: A research model based on research literature was built that deals with the six dimensions of institutionalization and four balanced outlook prospects. Further, model relationships were tested using data obtained from SME companies through questionnaires. In order to prepare data for the analysis, the average of the answers to questions about the six dimensions of industrialization related to the four balanced prospects of prospects was calculated. Interest in this study was the decision-making mass based on the Likert scale and other questions with regard to the percentage of

engagement in the type of decision-making. Finally, regression analysis was performed to test the relationships obtained using the SPSS program, which is a statistical analysis program.

Table No.4. Study Objectives

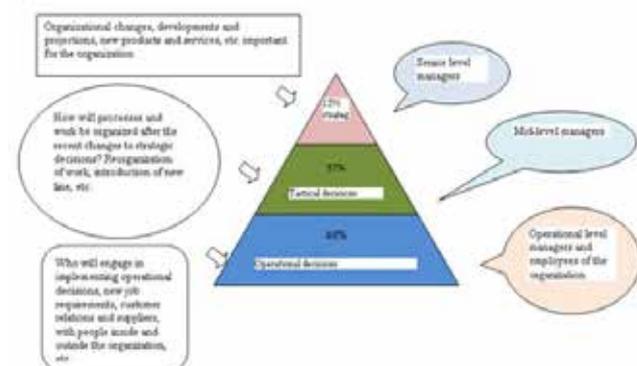
Objective	Study of
1 st	the impact of decision making as important dimension at four performance factors;
2 nd	the structure of decision making in SME in Albania;
3 rd	to identify decisions in every managerial level of SME in Albania;
4 th	Connection between type of decision making and managerial levels.

Based on objectives we raised or build two hypotheses.
 H1- Decision making can affect four performance aspects?
 H2- Whether exist one logical relations between managerial levels and different types of decision making?

The first hypothesis: decision-making according to the levels is approximated to the types of decisions. Second hypothesis: decision-making in SMS affects four perspectives. At the same time, outside the hypothesis, we can find different links from the results of the study. Decision-making is measured by 25 questions. Their safety and validity are at acceptable levels. They were also tested by this study and found satisfactory. Approximately 100 SMEs were randomly selected from a database. The poll was sent by email and the response rate was 55% (55 responses).

To analyze those hypothesis and aims were pursued different instruments. Gathering primary and secondary data from different theory sources (books, reports, journals, different documents);
 Model relationships were tested using data obtained from SME through questionnaires. Interviews with different managerial levels. Scale model from 1-5 point of evaluation, using econometric program SPSS to calculate all those inputs. Generating results from one logical and instrumental analyze process.

3. Study in Practical Concepts



From the processing of questionnaires, the strategic decisions occupy the lowest weight (about 15%) in the managerial decision-making group, then the tactical ones (about 37%) and finally the operational ones (about 48%).

Fig.1 Pyramid of decisions, management levels and reasons for decision making

The results of questionnaires were then elaborated on the different types of decisions which are summarized in the table below:

Table No.5. Distribution of types of SME decisions according to the questionnaire

Decision's types SME	%	Decision's types SME	%
Routine (O)-M of Low Level	10%	Reversible (T)-M.M.L.	4%
Operational Decisions (O)- M.L.L	34%	Emergency (T)-M.M.L.	2%
Experimental (T) -M.M.L.	4%	Irrevocable (T)-M.H.L.	1%
Steps (T) -M.M.L.	18%	Strategic (S)-M.H.L.	14%
Delayed (T) -M.M.L.	9%	Evidence and error (T) -M.M.L.	4%

The regression analysis according to SPSS suggests the values of the values of the indicators that the decision making relationship with the four SME performances is significant which confirms the second hypothesis (from the questionnaire processing to the scale of assessment 1-5)

- O- operational decisions
- T-tactical decisions
- S-strategic decisions
- MLL-Managerial Low Level
- MML- managerial Medium level
- MHL-Managerial High Level

Table No. 6. Relationship decision making and decision types according to each performance

Indicators	Client Performance (coefficients)	Financial performance (coefficients)	Process Performance (coefficients)	Growth performance (coefficients)
Decision-making (S.D)	3.5	3.75	3.95	4.25
(T.D)	11.25%	16.7%	18.5%	19.3%
(O.D)	32.50%	34.3%	40.4%	37.2%
	56.25%	59.0%	41.1%	43.5%

Decision-making has had a significant impact on all performances according to indicators over the average, but especially on the growth performance. For each type of performance according to the elaboration of the opinions received from the questionnaires results a structure of strategic, technical and operational decisions different for each performance. In the average structure, strategic decisions account for about 14% of the technical ones 36.1% and the remaining (about 49.9%) belongs to operational decisions. By comparing the search results according to table no.4 (14%, 36.1%, 49.9%) and the number of decision-makers according to the four performances taken in consideration on this study (15%, 37%, 48%).

4. Results

From SPSS econometric program we calculated the data:

Table No.7 impact of decision making in performance factors

Indicators Dimension of	Client Performance (coefficients) (From 1-5)	Financial performance (coefficient) (From 1-5)	Process Performance (coefficient) (From 1-5)	Growth performance (coefficient) (From 1-5)
Decision-making	3.5	3.75	3.95	4.25

H1-Decision making can affect four performance aspects= because of evaluation point system up to 3 for each performance factor (medium 3.86)

The comparison of the results of the figure 1 (Pyramid of Managerial Levels -PM)

With the results of table 5 (structure of types of decisions making) m) we can evaluate decision-making process in SME based on this study.

Result from :	Strategic Decisions	Tactical Decisions	Operational Decisions	Total:
Figure 1 :(Pyramid of ML)	15%	37%	48%	100%
Table 5 : (structure of types)	14%	42%	44%	100%
Deviation	1%	5%	4%	
Managerial Levels	MHL	MML	MLL	

This study has identified the four situations of decisions making in this structure:

Situations	% of events happened
Certainty	51%
Uncertainty	24%
Risk	20%
Chaos	5%

5. Conclusions & Recommendations

- Based on results of this study the decision making process is important for organizational performance; (H1)
- Decision making its important dimension of

Institutionalization; (H1)

- Decision making process has on logical meaning because the good coordination between ML and Types of DM; (H2)
- According to SME's surveyed in Albania decisions under certainty situations around to 51%;
- According to SME's surveyed in Albania decisions under uncertainty situations around to 24%;
- According to SME's surveyed in Albania decisions under risk situations around to 20%;
- According to SME's surveyed in Albania decisions under chaos situations around to 5%;

Recommendations:

- Organizations should have more attention to decision making function and process.
- This process and function can be evaluate and supported with different organizational resources (including: finance, H.R. equipment, etc.);

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Financial System Indicators and Unemployment: An Empirical Analysis on Albania

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ABSTRACT

The problems of the overall employment are crucial to the economic well - being of an economy, particularly for a developing country such as that of Albania. In this regard, employment should be the leading policy since it is directly associated to sustainable development. This paper analyses the effect of credit to private sector and non – performing loans on labor market performance. In order to reach this goal a regression is performed to check for this impact. The study considers a period from 2005 to 2013/Q3. The results indicate that the variables have a positive impact on the unemployment rate. In the Albanian case, where much attention and progress has been made in terms of economic expansion and poverty moderation, the problem of rural areas persists, where employment is the key factor. Therefore, it is imperative to consider the issues of employment in the rural areas, as well as identify potential rural non-farm activities that might contribute to increases in employment as well as overall development of these areas in the country.

Keywords: Economic growth, employment, credit, performance, and nonperforming loans

1. Introduction

Labor market situation is a crucial element of economic well – being and unemployment is closely concerned with being poor (Padhan, 2009). In the recent years, Albania has moved forward in terms of macroeconomic indexes and in the improvement of structural reforms. Even so, Albania still remains far behind the most advanced economies. The per cent of the activity of private sector to GDP accounts to 75, comparable with Bulgaria, the highest ratio in the region. Considering different factors, external as well as internal ones, and contrasting them with countries in the region, it appears that the fulfilling of the task will still need additional time. Yet, Albania cannot jump within short. However, the steps the country has done since the beginning of 90s are to be appreciated, even its effects will be more obvious in the long – run. Switching from a guaranteed employment to a market oriented one, put Albanian economy in difficulties. The collaboration of private sector in this regard has been weak. According to INSTAT, the unemployment rate in 2013 was quite high, standing at 16% of the total labor force. The problem about the labor market status stands on the impact of the increasing in formalization. Approximately, 75% of the total workforce is involved informally in the labor market (Sela, 2016).

Albania’s development since the period of transition has been significant. Aggregate growth since 1990 is on the top of all transition economies. According to the latest statements Albania not only improved, but went beyond per transition levels in terms of GDP. High levels of GDP have associated by a moderation in poverty. Despite that, human capital development has been influenced by inequalities in urban and rural areas. Labor market evolution has been affected substantially by the transition amendment as well as by social and economic environment in Albania. The decline of employment in the public sector has been sizable, mainly in the first years of the transition. Currently, only 20% of total employment is involved in the public sector. The correlation between GDP and employment rate has been disappointing, since it has taken place in a situation of relatively high economic growth (Sela, 2016). Annual GDP growth rated at 4.5% from 2003 to 2013. Nevertheless, this has not led to respective rates of employment development. However, the labor force is increasing and can be a significant factor affecting growth performance. In the coming decade, the working age will increase by approximately 5% annually. Nevertheless, considering this potential, Albania should improve its job creation record.

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Albania's demographic outline has three main characteristics: decreasing fertility rates, decreasing mortality rates and high migratory waves. Based to the 2001 survey, the population in Albania was calculated at 3.1 million, whereas in 2009 was estimated at 3.7 million citizens. This number is predicted to increase to more than 3.7 million in 2025. Even Albania is categorized as one of the youngest nations in Europe with a median of 28 against 39 of EU, now the population over 65 years is increasing and that below of 15 years of age is declining. Migration has been one of the major socio – economic factors in the last 20 years, in terms of external and internal flows, as well as short or long term migration. Albania is the only country in Central and Eastern Europe that has been affected by migration to such a degree in a very short period of time. Migration stands for 28% of the whole population. Without remittances Albanian citizens would be living in less than \$2 per day. Tirana's population alone is evaluated to have grown to around 850 000 residents in 2012 from 200 000 it was in the beginning of 1990s (Zisi and Merko, 2015).

2. Review of the Literature

The relation between economic growth and the financial development of a country is still under enquiry. Some researchers count on finance as a crucial element of a country's' growth. According to Schumpeter (1939), banking sector development was the key driver of a strong economic growth and therefore to a declining rate of unemployment. On the other side, Lucas (1988) indicates the overemphasized role of finance in the well - being of a country.

The finding of Greenwood and Jovanovich (1990), emphasize the bidirectional causality among banking sector development and economic growth. The role of financial intermediaries is very well known in facilitating the flow of capital from the savers to the investment entities, as well as in generating better information. A developed system of financial intermediaries is more capable to assign more capital to productive investment, fostering so the economic growth. Financial intermediaries increase efficiency and growth by upgrading corporate governance (Mankiw and Romer, 1992).

Indeed, the study of Goldsmith (1969) was the first one that showed the empirical positive relation GDP per capita and financial development. King and Levine (1993), as well, found an important positive relation among different financial development indexes and GDP per capita, and a negative relation between unemployment rate and economic growth. The studies of Haas (2001) and Berglof & Bolton (2002), while analyzing data from the central and Eastern Europe concluded that the increase in credit as

percentage of GDP would negatively affect the average rate of unemployment. Fink, Haiss & Mantler (2005), while examining 33 countries, concluded that the positive effects of financial development on economic growth are more obvious in the short - run rather than in the long - run.

Salas and Saurina (2002) have found a negative relation between GDP growth and non - performing loans. The explanation for this is that a high level of GDP growth implies a high level of incomes, which will upgrade the ability of the borrower to fulfill its obligations, reducing so the bad debts. According to Louzis, Vouldis, Metaxas (2010), while analyzing the Greek banking sector, indicated that non - performing loans are related to variables such as GDP, interest rates, unemployment and to the quality of management

Moreover, Haas (2001) and Levine (2005), reported a positive effect of financial development on the economy. The same conclusion, stated also Egert, Backe, and Zumer (2007), indicating a positive relation among GDP and the development of the banking sector in the transition economies. In contrast with these findings, Kenourgios and Samitas (2007) investigated the long-run relation among economic growth and finance for Poland and summarized that credit to the private sector has been one of the key driver elements of long - run economic growth. Berglof and Bolton (2002) argue that the relation among economic growth and financial development does not seem to be very strong, considering the ratio of domestic credit to GDP.

3. Methodology

In order to estimate the effects of financial sector on the overall economy, the impact of credit and non – performing loans on the unemployment rate has been considered, taking into account that unemployment reflects the well - being of a country. The set of data include quarterly observations of unemployment rate, credit as % of GDP and non – performing loans from 2005 until 2013. The model that is going to be estimated the equation will be:

$$UN = \alpha + \beta_1 * CG + \beta_2 * NPL \quad (1)$$

Where:

UN- is the unemployment rate

CG- is credit to private sector as % of GDP

CG- is non – performing loan

In order to make a full analysis a regression is run using OLS method. A regression analysis assists in understanding how the dependent variable changes if one of the independent variables differs, while keeping all the other variables fixed. The test considered will be the R

square test, Fisher test, T student test and Durbin Watson test. If all the tests pass it can be concluded that the independent variables affect the model, otherwise if just one of them fails, it cannot be preceded with quantitative analysis.

4. Data Analysis

Due to internal factors combined with the troubles of the global financial crisis economic activity in Albania started to slow down. In 2013 the output growth was still positive, standing at 0.7% although below potential. At present, there is a high volume of bad loans in the bank's portfolio, which is a barrier in the efficient capital intermediation. According to the data of 2013, this ratio increased to 23.5%, affecting the banking sector and the overall economy. After the fall of pyramid schemes in 1997, inflation rate has been quite stable, ranging from 2 – 4%, while unemployment rate has increased quickly, especially in 2013. In terms of export, Albania is not performing very well even it has an upward trend. Probably, the country's potential are not being used properly or not enough money are being invested on modern technologies in order to meet the European markets conditions (Nikolli, 2014). The rise of public debt can be attributed to extensional fiscal policy of 2008 – 2009 to diminish the influence of the financial crisis. After 2008 the remittances started to decline, and fell to 8.5% in 2013, a decrease of approximately 7% in comparison with 2005, reflecting the aggravating economic situation in Europe.

Table 1: Key Macroeconomic Indicators (2005 – 2013)

	'05	'06	'07	'08	'09	'10	'11	'12	'13
GDP	5.5	5	5.9	7.5	3.4	3.5	2.4	1.3	0.7
Infl.	2.4	2.4	2.9	3.4	2.3	3.6	3.5	2	1.9
Unemp.	12.5	12.4	13.5	13	13.8	14.2	14	13.9	16
Export	22.3	25.1	28.8	29.6	29.6	32.4	34	33.3	35.1
Import	46.3	49.2	55	56.4	53.8	53	56.7	51.9	52.9
Debt	57.8	56.7	53.4	51.3	55.5	54.8	56.5	58.4	61.3
NPL	2.3	3.1	3.4	6.6	10.5	14	18.8	22.5	23.5
FDI	3.1	3.5	5.8	9.6	11.1	9.2	10.6	7.5	11.4
Remitt.	15.4	14.9	13.7	11.6	10.9	9.7	8.7	8.3	8.5

Source: World Bank Indicators

In 2013 construction and services comprised more than 60% of total GDP, while agriculture accounted for 20% and industry accounted just for approximately 15%. However, agriculture is still the largest source of employment, although on a declining trend compared to the beginning of 2000s. Based on the data of 2013, the agricultural sector involved around 50% of total employment, service sector accounted for 35%, whereas in the industry sector were employed 15% of all workers. The private sector is controlled mainly by small enterprises. In

2012, around 90% of active enterprises employed up to 5 workers, with a general contribution to employment of 40%, mainly in the service sector. Enterprises hiring 20 employees or more stand for 3% of the total active enterprises, but represent 50% of total employment.

Table 2: Employment Indicators (2007 - 2014)

	2007	2008	2009	2010	2011	2012	2013	2014
Population. (ml)	2.98	2.95	2.93	2.91	2.90	2.90	2.89	2.89
Employ. rate	56.6	53.9	53.5	53.5	58.7	55.9	49.9	50.5
Unempl. rate	13.5	13.2	13.8	14.2	14.3	13.8	16.4	17.9
Registered jobseekers by sex(000)	73*	71*	70*	71*	69*	69*	68*	69*
Registered jobseekers by educ. level (000)	69**	69**	71**	72**	72**	73**	73**	72**
	77	74.6	76.0	77.5	77.7	77.8	77.8	76.9
	62	62.0	62.2	61.2	59.5	59.0	58.8	56.9
	3.3	3.5	3.7	5.0	5.1	5.6	5.9	8.1

Source: INSTAT

The age structure of the population in Albania has changed substantially in the last decades. From the beginning of 2000 till the end of 2013 population declined by 8%, with an estimation of 500 000 individuals migrating abroad. Nevertheless, latest tendency demonstrate raised homecoming, mainly from Greece. Based on the census of 2011, around 140 000 individuals turned back to Albania. Return migration is crucial in skill formation, due to their experience abroad. These skills can be profitable when they come back home in terms of labor. Migrants that come back bring their savings, contributing so to the Albanian economy. As it can be observed from the below table unemployment rate has increased significantly, mainly in the last years. This phenomenon can be attributed partly to the effects of the global crisis but also to internal factors, such as the inefficiency of creating new jobs.

5. Analysis of Results

In the following paragraphs the results after performing the econometric analysis using EVIEWS 7 software are presented. If the three tests hold, then the independent variables affect the dependent one.

Table 3: Regression Output for the Period 2005 - 2013

Variables	Coefficient	Std. Error	t - statistic	Prob.
C	0.112	0.014	8.215	0.000
Credit	0.022	0.024	2.945	0.021
NPL	0.091	0.021	4.423	0.000

Observations	36
R-squared	61%
Adjusted R – squared	58%
F – statistic	25.72
Prob. (F-statistic)	0.000

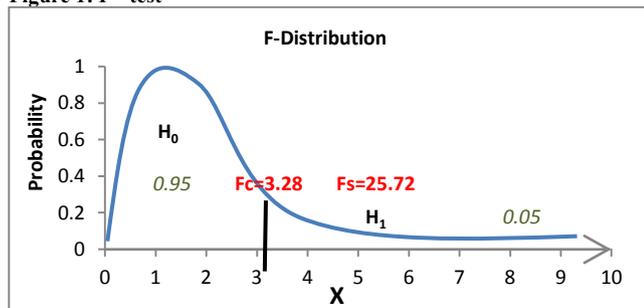
$$tc = t(\alpha/2, n - k) \quad (3)$$

$$tc = 2.348$$

The R^2 , stands between 0 and 100% and tells how close the observations are to the regression line, or it explains the percentage of the total variance that is explained by the independent variables. The regression appears to be quite strong with an R^2 around 61%, indicating that 61% of the variation of unemployment is explained by credit and non - performing loans. Since R^2 is above 60%, it can be concluded that the test is passable.

Fisher effect

Figure 1: F - test



CL= 95%

Hypothesis:

H0: $\beta_1 = \beta_2 = 0$ there is no relation

Ha: $\beta_1 \neq 0$ or $\beta_2 \neq 0$ there is a relation

The F-statistic from the table will be compared with F-critical (F_c) calculated below at 95% confidence level, thus $\alpha=0.05$:

$$F_c = F(\alpha, k - 1, n - k) \quad (2)$$

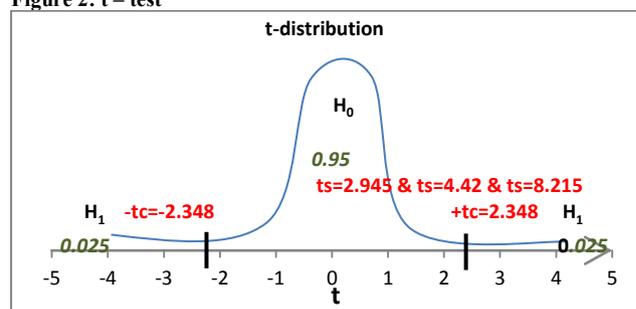
$$F_c = 3.285$$

Since F - statistic is higher than the F - critical the null hypothesis is rejected, suggesting that the independent variables affect our model.

t – Test

To test if the coefficients are statistically significant the t-test is used. The t-statistics from the table will be compared with t-critical (t_c) calculated below at 95% confidence level, thus $\alpha/2=0.025$:

Figure 2: t – test



As it can be observed from the graph, all the t – statistics from the table are not part of the H_0 , indicating a rejection of the null hypothesis, meaning that the estimated coefficients are statistically significant.

Summary:

1. R^2 ✓
2. Fisher ✓
3. t-student ✓

The intercept, is positive, $\beta_0=0.112$, suggesting an increase in the unemployment rate by 0.112 unit if $X_i=0$. The estimated coefficient, β_1 , is approximately 0.022, meaning that a percentage increase in the credit growth would result in an increase by 0.022% in the unemployment rate, keeping all the other variables constant. The estimated coefficient, β_2 , is equal to 0.091, meaning that a percentage increase in the non – performing loans would result in an increase by 0.091% in the unemployment rate, keeping all the variables constant. Both this variables have a positive impact on the unemployment rate.

6. Conclusions

The performance of financial intermediaries has always played an important role in the economic growth of all countries. The economic expansion over the transition in Albania has mostly been the outcome of shifting labor from low to higher productivity sectors and of the constructive transformation which brought jobs in services

and manufacturing whereas the part of agriculture declined. The fiscal and macroeconomic approaches followed in the last decade succeeded in settling the balance of payments, keeping up the economic growth and lowering inflation in Albania. The increase of demand – powered by the enlargement of sectors such as industry, construction, and services were the main accelerators of the general development. Up to 2008, the strong economic growth in the above sectors reduced poverty, but had a restricted influence on both the quality and the quantity of employment. Even Albanians' economy was not extremely affected by the financial crisis yet the impact came slowly. The decrease of exports, for instance, affected the GDP growth during this period of instability. Nevertheless, the government in association with the Bank of Albania took certain measures to control the situation of crisis. Consequently, the role of the Albanians' banking system was crucial in this cycle. In addition, the employment is considered as the key element of the well – being of a country. The major part of the unemployment during the transition is due to the failure of creating new jobs. This paper analyzes the relation among economic growth, financial development and unemployment rate, over the period 2005 -2013. To test this relation a regression is applied, indicating that the two independent variables such as credit growth and non – performing loans are statistically significant, therefore affecting our estimation model.

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Metabolite Profiling of *Gymnospermium Maloi* and *Gymnospermium Scipetarium* using NMR

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ABSTRACT

Gymnospermium maloi and *Gymnospermium scipetarium* are two endemic species located in the south region of Albania, respectively in Gjirokaster and Elbasan [1]. Most of the work done until now was directed to their botanical and biological characterization while little is known about the metabolic profile and chemical composition of these closely related species. The purpose of this study is to observe the chemical differences of these species from their spectra profiles and to evaluate their biological activity. The results obtained indicated that there is possible to differentiate these species further from their different spectra profiles. This study is focused on different classes of primary and secondary metabolites, including: amino acids, carbohydrates, and alkaloids.

Keywords: *NMR, PCA, Gymnospermium*

1. Introduction

The aim of our research work was to investigate the differences of chemical composition between two species of this plant which has toxic properties for animals by ingestion. In fact, *Gymnospermium maloi* and *Gymnospermium scipetarium* are two new endemic species located in the south region of Albania, respectively in Gjirokaster and Elbasan [1, 2]. From the botanic viewpoint, they are distinguished as two different species although little is known about their metabolite profile and chemical composition of these species.

Here we present some preliminary data of metabolite profiling for both species. To this purpose NMR spectroscopy was applied combined with chemometric techniques, these being robust and relatively fast techniques as regards metabolomic studies. The macroscopic view of metabolomes was obtained by ¹H NMR spectra of various crude extracts for different parts of the plants e.g. bulbs, stems and leaves. Samples were collected during April-May of the years 2014 and 2015. Multivariate statistical methods such as principal component analysis (PCA) applied to NMR spectra were used to compare sets of spectra identifying clusters of similarities and differences.

2. Results and Discussion

To compare the diversity between these two similar species we first analyzed single peaks for different regions of each spectrum. Even though crude extracts investigated with 1D NMR technique, exhibit very crowded peaks, some useful information could be gained. The high-field region from 0.8 to 3.5 ppm, belong to amino acids and acyl peaks of lipids. The mid to low-field region from 3.5 to 5.5 ppm showed peaks mainly due to carbohydrates. The low field region beyond 6.0 ppm contains mainly aromatic resonances. A single peaks investigation is a very difficult method to apply in these crowded spectra; for this reason, we moved to a more effective method called bucketing. Actually, the bucketing performs a data reduction by grouping spectral responses, not being strictly a method to align data. In the conventional most applied method, the spectra are divided into evenly spaced windows, named bins or buckets, whose width commonly ranges between 0.01 and 0.05 ppm. The intensities inside each bin are added up, so that the area under each spectral region is used instead of individual intensities.

Subsequently to better compare metabolite compositions and diversity between samples derived from both species

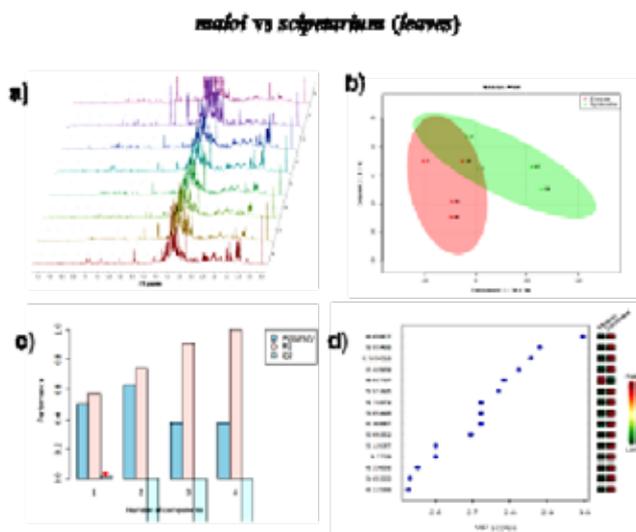
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(maloi and scipetarium) of *Gymnospermium*, Principal Component Analysis (PCA) and Partial Least Squares Discriminatory Analysis (PLS-DA) were performed using MetaboAnalyst v. 2.0, a web-based metabolomics data processing tool accepting a wide variety of input data such as NMR peak lists

<http://www.metaboanalyst.ca/MetaboAnalyst/>. PCA and PLS-DA are nowadays routinely used methods. PCA is an unsupervised pattern recognition method, in which all samples are grouped with the maximum separation of all samples based on the signals in the spectra representing the metabolomes. Chemical shifts for discriminating signals, most indicative in differentiating the samples, can be identified by so-called loading plots. PLS-DA is a supervised method that discriminates between groups of samples defined by the analyst. The most important information obtained from PLS-DA is the correlation between two data sets and the parameters as reported above, for instance, the measured ¹H NMR signals (metabolites) and the sample classification (group information). [3, 4]

Figure 1- Metabolites changes in leaves between *G. maloi* and *G. scipetarium* a) NMR spectra b) PLSDA 2D score plot c) cross validation d) Vp scores



PCA results (Figure 41-45) showed that different crude extracts exhibited different profiles depending on the part of the plant and different environment and geographic conditions. This study focused various classes of primary and secondary metabolites, including: aminoacids, carbohydrates, lipids, alkaloids and others minor compounds. These very interesting results make it possible to study in detail the differences in the plant metabolites' distribution in their different parts correlated with geographic origin and characteristics.

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New Design of Pantograph Based Copy-Evident Patterns

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ABSTRACT

A new method, for making official documents copy-evident, is presented. The design process is based on iterative algorithm that optimizes the distribution of bright and dark spots to be inserted in the original document. When photocopying or scanning the document, the word “void”, “invalid”, or “copy”, or a sign indicating that the document is not original, should appear. The iterative algorithm starts from a random or a deterministic distribution.

Keywords: *Pantograph, Security printing, Protection of documents*

1. Introduction

1.1. Context and related works

Documents may be scanned and photocopied to be used as original documents, which presents an illegal action. There is a real need to protect original documents from forgeries or fraudulent duplications. Prescriptions provided by doctors should not be duplicated. Pharmacists should be able to distinguish between original and copied prescriptions. There are two ways to make this distinction. The first consists in making profit from the imperfection of the photocopying machine or the scanner. The second way consists in making the original paper physically different from the paper on which the photocopy is performed. Several technologies have been proposed (Aronoff 2011, Hodgson 2013, Huang 2007, Ibrahim 2010, Kolyuchkin 2013, Solanki 2006, Thongkor 2011, Tang 2016, Yetisen 2016), including latent words, control numbers, void pantographs, scrub, gilding, special inks (for example: brighter metallic ink, blind ink, UV-reactive ink, iridescent ink, optically variable ink, Phosphorescent ink), holograms, reactive tags, RFID tags, dry stamps, pigments and fibers responding to the flash of the photocopier, optically variable brands (for example: Crystagram, Kinegram, Exelgram, Movigram, Pixelgram, Stereogram), tapes (for example: magnetic stripes, optically stripes), micro-line printing, and perforation (for example: needle perforation, laser perforation, micro-perforation).

One of the commonly used methods is the void pantograph. In addition to its efficiency, this method is expensive. Apantograph consists in a distribution of spots. These spots

do not present readable information. When photocopying or scanning pantographs, because of the low-pass filter behavior of the optical system of the photocopier or scanner, the suppressed high frequencies make the word “void”, “invalid”, or “copy” appear. In other words the higher frequencies generated the main features of word “void”, “invalid”, or “copy”. If they are suppressed the word become blurry and less intense.

However, recent developments in photocopying and scanning technologies present a serious challenge to this method (Rx-Security 2016). In fact, the imaging system of the photocopier is not behaving as a “low-pass filter” (Singleton 2016) anymore because the improved optical quality of the photocopiers and scanners. The words “void”, “invalid”, or “copy” do not appear anymore in the photocopy or scanned version.

Physically speaking, because of the finite size of optical components, sophisticated photocopiers and scanners are still behaving as low-pass filters. However, the cut-off frequency of the recent photocopiers and scanners is higher.

1.2. Structure

The remainder of the article is structured as follows. After describing the method, results are presented and discussed. Then a conclusion is given and followed by perspectives.

2. Method

We propose an iterative method for designing pantographs with variable cut-off frequencies f_c . We use the technique of constraint-degrees of freedom (Hamam 1994, Hamam

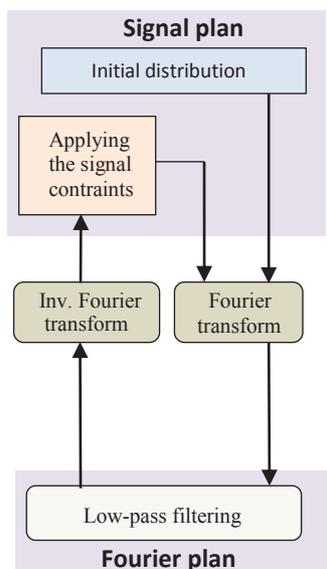
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2010a and b). The freedom degrees are the size of the word “copy”, or equivalent, and the way it is written. The first constraint is the fact that the word “copy”, or equivalent, should clearly appear in the photocopy or the scanned version of the paper containing the pantograph. The second constraint is that the pantograph does not contain any readable information. Therefore large dark or white areas are not allowed. This leads to the following quantitative constraints:

- It is not allowed that dark spots are distributed in a high density. I suggest at least one dark pixel for each 20 pixels in average.
- It is not allowed to have white areas. I suggest after a set of at most 30 white pixels comes one dark pixel.
- It is not allowed to have long sequences of dark spots. I suggest that after a set of 3 dark spots a white spot comes.
- The pantograph should be implementable on a paper in a 2D way (no 3D holograms). A binary pantograph (black and white) is easier to implement.
- Frequencies beyond f_c should be cut in the Fourier plane.
- By low-pass filtering the word “copy” or equivalent should be seen by the naked eye. A cost function should be formulated. This function should be minimized during the iteration process.

Figure 1: Gerchberg-Saxton based algorithm for designing pantographs.



The cost function is the uniformity of the word “copy” or equivalent.

The principle is illustrated by Figure 1. The initial distribution may be a random or a determined distribution. The Gerchberg-Saxton algorithm consists in Fourier

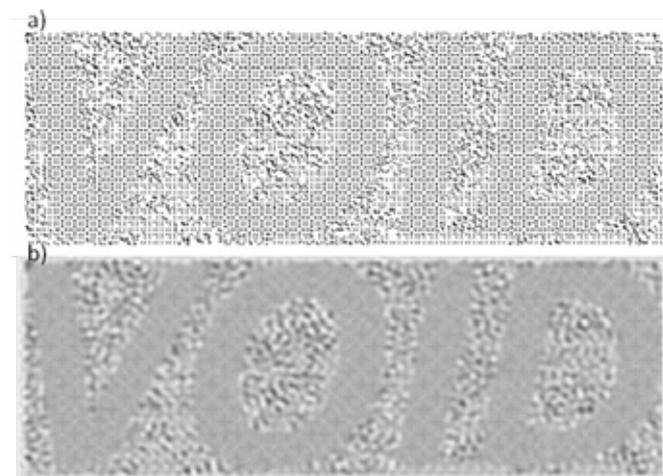
transforming the distribution back and forth and applying the constraints in each of the two planes: the signal plan and the Fourier plan. While the fifth constraint, mentioned above, is applied in the signal plan, all five remaining constraints are applied in the Fourier plan.

Let us call the image containing the pattern “copy” $h(x,y)$, and $g(x,y)$ the low-pass version of the pantograph. The cost function c is defined as follows:

$$c = \frac{1}{M} \int_{\text{pattern}} (h(x,y) - |g(x,y)|)^2 dx dy \quad (1)$$

Where M is the number of pixels over the pattern “copy”. Before calculating the cost function c , the function $h(x,y)$ should be normalized so that it contains the same amount of energy as the signal $h(x,y)$ over the pattern “copy”.

As an initial distribution, we considered a random distribution. This means that the convergence of the Algorithm is not rapid. To accelerate the convergence by starting from a deterministic rather than a random distribution.



3. Results

In our experiment we embedded the pantograph in an image of size $N \times N$ with $N=512$, and considered a cut-off frequency $f_c = \Delta u N/32, \Delta u N/16, \Delta u N/8, \Delta u 3N/16, \text{ and } \Delta u N/4$, where Δu is the sampling interval in the Fourier plan. It worth noting that if $f_c = N/2 \Delta u$, no frequency is cut. The results for a cut-off frequency $f_c = \Delta u N/4$ are given in 2,

where a) represents the pantograph and b) represents the low-pass filtered version.

Figure 2: a) The designed pantograph for a cut-off frequency $f_c = \Delta u N/4$, b) The expected photocopy or scanned version which corresponds to low-pass filtered of the pantograph.

Figure 2a is different from the initial distribution of Figure 2a since the pantograph spots are optimized through the iterative process of Figure 1.

In Figure 2b, the “void” pattern is very uniform since the cut-off frequency $f_c = \Delta u N/4$. However, if we take a lower cut-off frequency f_c ($\Delta u N/32$, $\Delta u N/16$, $\Delta u N/8$, and $\Delta u 3N/16$) the photocopy or scanned version is very blurred, because the low-pass filtering is very selective and most of the frequencies are filtered out.

4. Conclusion

A new method based on the Gerberg-Saxton algorithm for designing pantographs has been proposed. The Gerchberg-Saxton algorithm consists in Fourier transforming the distribution back and forth and applying the constraints in each of the two planes: the signal plan and the Fourier plan. The algorithm should minimize a cost function, which is in our case the uniformity of the pattern “copy” or equivalent. In a future work, we also intend to avoid having the algorithm trapped in a local minimum of the cost function. One of the avenue is to use the simulated annealing approach (He 2016).

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Transformational and Transactional Leadership and Financial Performance of Commercial Banks in Albania: A correlational study

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ABSTRACT

The relationship between various aspects of leadership as well as organizational performance has been extensively researched since it represents a field of fierce academic debate. Multifactor leadership theory developed by Bass (1985) has revolutionized the concept of leadership and inspired a plethora of academic and applied research with its multifaceted conceptual framework. We have built on this theory and employed the Multifactor Leadership Questionnaire (MLQ) to investigate the leadership traits of secondary banks' branch managers in Albania and the manner the leadership behavior relates to the financial performance of the organizations. The linkages between leadership patterns and banking institutions performance has not been researched to a satisfactory extent in our country. We have employed quantitative methods to gather data and utilized SPSS to analyze the tacit aspects of expected correlations between transformational and transactional leadership traits of branch managers and their institutional financial performance as measured by (Return on Equity) ROE. Our study's findings have shown the existence of strong and statistically significant correlations between the dimensions of transformational and transactional leadership behavior found among the middle level managers and their organizations' financial performance. The direction of this proven relationship is also very consistent with the peer research: transformational leadership traits are positively correlated with the ROE scores of a secondary bank, while the transactional and laissez faire leadership traits are negatively correlated to the financial performance of the targeted organizations.

Keywords: *transformational leadership, transactional leadership, financial performance, commercial bank*

1. Theoretical Framework: Transformational and Transactional Leadership

The cut in edge paradigm of approach to leadership is the Multifactor Leadership Theory, which is built upon of transformational, transactional and non-leadership trinity of leadership introduced by Burns (1978) in his seminal work and advanced by Bass and Avolio (1990, 1995, 2000), who developed and validated the Multifactor Leadership Questionnaire (MLQ) (Avolio & Bass, 2004). The academicians, researchers and leadership practitioners use this instrument to measure the transformational, transactional and non-leadership scales in a multitude of areas of research interest. Hundreds of research projects have emerged out of this data collection instrument all over

the world, covering various industries from hospitals (Baysak & Yener, 2015) to banking (Bushra et al, 2011).

The research has been conducted adopting a theoretical construct that shows the existence of a connection among the transformational and transactional leadership styles and one of the most frequent financial performance indicators, namely the return on equity (ROE). The researcher has intended to investigate the existence of a probable correlation between the leader's behavior and improvements/weakening in the values of ROE ratio across the commercial banks in the Albanian market.

In total, four transformational and three transactional leadership traits have been investigated as independent variables of the conceptual model (Burns, 1978). Idealized Influence (II) is a feeling of trust and confidence implanted on followers through a charismatic process of positively influencing and building emotional ties to the leader (Bass,

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1990). The employees share a sense of mission and commitment to the values identified and inculcated by the leader. Inspirational Motivation (IM) is a follower's psychological state of being motivated thanks to an articulation of the vision, mission and the future with a positive attitude (Avolio & Bass, 2002). Intellectual Stimulation (IS) is having the leader encouraging his subordinates to approach the existing procedures in from new angles, boosting innovation and promoting employment of intellect (Bass & Avolio 1995). Individualized Consideration (IC) is paying exclusive attention to each and every individual and granting them the feeling of being valued by transferring competences as opportunities for self-development (Geyer & Steyrer, 1998).

Three other scales were classified as transactional leadership items. Contingent Reward (CR) is the remuneration for adequate performance or using punishment to correct the inadequacy of follower's performance (Bass, 1990). Management by Exception (ME) is the exceptive intervention of the leader in the cases the followers fail to obey the predetermined standard procedures and allowing them to move ahead with carrying out their tasks as long as performance goals are accomplished (Avolio, Bass & Jung, 1999). The last scale is Laissez Faire leadership pattern. It is the total lack of leadership and is actually a non-transactional leadership trait (Geyer & Steyrer, 1988). However, it has been operationalized under the transactional leadership style for the researcher's convenience in measuring the behavior of transactional and transformational leadership styles related to the financial performance of a commercial bank.

2. Methodology

The aim of this quantitative research has been to investigate the nature of relationships between the leadership characteristics of commercial banks' branch managers (independent variables) and the financial performance of respective banks measured by return on equity (ROE) (dependent variable). We might be able to conclude that there is a positive/negative relationship between transactional, transformational and laissez faire leadership patterns of middle-level managers and financial performance indicators, only where statistically significant correlation coefficients were found.

Global financial and economic crisis since 2008 has been unavoidably influencing the financial and managerial performance of the commercial banks operating within the Albanian markets. Their structure of capital and financing portfolio, as well as the financial health of prominent clients are generally perceived as the exclusive factors determining their financial performance. The studies that employ scientific methods of evaluating the impact of uncommon predictors of financial performance, such as leadership style, may be useful to demonstrate the

significance of a multidisciplinary approach towards measuring the full range of performance influencers.

From a social sciences practical-turn point of view (Bourdieu, 1990), leadership is perceived as emerging in social interactions and the conventional notions of leadership are reshaped through the social practices (Crevani et al, 2009) within the organizational life. Therefore, our study assumes that quantitative studies of leadership should adopt a process ontology, which views the leadership practices as produced out of social interactions. We draw upon the seminal work of Carrol et al (2008) to examine the leaderful activity in nitty-gritty everyday activity of leadership, carried out in each and every organizational level through moral, emotional, and relational aspects of social practices involved. Leadership-as-practice (L-A-P) is more engaged with questions how, where, and why leaderful job is being carried out and completed rather than with who is the naturally predetermined leader who offers the sublime vision for subordinates to comply with (Raelin, 2011).

The current study's sample consisted of 55 questionnaires dispatched to branch managers working with 5 different Albanian banks in the district of Tirana. A google-form link of our questionnaire was sent to each branch manager and anonymous handling of the responses was guaranteed. 49 out of 55 targeted prospects filled the online questionnaire out, comprising up to 90% of rate of response. Only employees with leadership responsibility were targeted and any response originating from non-leadership staff was dropped out.

The current study has employed 21 items from MLQ (5x-short form), a validated instrument comprised of 45 (Avolio & Bass, 2004) items that measure self-perceived transformational, transactional and laissez faire leadership traits of commercial banks branch managers. This instrument is designed to measure idealized influence (q1, q8, q15), inspirational motivation (q2, q9, q16), intellectual stimulation (q3, q10, q17), individualized consideration (q4, q11, q18), contingent reward (q5, q12, q19), management by exception (q6, q13, q20) and laissez faire (q7, q14, q21) leadership traits as perceived by the middle managers themselves.

A Likert-scale ranging from (0) – not at all to (4) – frequently, if not always was adopted to obtain the perceptions of the targeted respondents. Additional demographic questions were added to the instrument to allow the researcher for correlation analysis between the MLQ results and financial performance of banking institutions. The financial performance indicators, namely ROE for the years 2015 and 2016, were obtained from the commercial banks audited financial statements as part of their annual reports. The instrument was calibrated to capture the existence of statistically significant correlations between transformational, transactional and laissez faire leadership styles of branch managers and financial performance of commercial banks in Albania.

Table 1 - Individualized Considerations – ROE correlation

Leadership constructs	ROE 2015		Column B (t)	
	r	P	r	P
IC1 - I help others develop themselves.	.764**	.000	.848**	.000
IC2 - I let others know how I think they are doing.	.693**	.000	.774**	.000
IC3 - I give personal attention to others who seem rejected.	.631**	.000	.935**	.000

The results reflect quite strong and statistically significant correlation between the financial performance of commercial banks in Albania and their branch managers' individualized considerations leadership patterns scores, $r(49) = .631$ to $r(49) = .935$, $p = .000$. Therefore, the null hypothesis for the lack of correlation between the independent and dependent variables is rejected, and alternative hypothesis is accepted. Pearson's correlation coefficients show that the correlation between the financial performance and individualized consideration leadership traits is positive.

Table 2 - Contingent Reward – ROE correlation

Leadership constructs	ROE 2015		Column B (t)	
	r	P	r	P
CR1 - I tell others what to do if they want to be rewarded for their work.	-.577**	.000	-.687**	.000
CR2 - I provide recognition/rewards when others reach their goals.	-.525**	.000	-.692**	.000
CR3 - I call attention to what others can get for what they accomplish.	-.545**	.000	-.815**	.000

The results analyzed on SPSS show that there exists a significant negative correlation between the financial results of the commercial banks and their branch managers contingent reward leadership traits, $r(49) = -.815$ to $r(49) = .525$, $p = .000$. The Pearson's correlation coefficients are significant at a 99% interval of confidence. Subsequently, we reject the null hypothesis and accept the alternative hypothesis.

Table 3 - Management by exception – ROE correlation

Leadership constructs	ROE 2015	Column B (t)
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	r	P	r	P
ME1 - I am satisfied when others meet agree-dupon standards.	-.741**	.000	-.724**	.000
ME2 - As long as things are working, I do not try to change anything.	-.562**	.000	-.844**	.000
ME3 - I tell others the standards they have to know to carry out their work.	-.517**	.000	-.661**	.000

Based on the above results, there exists a significant negative correlation between the financial performance of a commercial banks in Albania and their branch managers management by exception leadership behavior scores, $r(49) = -.844$ to $r(49) = .517$, $p = .000$. The correlation coefficients are significant at a very wide confidence interval, namely 99%. As a result, we reject the null hypothesis and accept the alternative hypothesis.

Table 4 - Laissez faire – ROE correlation

Leadership constructs	ROE 2015		Column B (t)	
	r	P	r	P
LF1 - I am content to let others continue working in the same way as always.	-.658**	.000	-.920**	.000
LF2 - Whatever others want to do is O.K. with me.	-.712**	.000	-.847**	.000
LF3 - I ask no more of others than what is absolutely essential.	-.668**	.000	-.770**	.000

The results analyzed on SPSS show that there exists a strong and significant negative correlation between the financial results of the commercial banks and their branch managers laissez faire leadership traits, $r(49) = -.920$ to $r(49) = .658$, $p = .000$. The Pearson's correlation coefficients are significant at a 99% interval of confidence. Therefore, we reject the null hypothesis and accept the alternative hypothesis.

In a summary, the researcher was able to assess the purpose of this study, 7 research questions and 14 hypotheses, by means of SPSS and other statistical methods and techniques, descriptive data analysis for all the dimensions of MLQ scores. Finally, the researcher was able to assess the existence of any correlation between the leadership traits of commercial banks' branch managers and the respective financial performance through the Pearson's correlation coefficients and accept/reject the hypotheses under study. 21 items from the MLQ (5x Short Form) were selected to tap the behavior of different leadership traits across the 5 scales of respondents' self-perception or self-confidence.

The correlational assessment proved the existence of strong and statistically significant correlation between all the MLQ items and the financial performance of the banks

measured by the ROE indicator. All the Pearson's correlation coefficients were found statistically significant ($p < .05$, or $p < .01$) as shown in Table 34. The majority of the Pearson's correlation coefficients were far higher than the threshold value of .70, ensuring for strong correlation between the leadership traits of targeted branch managers and their banks' financial performance.

As the correlation results proved statistically significant correlation between all the leadership traits and ROE values for the years 2015 and 2016, all the null hypotheses were rejected and all the alternative hypotheses from H1a to H7a were accepted. It was concluded that strong and statistically significant correlation exists between leadership and ROE. The sample size has been adequate and the instrument has been deemed reliable and valid to properly investigate the intended phenomena.

3. Data Results Analysis

Our study's findings support our hypothesis H1a to H7a on the existence of a correlation between the leadership styles, be it transformational, transactional or laissez faire leadership traits, of branch managers and their banks' financial performance measured by ROE. As it is indicated by the results presented in Chapter IV, transformational leadership had a statistically significant strong positive correlation with the trend of financial results accomplished by the banks, whereas transactional and laissez faire leadership traits showed statistically significant strong negative correlation with the financial health of the banks represented by the ROE.

Our findings are consistent with the conclusions of Geyery et al (1998) who found transformational leadership strongly affected the overall performance of a bank, outperforming the transactional leadership style. Contrary to his findings, we found that transactional and laissez faire leadership had a negative influence on the financial performance of a banking institution. The current study's conclusions are also consistent with those of Cherian & Farouq's (2013) study of the predictive power of the effective leadership styles on the financial performance of the banking sector in UAE. Similar results about the transformational leadership's explanation power of job satisfaction and organizational commitment were achieved from Bushra et al (2011) in their study of the banking institutions in the Lahore district of Pakistan. They concluded that transformational leadership positively influenced the job and organizational performance indicators.

Our model's prediction ability of ROE 2016 of a bank was shown strong based on the linear regression procedure conducted on SPSS ($R^2 = .982$, $p = .002$). Strong and statistically significant was the predicting power of our model even in the case of ROE 2016, with moderately weaker indicators ($R^2 = .720$, $p = .000$). These values indicate that 98.2% of the variability in the financial

performance of a bank in 2016 is explained by the leadership style adopted and applied by the branch managers, while it has only a 72% prediction power on the variations in the financial performance of a banking institution in 2015.

Transformational leader are more prone to manage branches of the banks that score high values of REO in comparison to banks reporting more consistent patterns of transactional and laissez faire leadership among their middle level managers. Banks are highly structured organizations with strictly defined standard operations and risk management procedures, and financial performance is absolutely determining their future course of business. On the other hand, leadership is not a tightly regulated activity and mostly depends on the personality and knowledge of the individual leaders. Thus, the positive contribution of the transformational leadership traits on the financial health of a bank is welcomed in a financial institution amid the financial and economic crisis the world is going through. On the other hand, transactional and laissez faire leadership patterns of branch managers are obviously associated with weakly performing banks, what makes it a non-desired quality in a bank manager.

Our ANOVA procedure conducted through SPSS intended to test the null hypotheses that the multifactor leadership theory (Avolio & Bass, 2004) model did not produce any significant effect on the financial performance of the commercial banks in Albania. Statistically put, it means that all the β values, which are the regression model's coefficients, are equal to 0. Our alternative hypotheses stated that at least one of the β values were different from 0, without indicating which of these coefficients is different from zero. According to the ANOVA results, the null hypotheses were rejected, and the alternative hypotheses that there exists at least one β value that differs from 0, proving the model's explanatory power of ROE 2015, ($F(11, 37) = 12.021$, $p = .000$) and ROE 2016 ($F(15, 33) = 172.941$, $p = .000$), were accepted.

Our first assumption that both transformational and transactional leadership of the branch managers was correlated to the financial performance of the banking institutions in Albania is based on Bass and Avolio's (1994) conceptual model that assigns transactional leadership dimension a contractual feature on which the emotional feature of transformational leadership is built. The data results of our study do not prove this operationalization of MLT (Bass & Avolio, 2004). The transactional leadership style produces a negative effect on the financial performance, with only the transformational leadership behavior positively informing the dependent variable.

To test the hypothesis no. 1, that there exists a correlation between the idealized influence of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance

of the targeted banks. We found that idealized influence positively and statistically significantly correlated to ROE 2015 ($r = .631, p < .01$) and ROE 2016 ($r = .846, p < .01$). In both cases variations in the idealized influence of the branch manager are indications that variations are happening in the financial performance of the bank as well. The Levene statistic was significant for ROE 2015 ($p = .040$) and ROE 2016 ($p = .000$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(11, 37) = 16.276, p = .000$ and ROE 2016, $F(11, 37) = 29.296, p = .000$. Therefore the null hypothesis H10 that there exists no correlation between idealized influence of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H1a was accepted.

To test the hypothesis no. 2, that there exists a correlation between the inspirational motivation of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. We found that inspirational motivation was positively and statistically significantly correlated to ROE 2015 ($r = .773, p < .01$) and ROE 2016 ($r = .869, p < .01$). In both cases variations in the inspirational motivation of the branch manager are indications that variations are happening in the financial performance of the bank as well. The Levene statistic was significant for ROE 2015 ($p = .000$) and ROE 2016 ($p = .014$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(12, 36) = 16.105, p = .000$ and ROE 2016, $F(12, 36) = 26.674, p = .000$. Therefore the null hypothesis H20 that there exists no correlation between inspirational motivation of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H2a was accepted.

To test the hypothesis no. 3, that there exists a correlation between the intellectual stimulation of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. We found that intellectual stimulation was positively and statistically significantly correlated to ROE 2015 ($r = .829, p < .01$) and ROE 2016 ($r = .811, p < .01$). In both cases variations in the intellectual stimulation of the branch manager are indications that variations are happening in the financial performance of the bank as well. The Levene statistic was significant for ROE 2015 ($p = .000$) and ROE 2016 ($p = .035$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(11, 37) = 14.834, p = .000$ and ROE 2016, $F(11, 37) = 32.090, p = .000$. Therefore the null hypothesis H30 that there exists no correlation between idealized influence of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H3a was accepted.

To test the hypothesis no. 4, that there exists a correlation between the individualized considerations of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this

item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. We found that individualized considerations was positively and statistically significantly correlated to ROE 2015 ($r = .718, p < .01$) and ROE 2016 ($r = .874, p < .01$). In both cases variations in the individualized considerations of the branch manager are indications that variations are happening in the financial performance of the bank as well. The Levene statistic was significant for ROE 2015 ($p = .000$) and ROE 2016 ($p = .000$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(8, 40) = 8.275, p = .000$ and ROE 2016, $F(8, 40) = 48.733, p = .000$. Therefore the null hypothesis H40 that there exists no correlation between individualized considerations of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H4a was accepted.

To test the hypothesis no. 5, that there exists a correlation between the contingent rewards of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. We found that contingent rewards was negatively and statistically significantly correlated to ROE 2015 ($r = -.579, p < .01$) and ROE 2016 ($r = -.791, p < .01$). In both cases variations in the contingent rewards of the branch manager are indications that variations are happening in the financial performance of the bank on the opposite direction. The Levene statistic was significant for ROE 2015 ($p = .000$) and non-significant for ROE 2016 ($p = .051$) slightly scoring over the confidence level of alpha, while the ANOVA test results showed statistically significant values for ROE 2015, $F(10, 38) = 7.875, p = .000$ and ROE 2016, $F(10, 38) = 20.192, p = .000$. Therefore the null hypothesis H50 that there exists no correlation between contingent rewards of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H5a was accepted.

To test the hypothesis no. 6, that there exists a correlation between the management by exception leadership pattern of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. It was found that management by exception was negatively and statistically significantly correlated to ROE 2015 ($r = -.629, p < .01$) and ROE 2016 ($r = -.917, p < .01$). In both cases variations in the management by exception of the branch manager are indications that variations are happening in the financial performance of the bank on the opposite direction. The Levene statistic was significant for ROE 2015 ($p = .000$) and for ROE 2016 ($p = .000$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(13, 35) = 5.685, p = .000$ and ROE 2016, $F(13, 35) = 30.024, p = .000$. Therefore the null hypothesis H60 that there exists no correlation between management by exception leadership trait of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H6a was accepted.

To test the hypothesis no. 7, that there exists a correlation between the *laissez faire* leadership style of the branch manager and the financial performance of a banking institution, we calculated on SPSS the correlation of this item with ROE 2015 and ROE 2016, as indicators of financial performance of the targeted banks. It was found that *laissez faire* was negatively and statistically significantly correlated to ROE 2015 ($r = -.631, p < .01$) and ROE 2016 ($r = -.883, p < .01$). In both cases variations in the *laissez faire* leadership behavior of the branch manager are indications that variations are happening in the financial performance of the bank on the opposite direction. The Levene statistic was significant for ROE 2015 ($p = .000$) and for ROE 2016 ($p = .000$), while the ANOVA test results showed statistically significant values for ROE 2015, $F(12, 36) = 7.566, p = .000$ and ROE 2016, $F(12, 36) = 52.222, p = .000$. Therefore the null hypothesis H70 that there exists no correlation between *laissez faire* leadership behavior of a branch manager and financial performance of a bank was rejected and finally the alternative hypothesis H7a was accepted.

4. Conclusions

The leadership's style's explanatory power of variations in different aspects of financial institutions performance has appealed researchers of organization studies to extensively investigate it and come to very significant conclusions in the framework of management and leadership theory. From leadership theoreticians (Selznick, 1957; Burns, 1978; Bass, 1985, 1990; Avoglio & Bass, 1990, 1994, 2002, 2004; Jacobs, 1970; Avolio, Bass & Jung, 1999; Judge & Piccolo, 2004) to academicians (Basak & Yener, 2015; Bushra et al, 2011; Cherian & Farouq, 2013; Geyery et al, 1998; Hargis, 2011; Pielstick, 1998) and further to the PhD students (Witts, 2016; Cole, 2007) Multifactor Leadership Theory and its widely accepted instrument, Multifactor Leadership Questionnaire have been researched and validated in almost every sector of business and organizational life across the world. Qualitative and quantitative methods have been successfully employed and mixed serve the scientific interest of the academicians and leadership practitioners.

Banking industry has proven to be one of the most researched sectors with studies covering the correlation or the predictive power of leadership on a variety of aspects of performance. Performance itself has experienced a revolutionarization, as performance theoreticians have struggled to escape a monolithic approach of measuring it exclusively based on financial performance indicators (Eccless, 1991) towards a multifaceted definition of performance that covers dimensions such as market share, quality service, job satisfaction, organizational commitment, employee motivation, employee attitudes, productivity, public responsibility, and organizational

objectives accomplishment. Focusing on return on investment or earning per share as sufficient measures of organizational success can mislead the senior executives, because the "what you measure, is what you get" (Kaplan & Norton, 1992). The business, nowadays, is eager to know not only what is accomplished, but also the way it has been accomplished. Comprehensive instruments such as Balance Scorecard (Kaplan & Norton, 1992) have been proposed as more accurate measures of organizational performance.

Nevertheless, behavioral research has persistently added value to the understanding of the linkages between leadership and firm's performance through quantitative methods. The most influential theory of leadership in the nowadays academia is the Multifactor Leadership Theory, proposed by Bass (1985, 1990) and further developed by several authors such as Avoglio & Bass (1990, 1994, 2002, 2004), Avolio, Bass & Jung (1999), Judge & Piccolo (2004) etc. The MLT's conceptual model and its data collection instrument has been continuously tested for reliability and validity through quantitative (Antonakis et al, 2003; Avolio & Bass, 2004; Judge & Piccolo, 2004) and qualitative methods (Pielstick, 1998). Therefore, the theoretical framework and the data collection questionnaire have been certified for academic and applied research across various business contexts.

Existing research in transformational and transactional leadership and its relation with aspects of business performance in the Albanian banking industry has given priority to the aspects of job satisfaction, employee performance and motivation and organizational commitment (Xhakolli, 2011). Others have studied these relations putting leadership within the wider context of organizational culture (Çapuni, 2016). Correlations between leadership style of top- or middle-level management and financial performance of the banks have not been investigated in the domestic contexts. Research conducted abroad by international academicians and leadership practitioners has shed some light on context-related facets of this correlation (Cole, 2007; Bushra et al, 2011; Cherian & Farouq, 2013).

In our study, we have drawn upon the works of Bass (1985; 1990), Avolio & Bass (1990; 1994; 2002), Avolio, Bass & Jung (1999) and Judge & Piccolo (2004) to design and conduct a survey that works in a strictly regulated setting such as that of secondary banking sector in Albania. Employing the 21 items from the MLQ (5x Short Form) developed by Avolio & Bass (1990), we collected branch managers' self-perceptions of their leadership behavior as keeping with their subordinates and teams throughout 5 secondary banks in Albania. The data were analyzed on SPSS, what helped the researcher check for the existence of statistically significant correlation between transformational and transactional leadership, and financial performance of commercial banks in Albania.

The study found that there exists strong and statistically significant correlation among transformational, transactional and laissez faire leadership traits of secondary banks' branch managers and the respective banks financial performance measured by ROE 2015 and ROE 2016. While the transformational leadership dimensions, i.e. idealized influence, inspirational motivation, intellectual stimulation and individualized consideration reflected strong significant positive correlation with the financial health of banking institutions, dimensions of transactional leadership, i.e. contingent reward and management by exception, and laissez faire leadership traits of the respondents showed strong significant negative correlation. This said, secondary banks whose branch managers self-perceived they entered with their teams and subordinates in relations based on transformational leadership style, showed a strong tendency to score higher ROE values. On the other hand, banks whose branch managers expressed the confidence they apply the transformational leadership style when dealing with their teams and personnel showed a strong tendency towards lower ROE ratio. This study's sample size was adequate to sufficiently tap the perceptions of branch managers in respect of the correlation between the leadership traits and financial performance of the bank. Small samples have shown inability to detect weak correlations between leadership styles and financial performance of banking institutions (Cole, 2007). Our seven alternative hypotheses were accepted based on our ANOVA procedures conducted on SPSS, while the strength and statistical significance of the expected correlations were checked through linear regression and correlation tests. All the tests' results, as shown in Chapters IV and V proved our alternative hypotheses that there exists a statistically significant relation between the MLT dimensions and financial performance of a secondary bank in Albania.

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